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Tyrer Ecological Consultants Ltd, Roselands, Suite 1, 3 Cross Green, Formby, L37 4BH

Technical Appendix IV - Biodiversity Management Advice

Wyreside Master Plan

February 2023



**Wyreside Master Plan
Biodiversity Management Advice**

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Prepared for	Graham Anthony (GA) Associates
Prepared by	Tyrer Ecological Consultants Ltd

Author(s)	Mr. M. Pritchard ACIEEM; Mr. D. Burrows Qualifying CIEEM
Reviewed by	Mrs. K. Wilding CEnv MIEMA ACIEEM
Approved by	Mrs. K. Wilding CEnv MIEMA ACIEEM
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1.0 Introduction

1.1 Tyrer Ecological Consultants Ltd were commissioned by Graham Anthony (GA) Associates on behalf of the owner of Wyreside Hall Hotel owner Wyreside Leisure Limited to produce an Ecological Assessment Report that considers the 'Wyreside Master Plan', an exciting project to create one of the most comprehensive leisure businesses in Wyre. See **Appendix I** for this reference.

1.2 The vision of the 'Master Plan' is to combine four development locations – **Wyreside Hall Hotel, Brook Lodge, Taylors Farm and Rivendell** - through a network of trekking trails and footpaths across the surrounding landscape for recreational enjoyment with each site providing a range of commercial services.

1.3 As part of the Wyreside Master Plan the applicant is proposing to rewild and enhance up to eight biodiversity hotspots in the wider ownership of Wyreside Hall Hotel which this report identifies as **Sites 1-8**.

1.4 A summary of the Master Plan proposals is provided below:

'Satellite developments in association with Wyreside Hall Hotel including: redevelopment of Taylors Farm to create equestrian centre for guest and conversion of existing buildings to overnight accommodation and guest reception; redevelopment of former fish hatchery Brook Lodge to create recreational fishery for guests staying at Wyreside and change of use of land to allow siting of holiday lodges; formation of nature trails and horse trekking routes; designation of rewilding and habitat protection areas in connection with Wyreside Hall;'

1.5 Based on their respective broad primary habitat types, this report presents habitat management and enhancement advice as well as species provisions to consider that would improve the candidate sites for biodiversity.

1.6 Once candidate sites have been selected and approved a bespoke Habitat Management Plan is recommended, it can be secured by a suitably worded condition of planning permission in association with a planning obligation.

1.7 General habitat enhancement measures are covered in this report for the following broad primary habitat types:

- Broad-leaved semi-natural woodland
- Other woodland
- Lines of trees, individual trees
- Hedgerows
- Neutral grassland
- Scrub
- Ponds

1.8 General species enhancement measures are covered in this report for the following groups of animals / species:

- Bats
- Breeding Birds
- Mammals
- Herpetofauna
- Invertebrates

2.0 Ecological Baseline

Site 1 - Brook Lodge

2.1 Primary UK habitats within the given boundary comprise of:

- Lowland mixed deciduous woodland (Priority habitat)
- Standing open water - Ponds (various) (Priority habitat)
- Lines of trees (non-priority but ecologically desirable)
- Other neutral grassland with scattered scrub, scattered trees and tall herbs
- Other neutral grassland
- Dense scrub
- Buildings

2.2 For **Brook Lodge** the reader is referred to **TA1 - Brook Lodge, Scorton – PEA** for comprehensive habitat information.

Site 2 - Taylors Farm

2.3 Primary UK habitats within the given boundary comprise of:

- Hedgerow (non-priority)
- Lines of trees (non-priority but ecologically desirable)
- Other neutral grassland with scattered scrub and scattered trees
- Other neutral grassland with tall herbs
- Other neutral grassland
- Other developed land

2.4 Site 2 is located just west of **Taylors Farm** and comprises a rank grassland for 90% of the Site, bounded by a non-native managed hedgerow to the north boundary and native mixed deciduous treelines to the south and west boundaries formed mainly by maturing Oak, Hawthorn and Willow trees. The sward of the grassland is predominantly rank sloping downhill northwards with the northern region dominated by naturally regenerative Willows and rushes. The central region is dominated by tall herb and ruderal species that included Rosebay willowherb, False oat-grass, Soft rush, Yorkshire-fog and various Docks. The site has two access points in the south-east and south-west corners on higher ground and is evidently used by tractor vehicles moving and storing silage bales which has resulted in some localised ground disturbance and bare earth consequences; a small area of hardstanding is also present in this area. The desktop results showed Great crested newt records have occurred in this boundary.

