Biodiversity Enhancement Assessment

North Claines Parish Council - Bull Meadow - update

Summary	
Project code	111
Applicant	North Claines Parish Council
Site location	Fernhill Heath - Bull Meadow - SO875594
Date	September 2021
Natural Networks Officer	Sean Webber
Site context and existing biodiversity	Bull Meadow is a c.5.5 ha ex-arable field which is proposed as a new public park. The landscape around the site is predominately arable or pasture farmland and residential development, along with some scattered deciduous woodland and riparian habitats. The site contains amenity grassland, hedges, and scattered trees. The Martin Brook and its adjacent woodland create a habitat corridor along the northern edge of Bull Meadow. Bull Meadow itself is a large open, amenity grassland field with some marginal areas of ruderal vegetation and dense scrub, and mixed boundaries of mature hedges, gappy remnant hedges, and woodland edge. There is a proposal to create a new wetland area and new pedestrian entrance into the site to improve habitat for wildlife and access for the public.
Biodiversity enhancements	**1. Wetland creation, 2. Grassland enhancement, 3. Hedge creation and restoration, 4. Woodland, coppice, shrub, herb, and bulb planting, 5. Traditional orchard/fruit tree planting, 6. Habitat features: hibernacula, habitat piles, bee banks, 7. Wildlife boxes, 8. Public access improvements - including new pedestrian entrance**
Target enhancement area	**Up to 5.5 ha. The whole site is awaiting planning permission for change of use. Additional planning permission is being sort for the creation of a new wetland and pedestrian entrance (c. 0.57 ha).**

1. Natural Networks

The Natural Networks programme is a European Regional Development Fund (ERDF) funded partnership between Worcestershire Wildlife Trust and Worcestershire County Council. The programme aims to support biodiversity and enhance wildlife habitats by offering advice and grants.

Purpose of this report

Update - This report is an updated version of the original BEA which covered multiple sites across Fernhill Heath. The update focuses on Bull Meadow and the two areas within it which are being submitted for planning permission to create a new wetland area (centred: SO87565948, red line boundary covering 0.49 ha) and a new pedestrian entrance (centred: SO87385933, red line boundary covering 0.08 ha).

This report uses information gathered from the site manager, a desk study, and field surveys conducted in March and September 2021. It aims to describe the ecological context and status of the sites and to recommend biodiversity enhancement measures and wildlife-friendly management practices. 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 Regulations, we will not be undertaking the role of 'Principal Designer' and our recommendations are advisory only.

A comprehensive ecological assessment of a site can only be made through repeated visits to the site covering multiple seasons. Consequently, this assessment can only be considered to provide a 'snapshot' of the ecological interest of the sites. The survey was conducted outside of the optimum biodiversity surveying season.

2. Site context

Site and project context

North Claines Parish Council manage several public green spaces in and around the village of Fernhill Heath: Bull Meadow lies on the eastern edge of the village, to the immediate north of Droitwich Road (A38). Bull Meadow was recently acquired by the parish council for the purpose of creating a public park. There is the potential to create a large, biodiverse public park here which would be beneficial to wildlife and humans alike. As well as the village of Fernhill Heath, Bull Meadow is within walking distance of the Police Headquarters at Hindlip Hall, a significant employer for the area. Historically the site has been managed as an arable and pasture field. Following purchase by the Parish Council it was sown with an amenity grassland mixture and most of the area is regularly mown.

Landscape context

The village of Fernhill Heath is in a landscape of arable and pasture farmland with a loose hedge network and occasional linear woodlands alongside roads, railways, and watercourses. Much of the land around the sites has been developed into residential areas with gardens. There are additional areas of modified grassland in the form of golf courses and playing fields.

Important areas of wildlife habitat nearby including scattered small traditional orchards, parcels of parkland around Hindlip Hall, and a small number of good quality semi-improved grassland fields, including Kennels Lane Meadow Local Wildlife Site (LWS) which consists of unimproved species-rich neutral grassland. Lower Smite Farm is also nearby, this site is a Worcestershire Wildlife Trust Nature Reserve with a variety of valuable habitats including grassland, hedges, wetlands, and a traditional orchard. There are also several important wetland habitats in the local landscape. These include the River Salwarpe LWS, Worcester and Birmingham Canal LWS, Hindlip Lake LWS, and Offerton Wetlands Local Nature Reserve (LNR). Other ponds can be found just to the south of Bull Meadow on the opposite side of Droitwich Road, around Hindlip Hall, and at Lower Smite Farm.

The Martin Brook runs to the immediate north of Bull Meadow. The brook has a corridor of woodland, primarily semi-natural woodland in the western half and mixed plantation woodland in the eastern half. The brook and its adjoining woodland form a habitat corridor which connects to the River Salwarpe LWS and the Droitwich Canal, which in turn connect to the River Severn LWS.

According to the Soilscapes map (http://www.landis.org.uk/soilscapes/) the soils in the area are freely draining slightly acid loamy soils. Habitats which can be found in areas with this soil type include neutral and acid pastures and deciduous woodland.

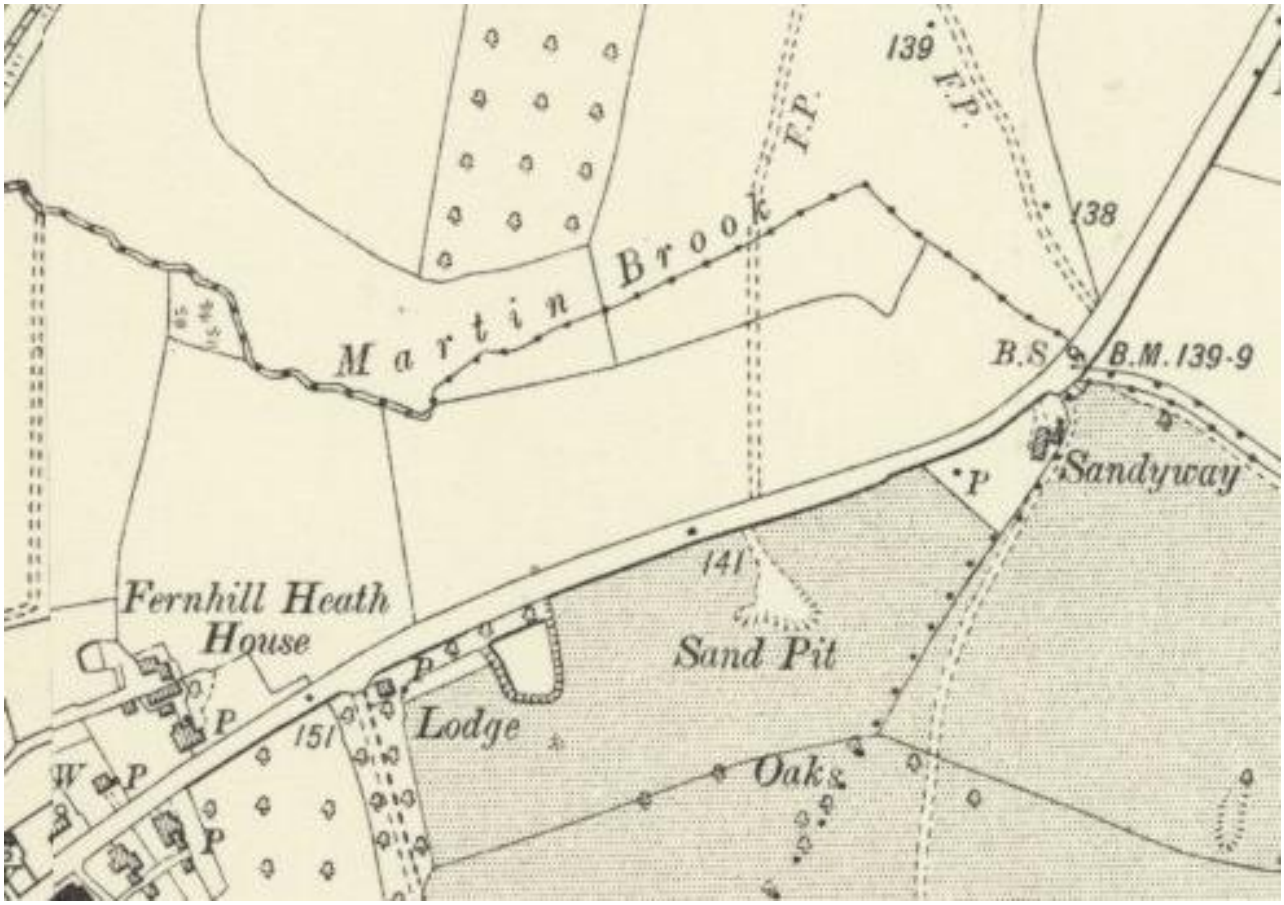
The project site lies within the Mid-Worcestershire Corridor Ecological Character Area (ECA) in the Worcestershire Green Infrastructure Strategy. The landscape and biodiversity priorities identified for this ECA include:

- *Restore and enhance neutral grasslands, orchards and semi-natural ancient woodland, wet woodland and stream corridors.*
- *Enhance and create traditional field boundaries.*
- *Seek opportunities to enhance and restore the ancient woodland cover*
- *Seek opportunities to enhance the composition and pattern of hedgerows through management and replanting*
- *Seek opportunities to protect and create areas of permanent pasture*

Notable species records

Notable species records from within 1 km of the site boundary were obtained from the Worcestershire Biological Records Centre. A full list is given in Appendix 1.

Plant records inlcude blue fleabane, hornbeam, greater burnet-saxifrage, prickly sedge, stinking hellebore, wild thyme, sea club-rush, reflexed saltmarsh-grass, and yellow loosestrife. Amphibian and reptile records inlcude common frog, great crested newt (a Biodiversity Action Plan species), smooth newt, grass snake, and slow worm. Bird records inlcude fieldfare, redwing, cuckoo, kingfisher, merlin, hobby, house sparrow, starling, and barn owl. Mammal records inlcude brown hare, hedgehog and at least 8 species of bat (brown long-eared, common pipistrelle, lesser horseshoe, Natterer's, noctule, serotine, soprano pipistrelle, and whiskered).



An Ordnance Survey map of Bull Meadow from 1883-1913 (from https://maps.nls.uk/). Note the wet woodland/marsh area along the Martin Brook and the traditional orchard to the north of the brook and south of Fernhill Heath House.

Aerial views of Bull Meadow from c.1945 and c.2020. Note the loss the hedgerow through the centre of the site, the loss of traditonal orchards to the north and south west, and the increase of planted woodland cover along the Martin Brook.