Site 3 - Finchcroft Wood & Fields

2.5 Primary UK habitats within the given boundary comprise of:

- Lowland mixed deciduous woodland (Priority habitat)
- River & stream (Priority habitat)
- Lines of trees (non-priority but ecologically desirable)
- Other neutral grassland with scattered scrub, scattered trees and tall herbs

2.6 Site 3 is located south of the grounds of Wyreside Hall; Finchcroft Wood is a local name for the broadleaf deciduous woodland that makes up most of the northern region of this site; it is fenced off, contains a public accessible walkway and has a valley like stream flowing west to south-west, a tributary to the River Wyre. Oak and Ash are co-dominant and the woodland is dark. The rest of the site comprises a series of neutral grasslands intersected into four

unmanaged meadows. In each grassland there are areas clearly rank dominated locally by Docks, Willowherbs, Creeping thistle, Reed canary-grass, False oat-grass and Bramble; few areas are species rich, particularly in the southern region which were observed to have local patches of forbs such as Black Knapweed and Yarrow. There are areas where rushes are locally abundant; others contain young, scattered tree regeneration. Treelines typically have a base of established Stinging nettle carpets and are formed by a range of mature species that include Oak, Sycamore, Horse-chestnut, Ash, Sweet-chestnut, Hawthorn. Many of the treelines do not have connecting canopies.

Site 4 – Wyreside Hall Thicket

2.7 Primary UK habitats within the given boundary comprise of:

- Lowland mixed deciduous woodland (Priority habitat)
- Standing open water - Pond
- Mixed scrub

2.8 Site 4 is located just south-west of Wyreside Hall and just north-west of Site 3 described above; it is a scrubby habitat with a section of broadleaf woodland and dense scrub ground cover in its western section and mixed mature Hawthorn scrub in its eastern section. The eastern section also has a heavily shaded pond nearly dried out with leaf litter base; woody species comprise a mix of Hawthorn, Sycamore, Holly, Willow and *Rhododendron ponticum*. Ground flora included Tufted hair-grass, Wood-avens, Herb-robert and Common Figwort. Habitat is loosely linked to a treeline from its north-east corner.

Site 5 – River Wyre Corridor

2.9 Primary UK habitats within the given boundary comprise of:

- Lowland mixed deciduous woodland (Priority habitat)
- Lines of trees (non-priority but ecologically desirable)
- Gorse scrub
- Other neutral grassland
- Buildings

2.10 Site 5 is a continuous linear matrix of habitats high in ecological value in considering their locality along the eastern side of the River Wyre. The linear stretch covers some 0.65km north to south from National Grid Reference: SD51955311 in the north, next to the coniferous woodland Site 8 (described later), south to SD51805246; in the north there are loosely connected treelines with typical neutral grassland communities below – habitat here links to a lowland mixed deciduous woodland in the northern centre, where the river arcs to an ‘S-shape’ if observed from satellite imagery; the woodland has a range of species of varying age and condition and features open glades and scrub cover. Woodland eventually gives way to the loose stone banks of the River Wyre on its western side. At its southern side the woodland opens out to a second treeline similar to that described above which then links south to a continuous extent of dense Gorse dominant scrub exceeding seven metres high in places. In the centre the riverbank narrows to open grassland where the river arcs to the south-west before meeting a second mixed deciduous woodland more densely shaded than the northern. The southern woodland also contains an open access hay barn – the barn offers Bat roost potential and may be an option for enhancement. The southern extent of this site is largely made up of Gorse dominant scrub and patches of grassland. A bridge is present just south of the surveyed area.

Site 6 – Wyreside Hall Treeline

- 2.11 Primary UK habitats within the given boundary comprise of:
- Line of trees (non-priority but ecologically desirable)
- 2.12 Site 6 is located along the eastern boundary region of Wyreside Hall with species rich marshy grassland dominated by various rushes, possibly fen habitat fed by natural waters, on its western side. The treeline is a dense, mixed species assemblage, likely planted, with interconnecting crowns, some die back and several trees forming standing deadwood and offering bat roost potential. Frequent species are Scots-pine, Silver birch, Oak, Beech, Sycamore, Alder, Ash, Field maple and Hawthorn. Blackthorn and Willow are occasional to the sub-canopy. A central linear nerve of Leyland cypress trees form the understory in the north extent and are seemingly young in comparison to the canopy. Bramble scrub and Stinging nettle carpets make up most of the ground cover in the southern extent, which also contains a predominantly dry ditch.

Site 7 – Wyreside Hillside

- 2.13 Primary UK habitats within the given boundary comprise of:
- Line of trees (non-priority but ecologically desirable)
 - Other woodland - mixed but largely broadleaved
 - Other neutral grassland with scattered scrub and scattered rushes
- 2.14 Site 7 is located north-west of Wyreside Hall and comprises a young mixed plantation woodland with glades on a west-facing hill; the glade facing west has 40% scrub cover, 40% tall herb community and 20% species rich neutral grassland over rocks on its river facing side. Scots-pine, Oak, Willow, Field maple, Holly, Hawthorn, Blackthorn, Sycamore and Silver Birch trees form the young woodland, which has reasonable sunlight reaching the ground, and the woodland slopes to the west. The western region of this surveyed area has other neutral grassland, a fence, and a loosely connected treeline of Oaks, below which is both tussock forming and managed neutral grassland. Two Brown hare's were flushed from this area.

Site 8 – Conifer Wood and Field

- 2.15 Primary UK habitats within the given boundary comprise of:
- Line of trees (non-priority but ecologically desirable)
 - Other Scots pine woodland
 - Other woodland mixed
 - Other neutral grassland with scattered scrub and scattered trees
 - Other neutral grassland with scattered scrub and scattered rushes
 - Modified grassland
- 2.16 Site 8 comprises a large mature coniferous woodland located in the north of the site high on the eastern riverbank of the River Wyre; it had various Pines and Larch dominating. The centre of the woodland is dark and steeply valleyed, possibly containing open water. Soils appeared acidic with Bracken and Bramble dominating the woodland ground flora though some areas contained a range of ferns and bryophytes. The south-eastern outer extent of the woodland is double fenced to delineate it from surrounding grasslands and in this area has a adjoining mixed species woodland with maturing Whitebeam, Beech, Alder, Willow, Hawthorn, Sycamore and Field Maple intertwined with some of the conifers. In the east of the site boundary is a loosely connected treeline extending east from the woodland into open surrounding grasslands that appear managed for silage. Along the northern buffer of the

conifer woodland in the north of the survey area is a tussock-forming grassland that margins the woodland with scattered Whitebeam trees present; along the southern extent of the survey area the grassland appeared wetter, more trampled, sloping to the riverbanks to the west and had carpets of rushes including Soft-rush and Jointed Rush as well as Bramble scrub; this area could be enhanced to lowland meadow. The more improved grasslands were closely cropped through cutting with Yorkshire-fog, White clover and Red fescue dominant.