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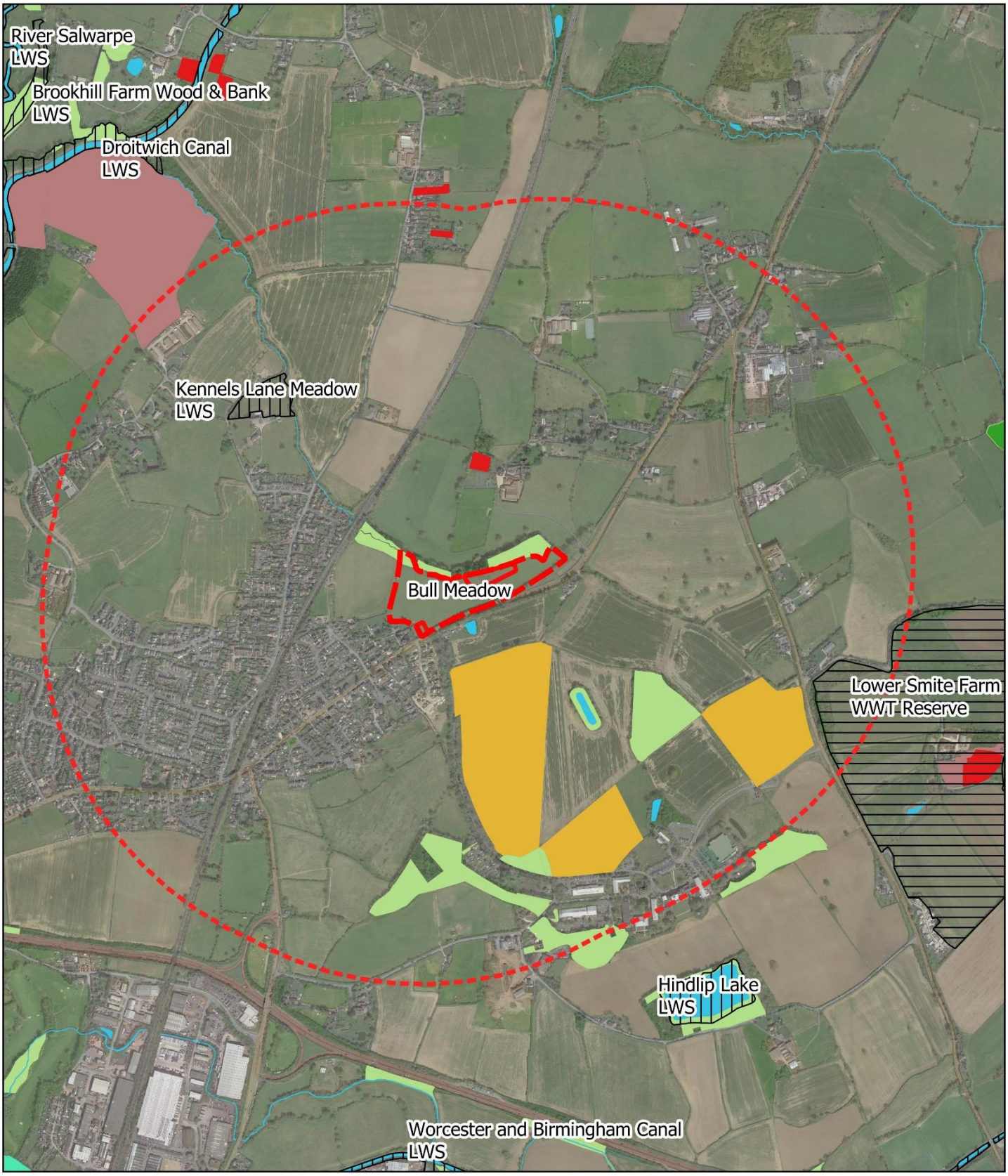
Bull Meadow Designated Sites and Priority Habitats Map



Local Wildlife Site
WWT Reserve
Surface water
Ancient Semi-Natural Woodland
Deciduous woodland
Traditional orchard
Good quality semi-improved grassland
Mixed habitat
Wood Pasture and Parkland

N

1:15,000

0 250 500 m

3. Existing Habitats and Biodiversity

Bull Meadow covers approximately 5.53 ha. The vast majority of this area is modified amenity grassland which was sown approximately two years ago following the end of arable agriculture in the field. The sward has a very low proportion of wildflowers and is of relatively little value for wildlife. The amenity grassland sward consists of common, coarse grasses including perennial ryegrass, meadow grasses, and some Yorkshire fog, as well as white clover, greater plantain, and dandelion.

The species-poor modified grassland of Bull Meadow with the proposed wetland area and Martin Brook woodland corridor in the background. (09/2021)

Proposed wetland area

Margins of scrub and ruderal vegetation have developed along the northern edge of the site, along the edge of the Martin Brook woodland corridor. These areas have not been regularly mown or recently reseeded, in part because the ground here is wetter and there are some deep tractor wheel ruts. The proposed wetland creation area is at the widest point of this margin. The vegetation here is dominated by rosebay willowherb and creeping thistle, along with cocksfoot, false oatgrass, timothy, bramble, stinging nettle, and occasional broadleaved dock, scattered common elm saplings, and clusters of pussy willow saplings. Other, less abundant, species include ragwort, male fern, bittersweet, hairy sedge, figwort, ribwort plantain, meadow vetchling, and ash saplings. There is a single young oak tree (c. 10 years) within the red-line boundary of the proposed wetland creation site. There are two mature oaks in the woodland adjacent to the wetland creation area - these are outside of the site boundary. The area is likely to support a range of invertebrates and there is limited potential for slow worms, amphibians, and nesting birds.

In other parts of the margins along the Martin Brook corridor, outside of the proposed wetland creation area, there are some patches of blackthorn, coppiced alder, bramble, dogrose, herb Robert, one stand of garden daffodil, and a small number of bluebells. These marginal areas help to provide shelter and variety in habitat for wildlife and provide a buffer for the woodland, but they are relatively young ex-arable land habitats which are limited in species diversity.

The eastern end of the proposed wetland creation area. (09/2021).

The widest point of the proposed wetland creation area. (09/2021)

A single oak sapling near the northern boundary of the proposed wetland area. (09/2021)

Proposed pedestrian entrance area

The southern boundary is formed of a mature hedge and stock fence. The western half of the southern hedge consists of hawthorn and elder with dense ivy growth. This half of the hedge is rather over-mature and several significant gaps are developing. The fence is in poor condition in places.

The southwest corner of the site is where the new gateway is proposed. The vegetation in this area is formed of the same species-poor amenity grassland present across most of the rest of the site along with a margin of dense scrub and ruderal habitat consisting of bramble, stinging nettle, rosebay willowherb, bindweed, creeping thistle, along with some Yorkshire fog, perennial ryegrass, and false oatgrass. There are several piles of woodchip here and a large metal manhole cover. The boundary along this section is formed of damaged, spiked estate fencing with some remnant stock fencing wire. There are 3-4 elm saplings, a single non-native turkey oak sapling (c. 5-10 years old), and some ivy-covered posts along this section of fence. Part of the area has recently been cleared of vegetation as part of the tree and shrub planting along the southwest fenceline and there are two piles of woodchip near the proposed entrance which will presumably be used as mulch for the new shrubs and trees.

There is limited potential for this area to host slowworms and nesting birds, though the noise and traffic along Droitwich Road means that the site is far from ideal. It is likely that the small elm saplings and the non-native turkey oak sapling will need to be cleared as part of the work. Any vegetation clearance work carried out here should be done outside of the bird nesting season (usually March to August inclusive).

The western end of the southern boundary hedge with dense ivy growth and mature elder shrubs. (09/2021)

The dense scrub and ruderal vegetation at the proposed entrance point. (09/2021)

The proposed pedestrian entrance showing part of the recently planted strip of trees and shrubs along the southwest fence line. (09/2021)

The proposed pedestrian entrance from Droitwich Road. (09/2021)

Other parts of Bull Meadow

The eastern half of the southern hedge is slightly younger and consists of hawthorn and occasional ash trees. The fence here is in slightly better condition with post and rail as well as mesh. The southern hedge appears to have been regularly managed with a flail in the past but has not been cut for at least 5-10 years. The hedge provides some habitat for wildlife, but it needs restoration/laying to ensure it remains dense and healthy.

The eastern half of the southern boundary hedge. (03/2021)

The eastern boundary is marked by several mature trees and shrubs and an old fence along the Martin Brook, which is then culverted under the road verge and Droitwich Road to the south. The remnants of a livestock pen created from metal railings can be found in the southeast corner. The ground flora of the hedges includes bramble, lords and ladies, cleavers, stinging nettle, and ivy. The marginal vegetation at the base of the hedges has been cut back close to the fence lines in recent years.

The eastern boundary with ditch, mature trees, and scrub corners. (03/2021)

The hedge on the western boundary is sparse and gappy with some sections consisting only of stock fencing and bramble. Other plants include hawthorn, blackthorn, hazel, oak and elder with scattered ivy growth. An approximately 10 m wide strip of grassland around the boundary with the house in the southwest corner of the

site has been planted with a mixture of trees and shrubs. There is no existing hedge along this section of the boundary.

The hedge on the western boundary. (03/2021)

Most of the woodland along the Martin Brook is not part of the site, with the boundary being marked by the stock fencing at the edge of the field. The woodland is a combination of semi-natural and mixed plantation woodland, with the eastern half being predominately planted. Species in the woodland include alder, ash, oak, poplar, non-native conifer, lime, holly, beech, field maple, crack willow, hawthorn, and dogwood with a ground flora of bramble, ivy, stinging nettle, lesser celandine, lords and ladies, herb Robert, and mosses. There are several veteran trees along the edges of the wood, including some with large cracks, dead limbs, and dense ivy growth, all of which offer opportunities for wildlife to shelter and feed. There is also a good amount of standing and fallen deadwood within the woodland and several piles of brick rubble and logs along woodland edge. There is also a small patch of the non-native and potentially invasive Mahonia shrub along the fence line.

The woodland corridor along the Martin Brook. (03/2021)

The only part of the woodland corridor which is inside the Bull Meadow site boundary is an area of wet woodland in the northwest corner. Wet woodland is a priority habitat, and this part of the site is particularly valuable for wildlife. It has a good mixture of mature trees and shrubs, mainly hazel and crack willow, with an abundance of standing and fallen deadwood. There is also a variety of small pools and streams, and a relatively diverse ground flora which includes lesser celandine, lords and ladies, bluebell, primrose, willowherb, creeping buttercup, wood avens, bramble, and pignut.

The wet woodland in the northwest corner of the site. (03/2021)

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0 25 50 m

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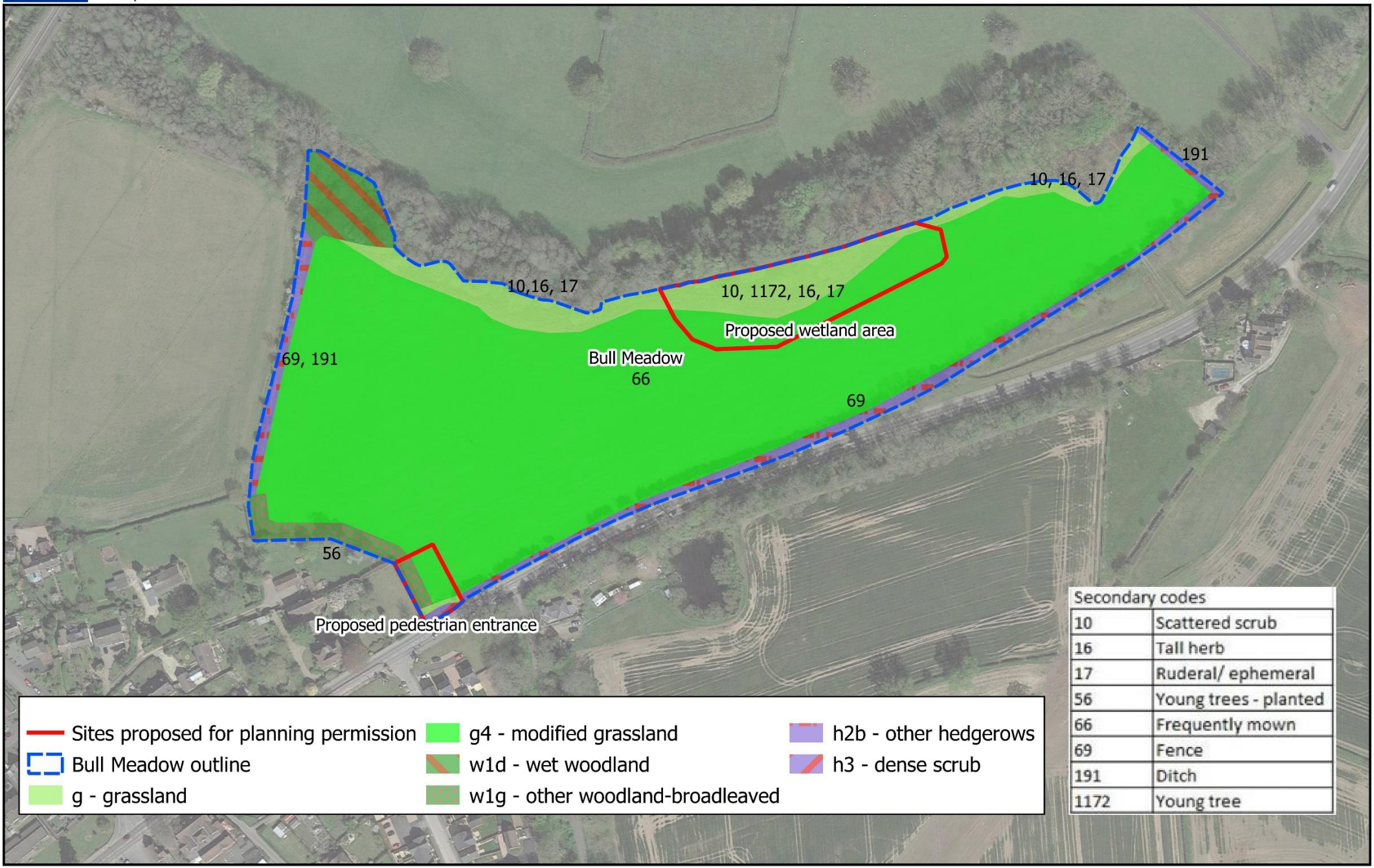
Bull Meadow Habitats Map (UKHab)



Secondary codes	
10	Scattered scrub
16	Tall herb
17	Ruderal/ ephemeral
56	Young trees - planted
66	Frequently mown
69	Fence
191	Ditch
1172	Young tree

4. Recommendations for Biodiversity Enhancement

Aspirations

The site offers significant potential for habitat creation and enhancement and a variety of different options could be suitable. Most of Bull Meadow is effectively a ‘blank canvas’ of species-poor amenity grassland which could be enhanced for wildlife in many ways.