3.0 Habitat Enhancement Measures

3.1 Broadleaved semi-natural woodland

- 3.1.1 There are different ways in which broadleaved woodland can be managed to conserve value for wildlife. The following gives broad views on a range of regimes that may be appropriate.
- 3.1.2 A diverse woodland structure, with open space, a dense understorey, and a more mature canopy is important. A range of ages and species within and between stands is desirable. Some dead and decaying wood, such as fallen logs, can provide habitats for fungi and invertebrates. However, work may be needed to make safe dangerous trees in areas of high public access. Both temporary and permanent open spaces benefit groups of invertebrates such as butterflies. They may require cutting to keep them open and should be of sufficient size to ensure that sunny conditions prevail for most of the day.
- 3.1.3 Felling, thinning or coppicing may be used to create or maintain variations in the structure of the wood, and non-native trees and shrubs can be removed at this time. To avoid disturbance to breeding birds the work is normally best done between the beginning of September and the end of February. Work should be avoided when the ground is soft, to prevent disturbing the soil and ground flora. Normally successive felling, thinning or coppicing operations should be spread through the wood to promote diversity, but where there is open space adjacent plots should be worked to encourage the spread of species that are only weakly mobile. Natural regeneration from seed or stump regrowth is preferred to planting because it helps maintain the local patterns of species and the inherent genetic character of the site.
- 3.1.4 Deer management and protection from rabbits or livestock are often necessary. Whilst light or intermittent grazing may increase woodland diversity, heavy browsing can damage the ground flora and prevent successful regeneration. Invasive species, such as Rhododendron or Himalayan balsam, should be controlled.
- 3.1.5 Parts of a wood should be left unmanaged to benefit species that do best under low disturbance or in response to natural processes. Within these areas some trees will eventually die naturally, and dead wood accumulate

3.2 Other Woodland

- 3.2.1 Creation of open spaces within any woodland can enhance the heterogeneity of flora and faunal species within a given area as well as connecting adjacent natural habitats.
- 3.2.2 Open spaces can be temporary, where trees are allowed to regrow after a time; permanent, where trees are managed in such a way to ensure no regrowth.
- 3.2.3 Create open areas if there's no open space. The total area of open space within each woodland should ideally be between 10% and 20%. This can include permanent and temporary open spaces. In smaller woods, temporary open spaces and well-managed edges should provide enough open habitat.
- 3.2.4 Avoid clearing areas containing valuable woodland features, such as veteran or ancient trees or rare bryophytes. Do not do any work that could disturb or damage protected species, semi-natural habitats, and/ or historic features.
- 3.2.5 Create new open spaces in woodland where the canopy is dense. Trees surrounding existing open space can also be removed to widen and restore existing open spaces.
- 3.2.6 For temporary open spaces you should leave the space to fallow for one season, then let the trees regrow or replant them. In a temporary open space trees should reach closed canopy again within 15 years. When creating temporary open space, incorporate space created by natural tree fall alongside planned tree felling.
- 3.2.7 Permanent open space will need annual management to ensure trees and scrub do not recolonise. This will include annual mowing, periodic or low-level grazing. Avoid overgrazing open spaces by livestock or wild animals. You can do this by managing wild mammal numbers or removing livestock from the site.
- 3.2.8 Creation of rides, a form of open space within a woodland, should include all the area between the trees on either side.
- 3.2.9 General advice is to keep rides wide, approximately 30 metres between the mature trees on the ridge edges. Wide rides allow light to reach the floor and reduce shade from the surrounding woodland; they will also be a more effective fire break.
- 3.2.10 Manage rides to make sure there are patches of short turf, medium and tall grass and flowering plants, and coppiced shrubs and bushes with brambles. This can be achieved by managing rides in 25, 50 metre and 100 metre strips; plant a diverse range of species (50% cover within the rides), keep small patches of bare ground, cut vegetation at varying heights.
- 3.2.11 Cut woody shrubs between August and March to avoid disturbing wildlife. Avoid cutting and mowing all the open areas at the same time. Cutting and mowing on rotation makes sure there's always suitable habitat for wildlife. Avoid winter cutting if there's a high risk of compaction to wet soils. Remove grass cuttings to avoid smothering plants. Where this is not possible, thinly scatter them across the site or gather into heaps. Mounds of grass provide valuable breeding habitat for reptiles (e.g. grass snakes).
- 3.2.12 Leave dead and dying tree stumps as well as ground lying dead wood. These provide habitats for cavity- nesting birds and other species, like fungi.

3.3 Lines of trees, individual trees

3.3.1 Where there are lines of trees there should be an emphasis on retaining mature and veteran trees which can be of exceptional value to biodiversity.