The recommendations for Bull Meadow made here draw upon the designs in the Concept Masterplan from Leaves of Green landscape architects, though several adjustments have been made including the creation of a traditional orchard for the community. Traditional orchards can be excellent for wildlife, including many of the migratory birds which have been recorded nearby, as they mimic open woodland habitat, with a ground cover of wildflower meadow and trees which provide flowers, fruit, and lots of cracks and crevices for animals to shelter in. However, many traditional orchards have been lost, including from the local landscape.

An example of a traditional Worcestershire orchard, a habitat which can support a wide range of wildlife.

The main recommendation for the site is the creation of a new wetland area near the northern edge of the site. This wetland area should be formed of a pond complex with multiple different sized ponds and scrapes to provide diverse wetlands habitats.

It is also recommended that the southern hedge at Bull Meadow is laid and restored, and that a new 10-15 m wide woodland belt is created along the southern boundary, potentially on an earth bank created from the spoil generated by wetland and path creation. This will help to create a habitat corridor for wildlife as well as reducing the noise and pollution from the road. Several large wildflower meadows and a wildflower lawn; linear woodland planting; hedge creation and restoration; various open woodland glades with scattered trees and shrubs (including a forest school and natural play area); coppice coups; and the installation of habitat and features such as bee banks, hibernacula, wildlife boxes, dead hedges, willow arches, habitat piles, and large pieces of deadwood are all recommended.

Public access to Bull Meadow can be improved by creating all-weather paths around the park and a boardwalk in the wet woodland; creating a forest school with natural play areas and seating features like earth banks and large pieces of deadwood (which will also provide habitat for wildlife); and installing interpretation panels with information about the site’s habitats and species. The interpretation panels could be used to create a nature trail around the site. The pavement along Droitwich Road also needs to be improved as it is narrow in places.

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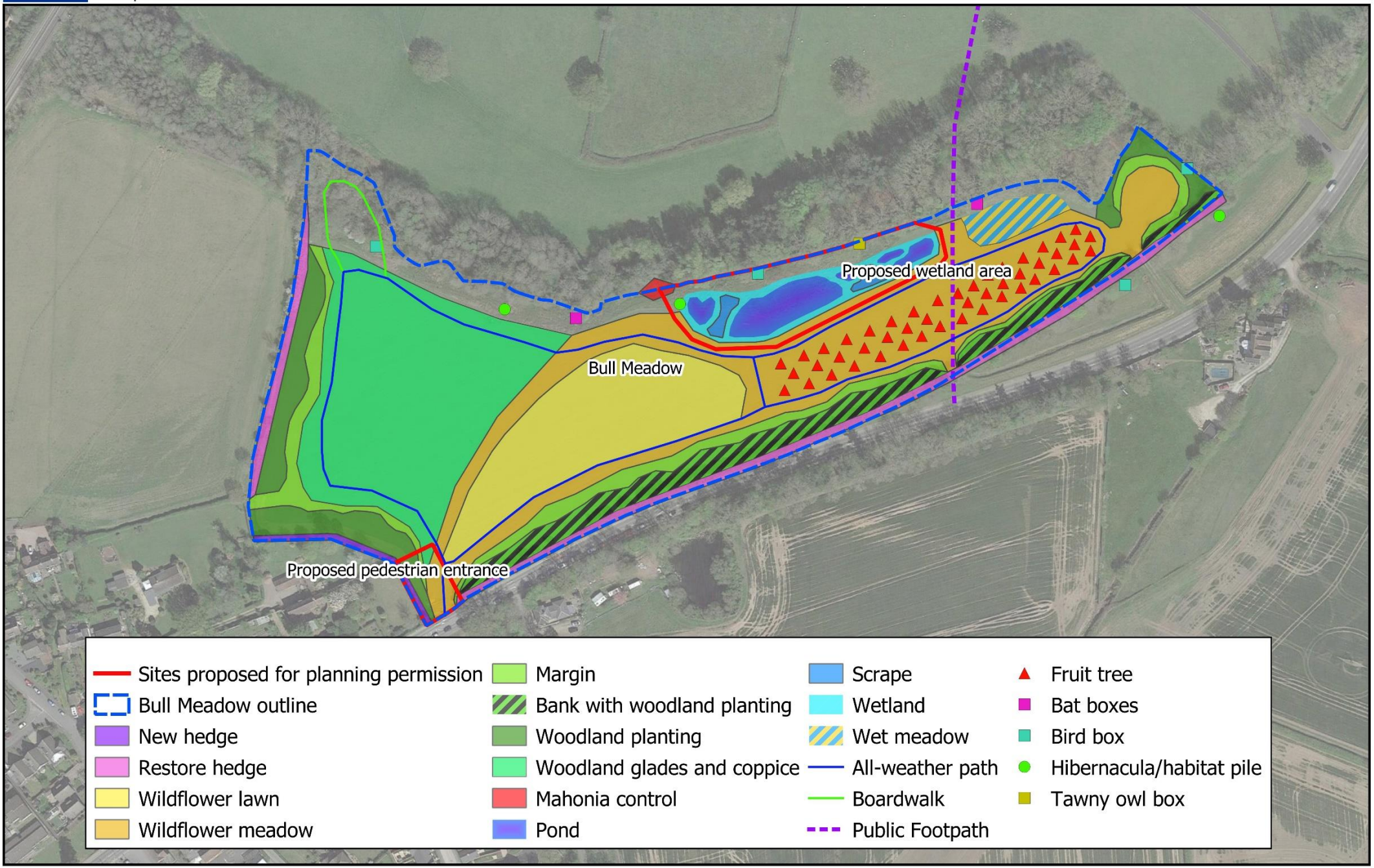
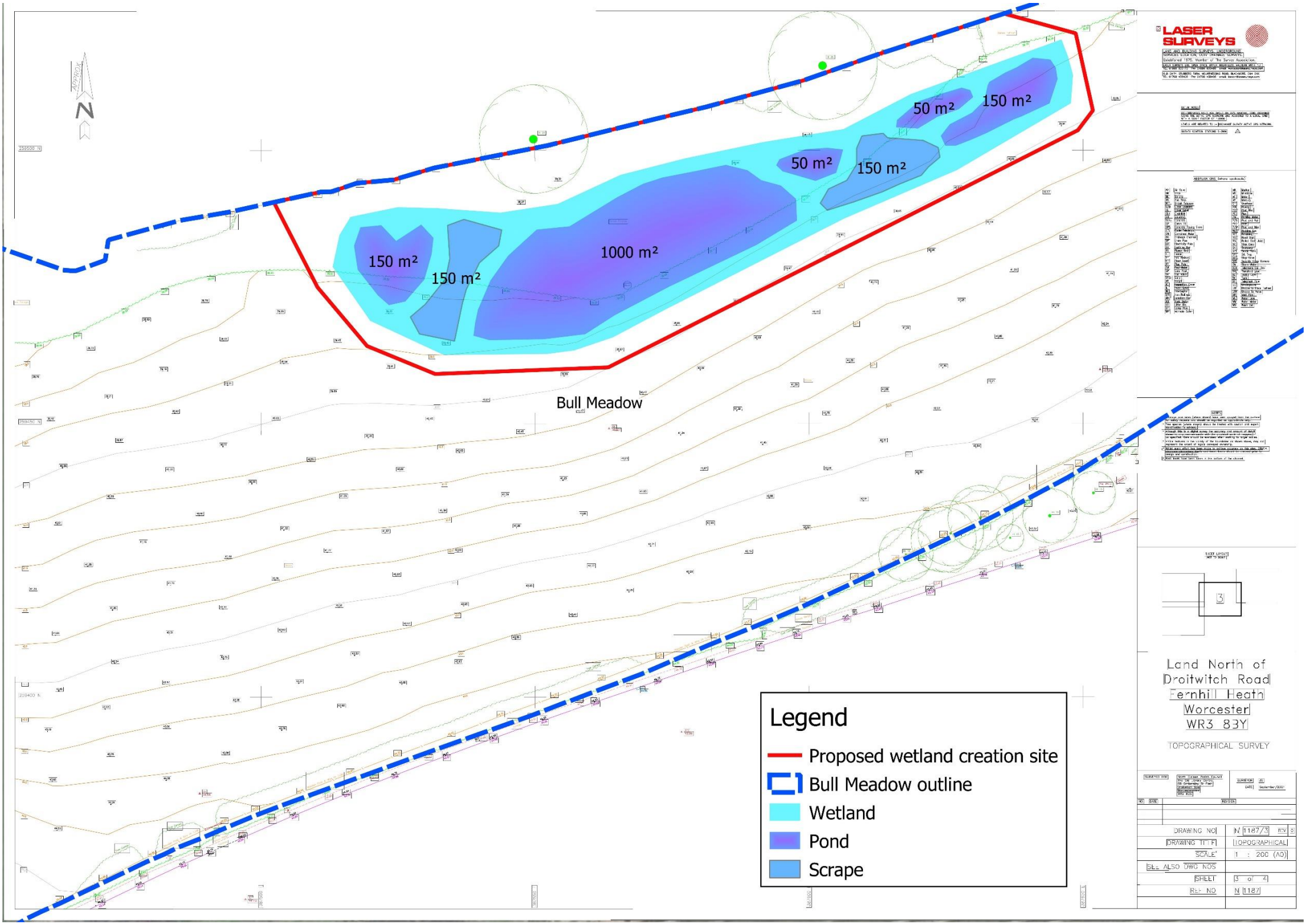
Bull Meadow Concept Map



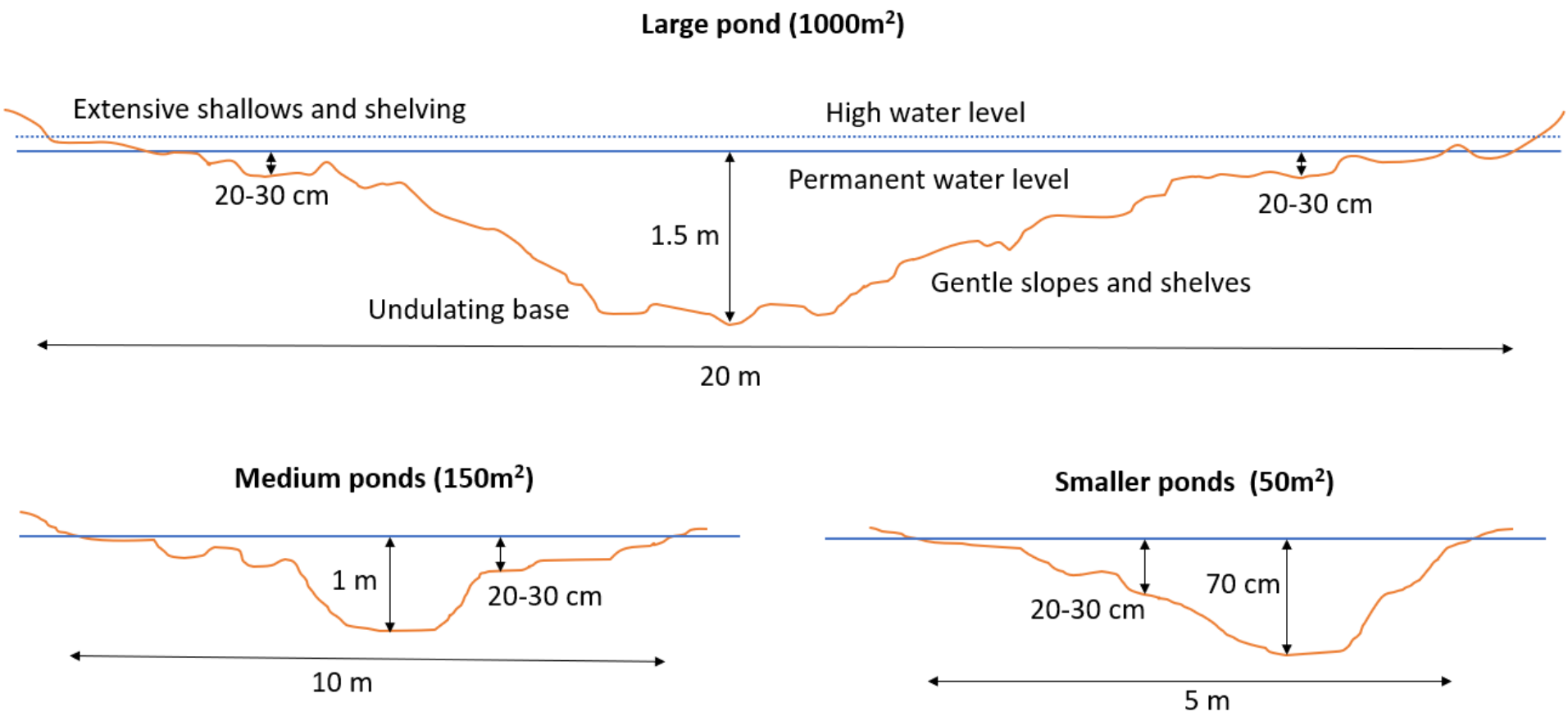


LASER SURVEYS

Land North of
Droitwitch Road
Fernhill Heath
Worcester
WR3 8JY

TOPOGRAPHICAL SURVEY

DRAWING NO	N 1187/3 REV 0
DRAWING TITLE	TOPOGRAPHICAL
SCALE	1 : 200 (A0)
SEE ALSO DWG NOS	
SHEET	3 of 4
REF NO	N 1187

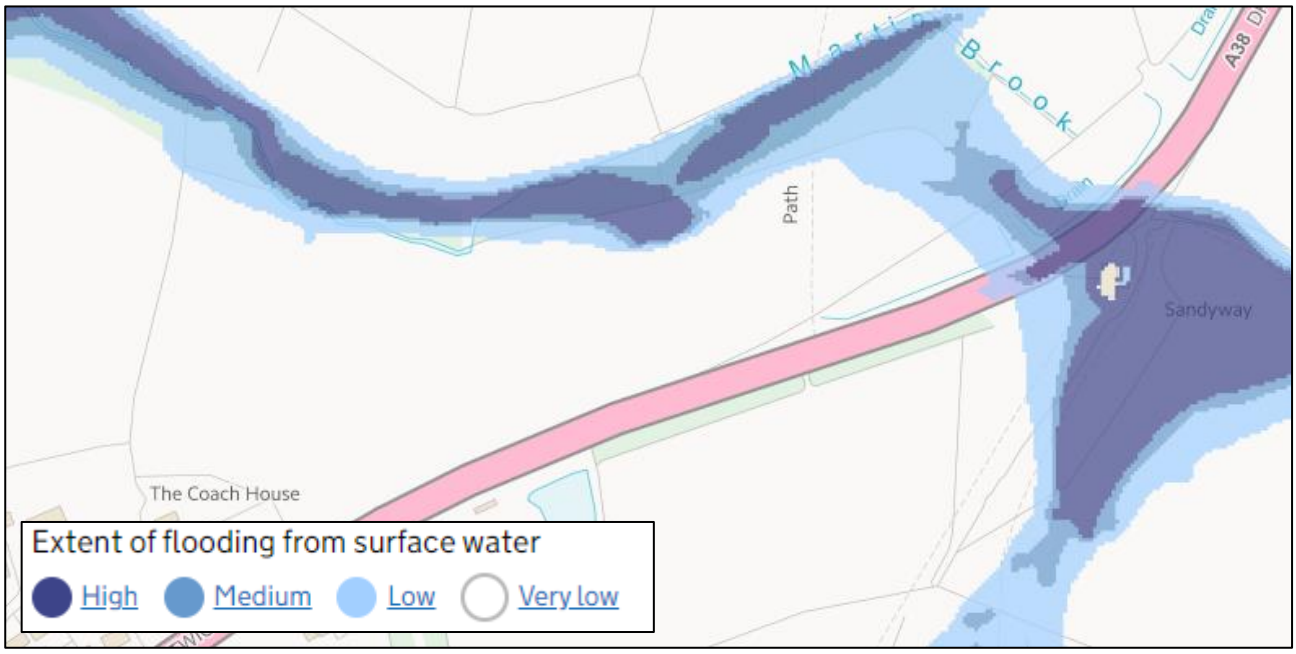


Sketch of pond cross sections and suggested depths with extensive shallows, gentle sloping banks, shallow-water shelving, and undulating base.

Recommended methods

1. Creation of new wetlands

The proposed new wetland at Bull Meadow will be created in the damp, low lying, field margin along the northern edge of the site, near the edge of the Martin Brook woodland corridor (see BEA). This area is lower lying and is shown as being at greater risk of surface water flooding in the Environment Agency's surface water flood risk map (see below). The proposed wetland area is c.0.29 ha and will contain 5 ponds (covering c. 1000m2, 150m2, 130m2, 50m2, and 50m2), 2 scrapes (c. 130m2 and 130m2), and 1300 m2 of wetland edge. The wetland will have a combination of open water, shallows, marginal vegetation, and scrub. A scrub margin of at least 5m width will be retained along the northern boundary of the wetland along the edge of the woodland. The young oak tree near the proposed wetland should be retained if possible and the wetland digging work and movement of heavy machinery should be kept outside of the Root Protection Zone (12 x trunk diameter at breast hight) of the two oak trees on the edge of the wood next to the proposed site. Creating an unlined scrape in the adjacent area of grassland (see Concept Map) to the east of the wetland would further complement the wetland by creating wet meadow habitat. If possible, the young oak tree here should be retained.

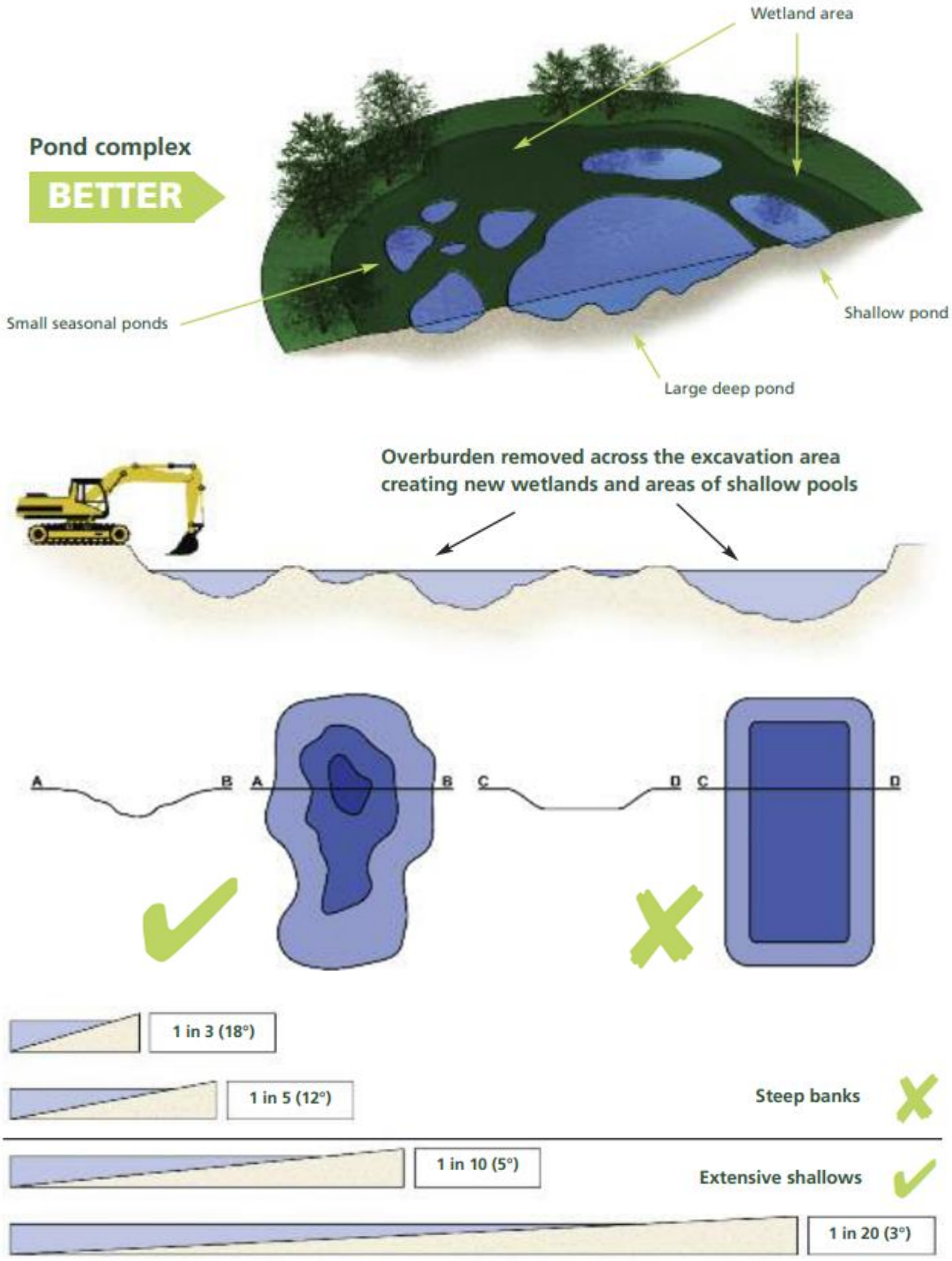


Surface water flood risk map (from https://flood-warning-information.service.gov.uk/long-term-flood-risk/map).

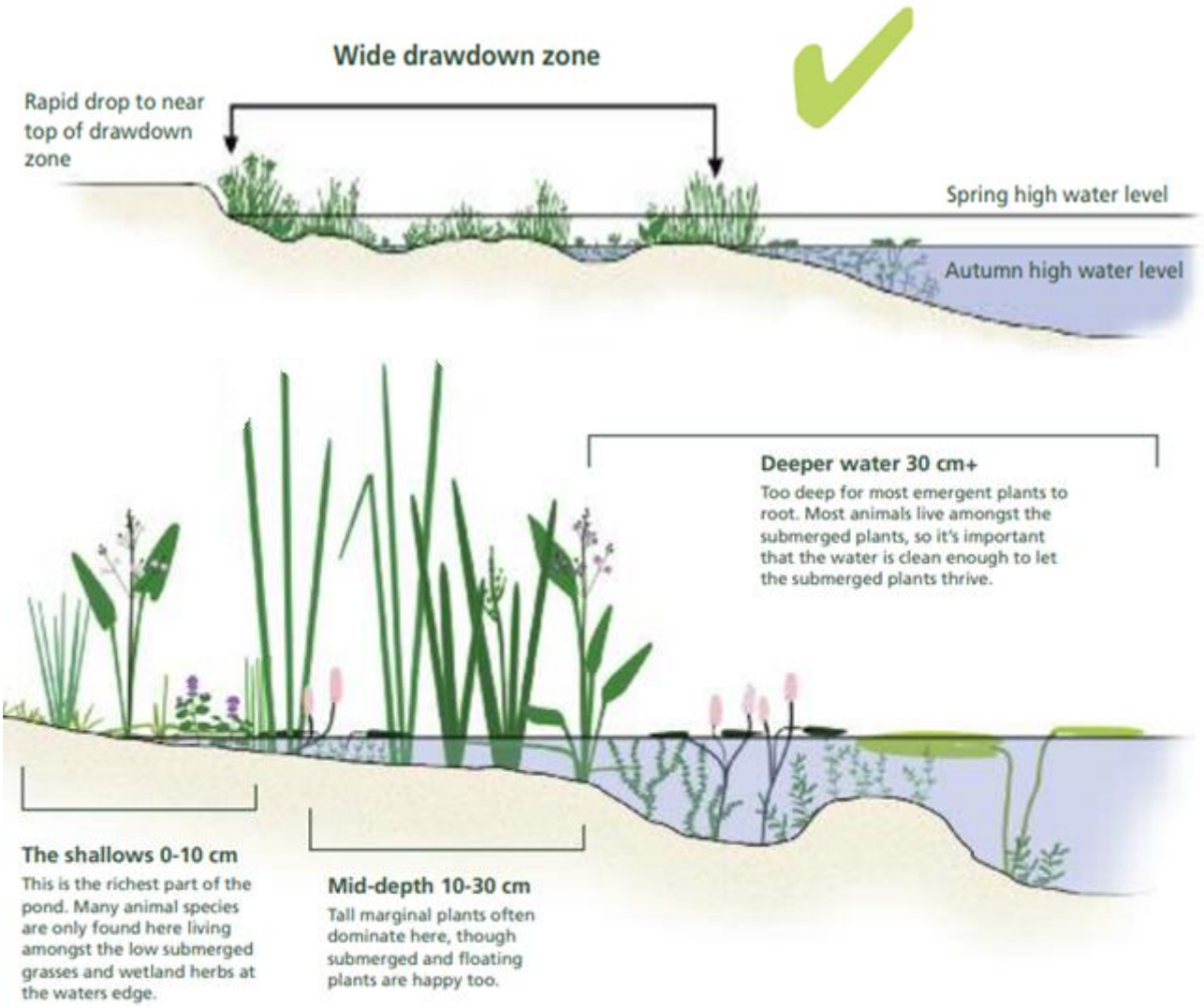
A geotextile clay-liner is recommended for the wetland area to increase water holding potential. It is envisaged that the liner will cover the majority of the wetland area, if not the entire area. The wetland area will need to be excavated to approximately 30-50 cm deeper than the target depth, the liner laid, and then a 30-50 cm layer of sub-soil laid over the liner to hold it in place and provide a base for plants to grow. Topsoil should not be laid over the liner as this will result in excessive nutrient in the water, leading to poor water quality and ongoing maintenance issues. The liner will also need to be anchored in place around the edges following the manufacturer's guidelines. If there are any field drains within the field, it may be possible to direct them into the wetland to increase water inflow. Care should be taken to avoid any pipes or utilities, particularly sewage pipes in the area, and the proper checks should be made before work begins.