3.3.2 A mature tree in this context is one that is at least 2/3 expected fully mature height for the species. All ancient trees are veteran trees, but not all veteran trees are ancient. A veteran tree may not be very old, but it has decay features, such as branch death and hollowing. These features contribute to its biodiversity, cultural and heritage value.

3.3.3 Veteran trees can be classified if they have four out of the five following features:

1. Rot sites associated with wounds which are decaying >400 cm²;
2. Holes and water pockets in the trunk and mature crown >5 cm diameter;
3. Dead branches or stems >15 cm diameter;
4. Any hollowing in the trunk or major limbs;
5. Fruit bodies of fungi known to cause wood decay

3.3.4 Aim to ensure that tree canopy is joined and predominantly continuous with gaps in canopy cover making up <10% of total area and no individual gap being >5m wide.

3.3.5 Aim to ensure there is an undisturbed, naturally vegetated strip of 6 metres on both sides of the trees to protect it/them from farming and other anthropogenic operations.

3.3.6 Where tree planting is necessary, aim to plant native species that are suitable for the area and habitat as opposed to non-native exotic species of little value to biodiversity.

3.3.7 The exact timing of the proposed planting should be dependent on the ground conditions, but planting should ideally take place between the months of December and February inclusive, This will allow plants more time to establish a network of feeder roots before the onset of spring. Planting should avoid freezing and water-logged conditions.

3.3.8 All trees should be protected from grazing damage by the fitting of welded mesh tree guards. Composted bark mulch will be spread to a depth of 75mm in a 1m diameter circle around all individual trees, ensuring that desirable groundcover plants (where present) are not buried.

3.3.9 A list of species typically suitable for tree planting are as follows (list non-extensive):

Trees	Alder Buckthorn	<i>Frangula alnus</i>
	Osier	<i>Salix viminalis</i>
	Pedunculate Oak	<i>Quercus robur</i>
	Rowan	<i>Sorbus aucuparia</i>
	Silver Birch	<i>Betula pendula</i>
	Wild Cherry	<i>Prunus avium</i>

3.4 Hedgerows

- 3.4.1 A hedgerow is defined as any boundary line of trees or shrubs over 20m long and less than 5m wide, and where any gaps between the trees or shrub species are less than 20m wide. Any bank, wall, ditch or tree within 2m of the centre of the hedgerow is considered to be part of the hedgerow habitat, as is the herbaceous vegetation within 2m of the centre of the hedgerow. Climbers such as honeysuckle and bramble are recognised as integral to many hedgerows, however they require other woody plants to be present to form a distinct woody boundary feature.
- 3.4.2 Aim to ensure hedgerow height and width are >1.5m and the base of the hedgerow ~0.5m from the ground. The areas at the base of hedgerows should aim to be protected and host natural vegetation.
- 3.4.3 Enhancement might consider removal of any invasive non-native species or neophytes from the base of hedgerows based on the habitat types: (*Neophytes are plants that have naturalised in the UK since AD 1500*). For information on neophytes see the JNCC website and for information on invasive non-native species see the GB Non-Native Secretariat website.
- 3.4.4 Enhancement of a hedgerow should typically aim to plug any gaps in existing hedgerows using suitable native species such as:

Woody shrubs	Blackthorn	<i>Prunus spinosa</i>
	Dog-rose	<i>Rosa canina</i>
	Dogwood	<i>Cornus sanguinea</i>
	Elder	<i>Sambucus nigra</i>
	Field Maple	<i>Acer campestre</i>
	Guelder Rose	<i>Viburnum opulus</i>
	Hawthorn	<i>Crataegus monogyna</i>
	Hazel	<i>Corylus avellana</i>
	Holly	<i>Ilex aquifolium</i>