The wetland should have one or two large ponds as well as several smaller satellite ponds, rather than a single large waterbody, as this provides more habitat variety. Having multiple ponds also provides some insurance against pollution or the introduction of invasive species. Ponds should have irregular shapes with extensive shelved shallows and gently sloping banks: less than 1:5 (12º) and preferably less than 1:20 (3º), and a deep point of at least 1 m. The shallows are where most of the different plant and animal species occur. The soil on the base of the pond should have undulations to increase diversity. Creating islands is not recommended as they can be difficult to manage and may encourage unsustainably high populations of geese and other waterbirds. The scrapes should be relatively shallow at around 30 cm depth, forming irregular-shaped shallow bowls. Several smaller depressions, hollows and small mounds should be created around the wetland area to increase microhabitat diversity. Natural Networks can provide more detailed advice about pond design if required. For more information about creating wetlands see:

- https://freshwaterhabitats.org.uk/projects/million-ponds/pond-creation-toolkit/
- https://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/PUBLICACCESS1.pdf
- https://assets.sussexwildlifetrust.org.uk/pond-creation.pdf



Pond complexes are generally better for wildlife than single ponds as they offer greater variety in habitats, which supports more species. Removing overburden and then creating several small pools and shallows around the main pond helps to create diversity. Images from the Freshwater Habitats Trust's Million Pond Project (https://freshwaterhabitats.org.uk/projects/million-ponds/pond-creation-toolkit/)



Irregular shapes and extensive shallows are best when creating ponds as this provides more diversity for wildlife: most wetland species live in the shallows. Images from the Freshwater Habitats Trust's Million Pond Project (https://freshwaterhabitats.org.uk/projects/million-ponds/pond-creation-toolkit/)

Planting wetlands

The wetlands can be planted with plugs of a variety of native marginal and emergent plants and a 'pond edge' native seed mixture can be sown over bare ground around the wetlands. Common reed and bulrush can become dominant in wetlands and may require regular maintenance: they are therefore not recommended in this case. Less vigorously growing species such as yellow iris (also known as flag iris) and cyperus sedge may be more suitable. Recommended species, locations, and approximate numbers are given below:

Common name	**Scientific name**	**Location**	**Number**
Common hornwort	*Certaphyllum demersum*	Deeper water	200
Frogbit	*Hydracharis morsus-ranae*	Shallow water	100
Amphibious bistort	*Persicaria amphibia*	Shallow water	100
Water crowfoot	*Ranunculus aquatilis*	Shallow water	100
Yellow iris	*Iris pseudacorus*	Shallow water	100
Water forget-me-not	*Myostis scorpioides*	Shallows and margins	200
Purple loosestrife	*Lythrum salicaria*	Shallows and margins	200
Water mint	*Mentha aquatica*	Shallows and margins	100
Cyperus sedge	*Carex pseudocyperus*	Shallows and margins	200
Marsh marigold	*Caltha palustris*	Shallows and margins	100
Soft rush	*Juncus effusus*	Marshy areas	100

Hard rush	*Juncus inflexus*	Marshy areas	100
Ragged robin	*Lychnis flos-cuculi*	Marshy areas	200
Meadowsweet	*Filipendula ulmaria*	Marshy areas	100
Cuckoo flower	*Caltha palustris*	Marshy areas	100

Wetland seed mixtures should contain a variety of native species (e.g. https://grassandflower.co.uk/british-flora/store/products/bfs-5-wetland-pond-edge-wildflower-seed-mix/).

2. Grassland enhancement

Wildflower meadows can support a wide range of pollinators and other invertebrates as well as the various species which feed on them. Most wildflowers have adapted to low fertility soils: nutrient rich soils encourage the growth of a small number of vigorous species and generally have lower species diversity. It is therefore important that no fertiliser is applied and that arisings are removed when possible.

It is recommended that three different types of wildflower grassland are created: in the more formal areas or where people are more likely to want to sit or play, the grassland can be managed as wildflower **lawns**; in the more open areas the grassland should be managed as traditional wildflower **meadows;** in the areas around the edges of the woodlands and hedges, shade-tolerant wildflower **margins** should be created.

The purpose of creating three different grassland types is to create variety in habitat and to form 'ecotones', where the habitats gradually blend into one another. Ecotones provide variety in vegetation structure and greater plant diversity; this also helps to increase the opportunities for different animal species to thrive. These different types of wildflower grassland will require different seed mixtures and slightly different management.

A sketch of a blended habitat 'ecotone' - from short grassland or wildflower lawns, to meadow, then to scrub and tussocky grasses, and finally to shrubs and trees.

Wildflower establishment

Wildflower seed can be introduced by using green hay or brush harvested seed from a nearby species-rich grassland, or if this is not possible, from a suitable commercially available seed mixture. Locally sourced seed is preferable because it helps to retain the species assemblages and genetic diversity of the local area, but it can be more complicated to obtain enough suitable seed.

The wildflower **lawn** areas can be established by introducing seed into the existing sward. This can be done by cutting the grassland as low as possible at the end of summer/early autumn and removing the arisings. The ground should then be harrowed to expose at least 50% bare soil. Generally, the more severe the reduction of the existing vegetation is, the more successful the establishment of the sown seed will be. Suitable seed mixtures include:

- https://www.habitataid.co.uk/collections/wildflower-seed-meadow-mixes-others/products/flowering-lawn-seed-mix
- https://wildseed.co.uk/mixtures/view/56

To prepare the **meadow** and **margin** areas for seed, it is recommended that a bare seed bed is created by either stripping off the turf or harrowing the ground and breaking up the existing sward to expose bare soil. The seed can then be broadcast onto the surface of the soil. Mixing seed with sand and spreading it from several different directions will help to ensure an even spread. Gently raking and ring-rolling the ground after sowing helps to achieve good seed-soil contact and improve germination, but it is important that the seed is not buried. This work should ideally be done in late August or September. Seed should be spread at a rate of 2-3 g per m^2.
Some examples of suitable **meadow** seed mixtures are:

- https://grassandflower.co.uk/british-flora/store/products/11919/
- https://wildseed.co.uk/mixtures/view/67

Suitable **margin** seed mixes include:

- https://grassandflower.co.uk/british-flora/store/products/bfs-6-hedgerow-shade-wildflower-seed-mix/
- https://www.habitataid.co.uk/collections/wildflower-seed-meadow-mixes-others/products/woodland-edge-seed-mix

More information about preparing ground for seeding can be found here:

- https://wildseed.co.uk/page/sowing-and-aftercare
- http://www.magnificentmeadows.org.uk/advice-guidance

Grassland management

When managing the new grassland areas in the first year it important to control vigorous plants like creeping thistle and dock as these can spread rapidly on newly exposed soil. Pulling or hoeing these plants during the summer months will help to suppress them and give the more desirable species a chance to establish.

The wildflower **lawns** can be mown roughly once every month, or whenever they reach 10-15 cm during the growing season. This gives the plants enough time to produce some flowers and seeds. The lawn should not be cut below 5 cm. Arisings should be removed.

The **meadow** grassland should be left uncut from April to August so that plants can produce flowers and seeds. Yellow rattle is an important annual wildflower species which helps to supress vigorous grasses - if it is mown before it can set seed it will quickly to be lost from the meadow. In the autumn, the grassland should be cut to approximately 5 cm and the arisings removed. Removing arisings is essential as this helps to prevent the build-up of a thatch of cut material which would otherwise smother germinating plants. It also reduces soil fertility, thereby allowing less vigorous wildflowers to compete. If required, the meadows can be mown several more times from the autumn through to early spring, again with the arisings being removed. Where necessary, paths can be mown through the meadow grassland to improve access and maintain a cared-for appearance. It is also recommended that a 1-2 m wide border is regularly mown on either side of the all-weather paths.

Annual hay-making cycle from Save Our Magnificent Meadows (http://www.magnificentmeadows.org.uk/).
('Grazing' can be replaced with cut-and-collect mowing)

Where possible the meadow and lawn areas should not be cut all at the same time as this removes all the flowers and shelter in one go. Instead, grassland mowing should be spread over several weeks: for larger meadow and lawn areas this might involve cutting one third or one half the area on the first occasion and then returning two weeks later to cut the next section.

The **margin** areas should only be cut/strimmed once every other year so that they can develop greater structure and provide more shelter. These areas should be managed in sections and on rotation so that there are always some areas which have not been cut, so that there is shelter for animals like queen bumble bees which often overwinter in areas of long tussocky grass. Ideally arisings would be removed.

Manging the **margins** and **meadows** is likely to require specific machinery which can cope with the longer material from hay meadows. It may be possible to arrange with a farmer for them to cut and collect the hay at the end of summer. For more information about managing hay meadows see:

- https://wildseed.co.uk/page/management-of-meadows-and-grassland
- http://www.magnificentmeadows.org.uk/advice-guidance
- https://www.cumbriawildlifetrust.org.uk/sites/default/files/2018-05/managing-and-restoring-hay-meadow-lealfet.pdf
- https://www.gwentwildlife.org/sites/default/files/2019-12/No.3_Habitat_Management_Toolkit_-_Acid Grassland FINAL.pdf

The arisings can either be stacked up in compost heaps positioned around the sites or taken away to be composted elsewhere. It is recommended that compost heaps are not located near gateways or site entrances as this can encourage dumping of garden waste. Installing small signs to explain the value of compost heaps can help visitors to appreciate them. Positioning one or two compost heaps near the wetlands, but not in a location where they might leach nutrients into the water, will help to provide habitat for nesting grass snakes. Compost heaps should contain a mixture of grass arisings, leaves, small branches and twigs, etc - if grass cuttings are used alone, they can form a solid mass which takes a long time to decompose.

3. Hedge creation and restoration

Hedge restoration

The southern hedge at Bull Meadow needs management to ensure that it remains healthy and functional. The hedge should be laid using 'conservation hedging' or 'wildlife hedging' methods, where most of the hedge material is retained. Removing fencing before hedge laying will provide more space and will make the process easier. For more information about hedge laying methods see: https://www.agricology.co.uk/sites/default/files/CEH_Rejuvenation_of_hedgerows_0.pdf

Hedge planting

New hedges can be created by planting shrubs and trees in double or triple staggered rows with approximately 40 cm between plants in the rows and 40 cm between rows. Hedges should contain a mixture of native trees and shrubs with up to half of the plants being hawthorn as this shrub helps create a dense structure. For double row hedges, 5 plants will be required per metre, and for triple row hedges, 7 per metre. Recommended species include:

Common name	**Scientific name**
Hawthorn	*Crataegus monogyna*
Blackthorn	*Prunus spinosa*
Hazel	*Corylus avellana*
Field maple	*Acer campestre*
Holly	*Ilex aquifolium*
Crab apple	*Malus sylvestris*
Dogwood	*Cornus sanguinea*
Midland hawthorn	*Crataegus laevigata*
Wild privet	*Ligustrum vulgare*
Spindle	*Euonymus europaeus*
Dogrose	*Rosa canis*
Cherry plum	*Prunus cerasifera*

The ground should be prepared for hedge planting by cutting back the existing ground vegetation. Following planting, the hedge bases should ideally be mulched with well-rotted wood chip, compost, or biodegradable mulch matting. Some local authorities will sell municipal compost in bulk and at relatively low cost.

Rabbits are present at the site and the young trees will need to be protected. Installing rabbit-proof wire fencing along the edge of the new hedge/woodland edges may be the most feasible way to do this. The scatted trees in the woodland glades may require individual guards. Wherever possible, fully biodegradable guards should be used.

Hedge management

Hedges should be managed on rotation, with sections cut ideally over at least a 3-year period. Cutting to form an 'A' shape or chamfering edges helps to create a dense and healthy hedge. Gradually expanding the height of the cut each year allows the hedge to fill out. For more information on hedge management see: http://www.hedgelink.org.uk/index.php?page=23.

4. Woodland, shrub, and bulb planting

Woodland planting

At Bull Meadow it is recommended that a linear woodland belt is planted along the southern and western boundaries and around the eastern end of the site. These woodland areas should contain a mixture of native trees and shrubs with spacing of approximately 2 m between plants. Planting should generally take place in the winter when the trees are dormant. Recommended species include:

Common name	**Scientific name**
English oak	*Quercus robur*
Field maple	*Acer campestre*
Hornbeam	*Carpinus betulus*
Silver birch	*Betula pendula*
Wild cherry	*Prunus avium*
Rowan	*Sorbus aucuparia*
Holly	*Ilex aquifolium*
Crab apple	*Malus sylvestris*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Blackthorn	*Prunus spinosa*
Spindle	*Euonymus europaeus*
Wild privet	*Ligustrum vulgare*
Bird cherry	*Prunus padus*
Cherry plum	*Prunus cerasifera*
Wild honeysuckle	*Lonicera periclymenum*

Guelder rose and goat willow could also be considered for damper areas.

The spoil from the creation of the wetlands and paths could be used to create an earth bank landscaping feature which would further block the noise and sight of the road. Planning guidance should be sought for an acceptable height of this feature. It would be preferable to lay and restore the southern boundary hedge before this bank is created. Created along the southern edge of Bull Meadow, it is recommended that it is sown with a woodland edge/hedgerow wildflower mixture such as those indicated for the **margin** grassland.

Woodland glades

The creation of open woodland glades with a forest school and natural play areas is supported as these areas can also offer good habitat for wildlife. The same species of tree and shrub recommended for the woodland areas can be planted here, but at a greater spacing and with some large open areas. Some scattered planting of gorse and broom scrub should be considered: broom is less spikey and so may be more appropriate here. Small scale scattered planting of sweet chestnut could also be considered in this area.

Coppice

Several small coppice coups could also be created in the western half of Bull Meadow. Hazel would be the recommended species, but willow and alder could also be considered and there are already some coppice alder stalls near the edge of the wet woodland area in the north west corner of the site. Creating several small coppice coups or several lines of planting for coppicing is recommended so that they can be managed on rotation, with one row or coup being cut every few years. This will help to provide a steady supply of material as well as ensuring variety of habitat for wildlife. Establishing coppice areas and the rotational cycle can take several years but is a good way to create biodiverse habitat which also produces useful timber and could act as an educational resource.

For more in information about creating and manging woodland glades/rides and coppicing see:

- https://www.wildlifetrusts.org/wildlife-advice/how-manage-woodland-wildlife
- https://ptes.org/conservation-and-coppicing/

Shrub and herb borders

In more formal areas of the park, including around the new gateway, a border of small trees, flowering shrubs, herbs, and bulbs should be considered. These should not be so densely planted that collecting litter becomes difficult. Recommended species include:

Common name	**Scientific name**
Bird cherry	*Prunus padus*
Hawthorn	*Crataegus monogyna*
Midland hawthorn	*Crataegus laevigata*
English lavender	*Lavandula angustifolia*
Wild marjoram	*Origanum vulgare*
Wild honeysuckle	*Lonicera periclymenum*
Flowering currant	*Ribes sanguineum*
Guelder rose	*Viburnum opulus*
Rowan	*Sorbus aucuparia*

Wildflower bulb planting

Bulbs and plugs should be planted in swathes and clusters of the same species, with plants approximately 15-30 cm apart. Gently throwing a handful of bulbs and planting them where they fall can help to create a more ‘natural’ looking spread of plants. Bulbs are usually planted in the late autumn whilst they are dormant. They can also be planted as ‘in-the-green’ bulbs the spring, but these are generally more expensive and delicate. Generally, bulbs should be planted at a depth of approximately three times their height (c. 10-15cm), with the growing tip facing upwards. Recommended species and suggested numbers and locations are given below:

Common name	**Scientific name**	**Location**
English bluebell	*Hyacinthoides non-scripta*	Woodland and under trees
Wild daffodil	*Narcissus pseudonarcissus*	Grassland and under trees
Snowdrop	*Galanthus nivalis*	Under trees and hedges in the Open Spaces
Wild garlic	*Allium ursinum*	Woodland

These should be wild-type plants, not garden-type varieties with double petals as these are not valuable for pollinators. Care should also be taken to ensure that British/English bluebells *Hyacinthoides non-scripta*, are purchased and not hybrid or Spanish bluebells.

Further tree and shrub planting guidance and sourcing

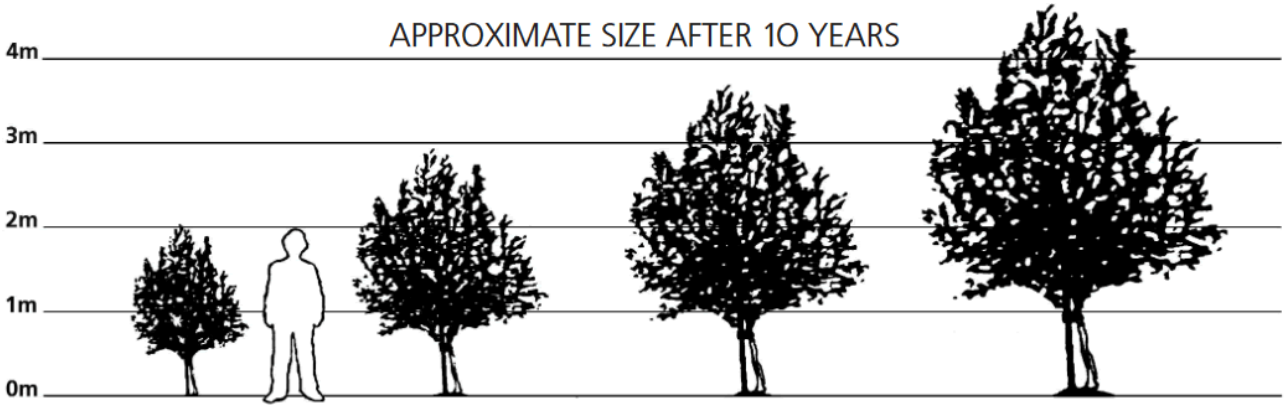
The woodland belts around Bull Meadow can be protected from rabbit grazing damage by installing rabbit fencing around the edge of the woodland. It may be easier to protect the more scattered trees in the woodland glade areas with individual tree guards: to avoid plastic litter and the potentially difficult task of removing guards, biodegradable guards are recommended (e.g. https://www.habitataid.co.uk/collections/planting-accessories/products/compostable-plant-guards). Bare-rooted shrubs should be planted during the winter whilst they are dormant. For more guidance on tree and shrub planting see:

- https://www.woodlandtrust.org.uk/plant-trees/advice/how-to-plant/
- https://www.wildlifetrusts.org/actions/how-make-woodland-edge-garden-wildlife

5. Traditional orchards

An orchard of c. 0.70 ha containing approximately 47 trees is recommended for the eastern third of Bull Meadow. These trees should have a spacing of approximately 10 m to give plenty of room for them to grow and to create an open meadow below the trees. A hexagonal (or triangular) planting pattern is recommended here as it is more visually appealing and allows more trees to be planted (see: http://publications.naturalengland.org.uk/publication/26001).

The orchard should contain a mixture of fruit tree species, e.g., apple, crab apple, pear, cherry and damson, and should have several different varieties to ensure good cross-pollination. Tagging the trees with permanent labels which show their species and variety is recommended. The preference should be for local Worcestershire or midlands varieties. The tree's rootstocks will determine how large and quickly they grow. It is recommended that moderate rootstocks (e.g., MM106 or M111 for apple trees) are used as these will grow into medium sized and reasonably long-lived trees. All orchard trees should be supported by wooden stakes until they are established. They should also be protected from rabbits with biodegradable spiral guards. If livestock are ever grazed around the trees they will likely require more protection.



DWARF		SEMI DWARF		MODERATE		VIGOROUS	
FRUIT	ROOTSTOCK	FRUIT	ROOTSTOCK	FRUIT	ROOTSTOCK	FRUIT	ROOTSTOCK
APPLE	M9	APPLE	M26	APPLE	MM106	APPLE	M25
PEAR	QUINCE 'C'	PLUM	PIXY	PEAR	QUINCE 'A'	PLUM	BROMPTON
CHERRY	GISELA 5	PEAR	QUINCE 'C'	PLUM	ST JULIEN 'A'	CHERRY	CHERRY F.12.1
		CHERRY	GISELA 5	DAMSON	ST JULIEN 'A'	PEAR	WILD PEAR
				CRAB APPLE	MM106		
				QUINCE	QUINCE 'A'		

Rootstock size chart - a rough guide. From Walcot Nursery (https://walcotnursery.co.uk/rootstocks/)

Organic mulch, e.g., well-rotted wood chip or compost, should be spread around the base of each tree in a 1 m diameter circle to help retain moisture and reduce competition with grasses. Mulch should not be piled up against the trunks of the trees as this can result in fungal damage. Watering the trees for the first few years during dry spells will help them to establish. More information about creating traditional orchards can be found here: http://publications.naturalengland.org.uk/publication/26001

Biodegradable tree guards and canes are recommended for the trees and shrubs where appropriate. Natural Networks can help to source suitable plants and sundries. Potential suppliers include:

- https://www.habitataid.co.uk/
- https://www.naturescape.co.uk/
- https://walcotnursery.co.uk/ (for fruit trees)

For more information about the benefits of traditional orchards and how they can be created see:

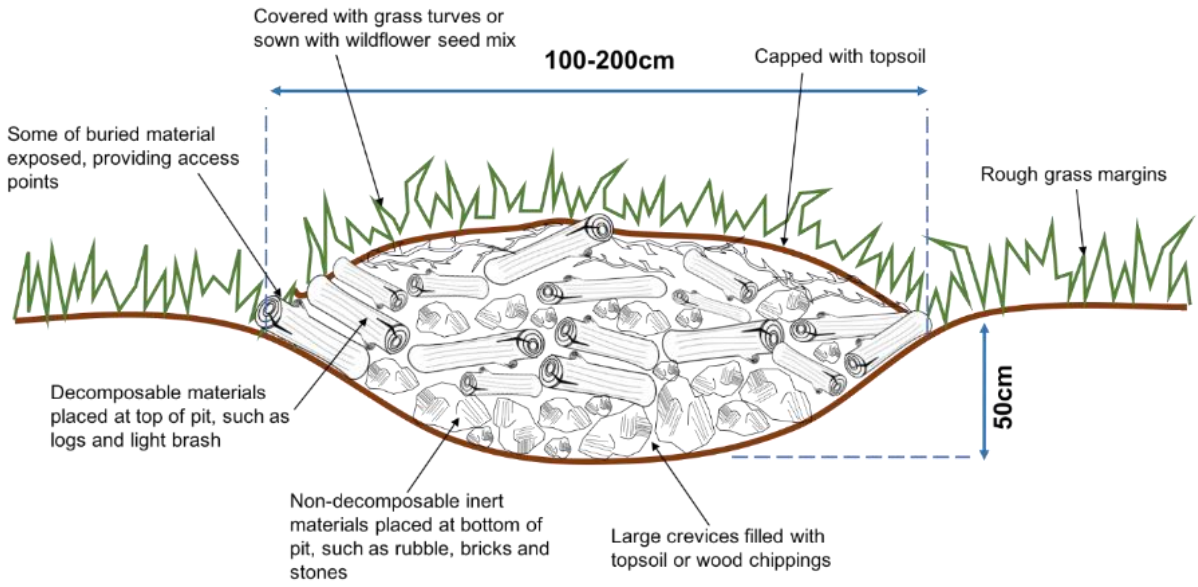
- https://ptes.org/campaigns/traditional-orchard-project/
- http://publications.naturalengland.org.uk/publication/19007

6. Habitat features

Hibernacula

It is recommended that at least one hibernaculum, and preferably 2 or 3, is / are created near the new wetland in Bull Meadow. Hibernacula provide frost-free crevices where amphibians, reptiles, and invertebrates can hibernate over winter. They should be constructed in undisturbed locations where there is no risk of seasonal flooding. A range of materials can be used: timber, brash, inert hardcore, bricks and rocks. The bricks and logs from around the northern boundary fence at Bull Meadow could be reused for this purpose.

It is preferable to partially bury materials, with heavier non-decomposable materials placed at the bottom and looser materials, such as brash, placed on top. The soil cap can be seeded with meadow seed, planted with wildflower bulbs, or left to naturally revegetate.



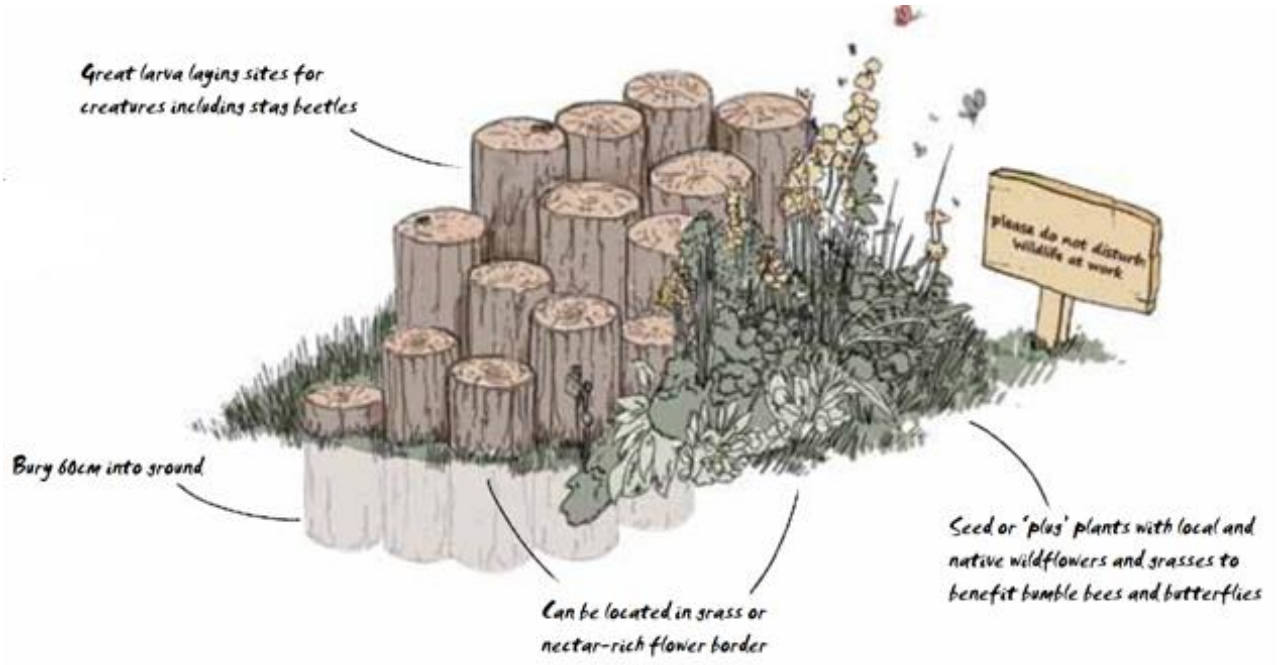
An example of a hibernacula design, with pieces of timber and rubble partially buried to provide shelter for amphibians, reptiles, and invertebrates.

Habitat piles

Although it is preferable to leave dead trees standing if it is safe to do so, any felled wood should be kept on site and used to create habitat piles. Habitat piles can be created by simply piling lengths of trunk and branches together. Pieces of deadwood should be kept as large as possible so that they take longer to break down and provide suitable habitat for beetle larvae, many of which require large pieces of wood in which to complete their lifecycle.

A habitat pile created using large sections of tree trunk and branches at a sunny woodland edge.

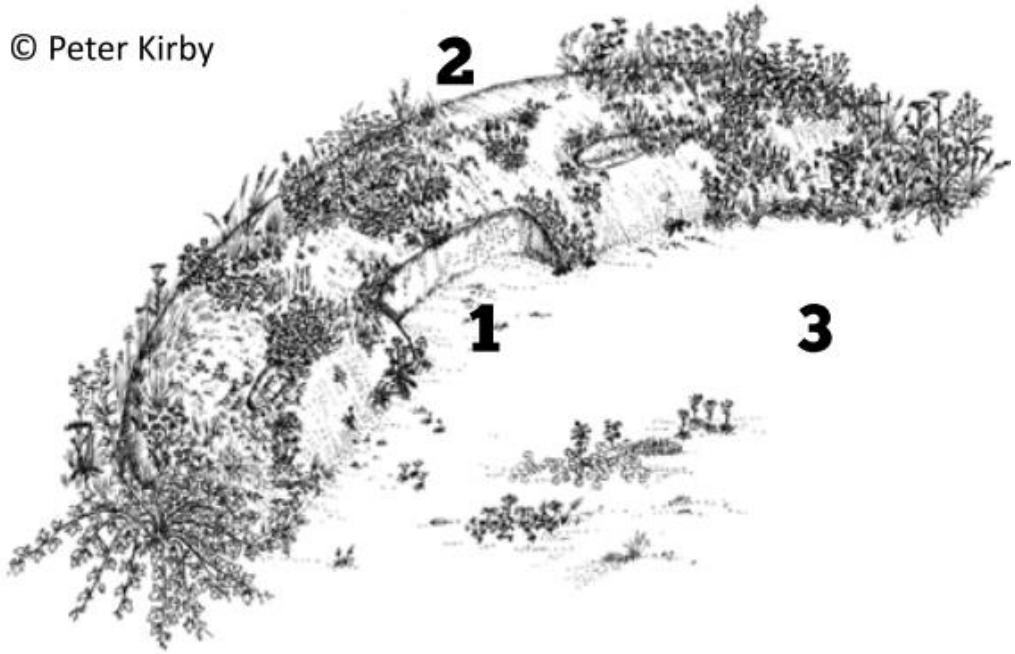
An alternative to the standard horizontal habitat pile is a vertical log pile, where logs are partially buried in an upright position. As well as providing habitat for wildlife these features can be eye-catching and interesting features which may be used for natural play. Other habitat features like ‘dead hedges’ made from brash, hazel/willow tunnels, bug hotels, and large pieces of deadwood would also be beneficial.



A vertical log pile which provides habitat for wildlife as well as being an interesting feature for visitors. https://www.wwtconsulting.co.uk/wp-content/uploads/2013/06/WWT-RSPB-guidance-SuDS-report-final-lowres.pdf

Bee banks

It would be beneficial to create several small ‘bee banks’ or ‘butterfly banks’ at Bull Meadow. These are south facing banks of sandy soil which provide warm microclimates and areas of bare or sparsely vegetated ground where solitary ground nesting bees can nest. These bees are not aggressive and are very unlikely to sting. The banks should be positioned in open areas where they will receive lots of sunlight. These banks could be constructed from spoil from the new wetland creation if the sand content of the soil is high enough.



Example diagram of a bee bank (by Buglife/Peter Kirby). 1 - ‘Clifflet’ – cut in a small cliff to create vertical nesting space, 2 - Vegetation – maintain sparse vegetation on the bank so that bare ground is always visible, 3- Bare ground around the bund provides additional nesting space.

7. Wildlife boxes

Bird and bat boxes

The cracks and crevices found in veteran and ancient trees provide vital opportunities for roosting bats and nesting birds. However, many of our ancient trees have been lost and suitable nesting and roosting opportunities are limited. This can be partially compensated for by installing bat and bird boxes. Boxes should be installed on large, healthy, and long-lived trees (e.g., oak). Some suitable trees are indicated on the Concept Map.

Boxes can be installed at any time of the year but installing them in the autumn increases the chances that they will be used for nesting in the next spring and provides additional shelter for animals over the winter. When boxes are installed on trees, aluminium or stainless-steel nails should be used as other types of nail may corrode and damage the tree. Larger boxes may require more substantial fixtures. It is recommended that boxes are constructed from 'woodcrete' or 'woodstone' material where possible, as this provides better protection against squirrels and other nest predators, better insulation, and lasts longer than wood. Natural Networks can provide more advice on box types and installation if required.

Bat boxes

Bat boxes should be at least 4 m above the ground and should face into an open space to ensure easy flight lines. Bat boxes should be exposed to sunlight for at least part of the day so that they warm up, orientating them towards the south helps to achieve this. However, bat boxes should not be exposed to artificial light. For more information see: https://www.bats.org.uk/our-work/buildings-planning-and-development/bat-boxes/putting-up-your-box. Once installed, bat boxes should only be opened or moved by people with the required licences.

A mixture of boxes for both cavity- and crevice-roosting species is recommended for the site. Suggested models include:

- 2 x general purpose bat box https://www.nhbs.com/convex-wood-concrete-bat-box
- 2 x multi chamber bat box https://www.nhbs.com/large-multi-chamber-woodstone-bat-box

Small bird boxes

Small bird boxes should be fixed 1.5-3 m above ground level. They should preferably be out of the reach of the public but accessible by ladder so that they can be emptied of old nesting material at the end of autumn (October or November). Boxes should be positioned out of direct sunlight and prevailing wind; in more exposed areas this means orientating towards the east or northeast. Starling boxes should be positioned near to each other as this species is gregarious. House sparrow nest boxes can also be positioned near each other. Small bird boxes should ideally be cleaned out in the late autumn to encourage repeated nesting in the spring.

Suitable models include:

- 1 x open-fronted https://www.nhbs.com/vivara-pro-barcelona-woodstone-open-nest-box
- 1 x 32 mm oval hole https://www.nhbs.com/vivara-pro-seville-32mm-oval-woodstone-nest-box
- 1 x 32 mm hole https://www.nhbs.com/vivara-pro-seville-32mm-woodstone-nest-box
- 1 x 28 mm hole https://www.nhbs.com/vivara-pro-seville-28mm-woodstone-nest-box

Tawny owl nest box

A tawny owl nest box could be installed on a large tree along the edge of the Martin Brook woodland corridor. This box should be mounted at least 4 m above ground and should face away from prevailing winds and direct sunlight. Suitable models include:

- https://www.nhbs.com/tawny-owl-nestbox

8. Public access improvements

Permissive paths

Permissive all-weather paths could be created around Bull Meadow as well as a boardwalk in the wet woodland in the northwest corner of the site. Additional mown paths could be created to offer alternative routes.

Natural play features

Natural play features like earth banks and mounds, and large pieces of deadwood can be beneficial for both wildlife and children visiting the site. Earth banks and mounds could be made from some of the spoil from the wetland and all-weather path creation.

Interpretation panels and nature trails

A series of interpretation panels could be installed to describe the habitats and the species which they host. Panels at Bull Meadow could also show a map of the site and could be part of a nature trail with a series of smaller marker posts. Medium sized panels are generally recommended (e.g., A3) but larger signs could be installed near the entrance to Bull Meadow. Natural Networks can provide more advice on the content of the panels if required.

It may also be beneficial to install several smaller, potentially temporary, or mobile signs, around the site to explain any works which may be considered ‘untidy’. These can be useful for explaining why meadow grassland is not cut during the summer and why habitat piles are important. The interpretation panels and other signs could also remind visitors to clean up after their dogs, not to allow dogs in the wetlands, and not to dump garden waste in the park as this can lead to the spread of diseases and invasive species.

An example of a small interpretation panel giving information about a meadow area and its management.

Table 2. Recommended timeline for the first year of biodiversity enhancement works. Darker orange indicates optimum timing.

Type of work	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Wetland creation and installation of hibernacula												
Hedge laying and any vegetation clearance												
Tree and shrub planting												
Bulb planting												
Plug planting												
Grassland enhancement												
Installation of boxes, panels, etc.												

5. Things to consider and next steps

- Planning permission and drainage consents may be required for the creation of the new wetlands and landscaping banks. The local planning authority should be involved in the plans for creating the wetlands from an early stage.

- It will be important to check the locations of utility pipes and cables to ensure that activities such as wetland creation and tree planting do not damage infrastructure.

- Biosecurity should be a key consideration when creating the new wetlands as invasive wetland plants can be particularly harmful to biodiversity as well as being difficult (if not impossible) and expensive to eradicate. Biosecurity plans should include ensuring all diggers and other machinery have been thoroughly cleaned before they arrive at the site.

- All plants and seeds purchased as part of the project should be sourced and grown in the UK, ideally from local stock. They should be produced using peat-free and preferably organic methods. All other materials should be sustainably sourced and reused or recycled wherever possible.

- It may be possible to form several 'Friends of' groups to help look after the green spaces around the village, these groups can be particularly useful for looking after habitats like traditional orchards and wetlands.

- Applicants are encouraged to be mindful of policy and legislation which protects wildlife from some activities which may be included within the proposed biodiversity enhancement works. A summary of relevant legislation can be found at https://www.wildlifetrusts.org/uk-wildlife-law. Scrub clearance, for example, should take place outside of the bird nesting season, which generally takes place between March and

August inclusive. Timing of works or method statements detailing safe working practices in relation to other protected species may also be required.

- Grants cannot be given for works which have taken place before the grant agreement is signed. Before a grant can be claimed, a Natural Networks Officer will carry out a check for satisfactory completion of works. If works are found to be unsatisfactory or incomplete, the grant cannot be claimed until remedial works are undertaken by the applicant.

- Natural Networks can only help to fund public access improvements, including interpretation panels and paths/boardwalks, up to a maximum of 20% of the total project cost.

- A management plan will be required by the Natural Networks appraisal panel before a grant is awarded. Management plans can be very helpful for ensuring the long-term future of wildlife habitats such as meadows and hedges, as management often involves rotational and/or season-specific work over many years.

- The next step should be to discuss the recommendations made in this report with the Natural Networks officer to ensure the proposals are suitable. Once this has been done, it is recommended that a full application is submitted to the Natural Networks appraisal panel for funding.

Appendix 1

Notable species records from within 1 km of the Bull Meadow site boundary (as of March 2019).

Order	Common name	Scientific name	Status	Grid Ref	Date
amphibian	Common Frog	*Rana temporaria*	WCA	SO878590	2011
amphibian	Great Crested Newt	*Triturus cristatus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO882588	16/06/2010
amphibian	Smooth Newt	*Lissotriton vulgaris*	WCA	SO882588	16/06/2010
amphibian	Smooth Newt	*Lissotriton vulgaris*	WCA	SO878590	2011
bird	Barn Owl	*Tyto alba*	WCA	SO88685911	01/03/14
bird	Barn Owl	*Tyto alba*	WCA	SO88685911	03/09/09
bird	Barn Owl	*Tyto alba*	WCA	SO885591	13/12/12
bird	Barn Owl	*Tyto alba*	WCA	SO887592	21/04/04
bird	Barn Owl	*Tyto alba*	WCA	SO8870759210	24/09/15
bird	Barn Owl	*Tyto alba*	WCA	SO88685911	27/11/12
bird	Cuckoo	*Cuculus canorus*	NERC s.41 UKBAP Bird:Red	SO880586	20/05/15
bird	Hobby	*Falco subbuteo*	WCA	SO86835986	22/08/12
bird	House Sparrow	*Passer domesticus*	NERC s.41 UKBAP Bird:Red	SO870599	09/07/2010
bird	House Sparrow	*Passer domesticus*	NERC s.41 UKBAP Bird:Red	SO872599	27/06/2016
bird	House Sparrow	*Passer domesticus*	NERC s.41 UKBAP Bird:Red	SO869600	28/01/13
bird	Kingfisher	*Alcedo atthis*	WCA	SO873588	02/09/10
bird	Merlin	*Falco columbarius*	WCA	SO88685911	24/01/13
bird	Peregrine	*Falco peregrinus*	WCA	SO8859	16/09/09
bird	Red Kite	*Milvus milvus*	WCA	SO88685911	28/05/15
bird	Skylark	*Alauda arvensis*	NERC s.41 Bird:Red	SO883588	16/05/05
bird	Skylark	*Alauda arvensis*	NERC s.41 Bird:Red	SO877584	27/06/2016

bird	Song Thrush	*Turdus philomelos*	Bird:Red	SO870599	09/07/2010
bird	Starling	*Sturnus vulgaris*	Bird:Red	SO870599	09/07/2010
bird	Yellowhammer	*Emberiza citrinella*	NERC s.41 UKBAP Bird:Red	SO872599	27/06/2016
flowering plant	Corn Buttercup	*Ranunculus arvensis*	NERC s.41 UKBAP Locally Nb	SO885592	27/05/04
flowering plant	Corn Buttercup	*Ranunculus arvensis*	NERC s.41 UKBAP Locally Nb	SO887592	27/05/04
flowering plant	Greater Burnet-saxifrage	*Pimpinella major*	Locally Nb	SO873595	23/03/93
flowering plant	Greater Burnet-saxifrage	*Pimpinella major*	Locally Nb	SO873598	23/03/93
flowering plant	Greater Burnet-saxifrage	*Pimpinella major*	Locally Nb	SO875598	23/03/93
flowering plant	Hornbeam	*Carpinus betulus*	Locally Nb	SO874586	14/03/93
flowering plant	Large-Leaved Lime	*Tilia platyphyllos*	Locally Nb Nationally Scarce	SO875595	19/11/99
flowering plant	Prickly Sedge	*Carex muricata ssp. lamprocarpa*	Locally Nb	SO882599	29/10/00
flowering plant	Sea Club-Rush	*Bolboschoenus maritimus*	Locally Nb	SO880597	19/11/99
flowering plant	Sea Club-Rush	*Bolboschoenus maritimus*	Locally Nb	SO880597	26/09/99
flowering plant	Short-styled Field-rose	*Rosa stylosa*	Locally Nb	SO887592	Oct-99
flowering plant	Small-Flowered Buttercup	*Ranunculus parviflorus*	Locally Nb	SO886591	24/09/04
flowering plant	Small-Flowered Buttercup	*Ranunculus parviflorus*	Locally Nb	SO885589	27/05/04
flowering plant	Small-Flowered Buttercup	*Ranunculus parviflorus*	Locally Nb	SO885590	27/05/04
flowering plant	Wild Thyme	*Thymus polytrichus*	Locally Nb	SO869593	16/11/99
insect - beetle (Coleoptera)	Phytoecia cylindrica	*Phytoecia cylindrica*	Notable B	SO885591	03/05/07
insect - beetle (Coleoptera)	Rhinocyllus conicus	*Rhinocyllus conicus*	Notable A	SO885591	03/05/07
reptile	Grass Snake	*Natrix natrix*	WCA NERC s.41 UKBAP	SO882603	22/10/02
reptile	Slow-worm	*Anguis fragilis*	WCA NERC s.41 UKBAP WorcBAP	SO869594	06/02/2016
reptile	Slow-worm	*Anguis fragilis*	WCA NERC s.41 UKBAP WorcBAP	SO868590	20/08/02
terrestrial mammal	Badger	*Meles meles*	PBA	SO879597	02/11/15
terrestrial mammal	Badger	*Meles meles*	PBA	SO869592	04/03/14
terrestrial mammal	Badger	*Meles meles*	PBA	SO885591	04/11/2016

terrestrial mammal	Badger	*Meles meles*	PBA	SO883602	05/06/02
terrestrial mammal	Badger	*Meles meles*	PBA	SO884593	06/06/06
terrestrial mammal	Badger	*Meles meles*	PBA	SO887593	10/09/05
terrestrial mammal	Badger	*Meles meles*	PBA	SO87945965	12/04/07
terrestrial mammal	Badger	*Meles meles*	PBA	SO882596	14/01/08
terrestrial mammal	Badger	*Meles meles*	PBA	SO878595	16/01/03
terrestrial mammal	Badger	*Meles meles*	PBA	SO88275975	20/02/14
terrestrial mammal	Badger	*Meles meles*	PBA	SO887593	23/03/10
terrestrial mammal	Badger	*Meles meles*	PBA	SO884593	23/06/06
terrestrial mammal	Badger	*Meles meles*	PBA	SO882599	24/11/2014
terrestrial mammal	Bats	*Chiroptera*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO873591	27/05/11
terrestrial mammal	Brown Hare	*Lepus europaeus*	NERC s.41 UKBAP	SO88685911	02/05/08
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	03/07/2014
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	08/09/2015
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/06/2014
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/07/2014
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	21/07/2016
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	26/08/2016
terrestrial mammal	Brown Long-Eared Bat	*Plecotus auritus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	29/07/2016
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	03/07/2014
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8641359856	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8678458888	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8695158725	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8697358490	04/08/14

terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8717959943	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8768558368	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8661860026	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO8729560304	04/08/14
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	08/09/2015
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	17/06/2014
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	17/07/2014
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO869600	20/08/12
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	21/07/2016
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877588	26/08/2016
terrestrial mammal	Common Pipistrelle	*Pipistrellus pipistrellus*	WCA ECH4 WorcBAP	SO877584	29/07/2016
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882601	01/05/2016
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882601	05/05/2016
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO877594	05/07/14
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882600	08/07/15
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO865588	09/07/01
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO869589	11/07/2016
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882601	11/07/2016
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO869589	19/06/03
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO88476008	22/08/12
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882601	23/06/01
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882600	24/08/12
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO882601	25/04/2015
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO883603	25/09/05
terrestrial mammal	Hedgehog	*Erinaceus europaeus*	NERC s.41 UKBAP	SO877586	27/04/06
terrestrial mammal	Lesser Horseshoe Bat	*Rhinolophus hipposideros*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Lesser Horseshoe Bat	*Rhinolophus hipposideros*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	26/08/2016

terrestrial mammal	Lesser Horseshoe Bat	*Rhinolophus hipposideros*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	27/06/2016
terrestrial mammal	Natterer's Bat	*Myotis nattereri*	WCA ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	03/07/2014
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	08/09/2015
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO879585	11/08/2009
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/06/2014
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/07/2014
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO869600	20/08/12
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	21/07/2016
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Noctule	*Nyctalus noctula*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877586	29/07/2016
terrestrial mammal	Pipistrelle sp.	*Pipistrellus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO8720259971	04/08/14
terrestrial mammal	Serotine	*Eptesicus serotinus*	WCA ECH4 WorcBAP	SO877588	29/07/2016
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	03/07/2014
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO8654159934	04/08/14
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	08/09/2015
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO879585	11/08/2009
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/06/2014
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/07/2014

terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO869600	20/08/12
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	21/07/2016
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Soprano Pipistrelle	*Pipistrellus pygmaeus*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877585	29/07/2016
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	03/07/2014
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/06/2014
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	17/07/2014
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO869600	20/08/12
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877584	21/07/2016
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	25/08/2016
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877588	26/08/2016
terrestrial mammal	Unidentified Bat	*Myotis*	WCA NERC s.41 UKBAP ECH4 WorcBAP	SO877587	29/07/2016
terrestrial mammal	Whiskered Bat	*Myotis mystacinus*	WCA ECH4 WorcBAP	SO877588	11/08/2016
terrestrial mammal	Whiskered Bat	*Myotis mystacinus*	WCA ECH4 WorcBAP	SO877588	26/08/2016
terrestrial mammal	Whiskered Bat	*Myotis mystacinus*	WCA ECH4 WorcBAP	SO877584	27/06/2016

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, Conservation of Habitats and Species Regulations (2017)