- 3.4.5 The exact timing of hedgerow planting should be dependent on ground conditions, but bare-root planting should ideally take place between the months of December-February inclusive. It is expected that ground conditions and climate will allow for earlier planting (i.e. before January), and this will allow the plants more time to establish a network of feeder roots before the onset of spring. Planting should avoid freezing and water-logged conditions.
- 3.4.6 Planting slots should be made using a planting spade. Plant notches should be L- shaped, using spades of a design suitable for this purpose. The planting notches must be vertical and deep enough for roots to hang freely, with the transplant being planted so that the root collar is exactly level with the ground surface. The notch must then be closed and the soil well firmed round the roots in line with the guidelines as set out in BS 4428 (1989).
- 3.4.7 If ground conditions are dry during the time of planting (unlikely during December-February) then all individual plants should be well watered following planting.
- 3.4.8 All hedgerow planting stock should be protected from rabbit damage using approved proprietary 600mm clear plastic spiral guards, supported with 0.9m 12/14lb canes as advised by the manufacturer (to be removed once plants have established).

3.5 Neutral grassland

Dry grassland

- 3.5.1 Neutral dry pastures require active management if they are to offer conservation interest. In order to maintain a species-rich sward, each year's growth of vegetation must be removed otherwise the sward becomes progressively dominated by tall and vigorous grasses which, together with an associated build up of dead plant matter, suppress less vigorous species and reduce botanical diversity.
- 3.5.2 On pastures, this management is achieved by grazing. The precise timing and intensity of grazing will vary both between and within sites, according to local conditions and requirements (such as, for example, type or availability of stock or the needs of individual plants or animals of conservation concern) but should aim to keep a relatively open sward without causing excessive poaching. Light trampling can be of benefit by breaking down leaf litter and providing areas for seed germination. No other management should be routinely required. Any surrounding, well-managed hedgerows may considerably add to the habitat in providing shelter for invertebrates. The application of pesticides including herbicides or fertilizer (including manure or slurry) would be damaging and should be avoided. Occasional dressings of lime may be acceptable.
- 3.5.3 For damper pastures, regular and careful maintenance of surface drainage including ditches and drains can be essential to prevent adverse changes in the plant species composition of the sward. Deepening of surface drainage should be avoided.
- 3.5.4 Grassland should be managed according to the grassland type, to provide a varied habitat structure providing nesting opportunities for birds and nectar, pollen and shelter for invertebrates, amphibians, reptiles and small mammals.
- 3.5.5 Taller and structurally varied grassland vegetation managed for conservation purposes should be encouraged and managed as species-rich tussocky grassland, with additional species-rich 'floodplain' grasslands encouraged to develop also. Occasional bare patches, either naturally arising or created in the course of management should be tolerated and retained as these increase micro-topographic diversity and variety of ground conditions which can be essential for the life cycle of many invertebrate species and also may potentially be utilised by skylark for nesting and feeding purposes. These small areas also provide periodic disturbed ground conditions necessary to develop and maintain typical wildflower communities.

Wet grasslands and marsh

- 3.5.6 Neutral hay meadows and marshy grasslands require active management if they are to retain their conservation interest. In order to maintain a species-rich sward, each year's growth of vegetation must be removed otherwise the sward becomes progressively dominated by tall and vigorous grasses which, together with an associated build up of dead plant matter, suppress less vigorous species and reduce the botanical diversity of the site. In neutral hay meadows, the above objective is traditionally achieved by closing the fields to stock in the autumn and cutting the resultant growth as hay. The cut is usually done in early July, but the precise timing depends on local factors, including past management and current weather conditions. It should always be after ground-nesting birds have fledged their young and any short-lived, characteristic plants have set seed. The aftermath is then grazed in late summer/autumn.
- 3.5.7 Aftermath grazing is important for maintaining a species-rich sward, both through controlling competitive grasses and through hoof-prints providing suitable sites for seedlings to establish. Heavy poaching must be avoided.

- 3.5.7 On marshy grassland this management is achieved by grazing. Cattle are often the preferred stock, being relatively tolerant of wet conditions and able to control tall grasses and rank vegetation. Cattle also tend to produce a rather uneven, structurally diverse sward. However, ponies, or even hill sheep, can be used if necessary. Grazing usually takes place at times between late spring and early autumn, but the precise timing and intensity will depend on local conditions and requirements, such as the need to avoid trampling ground-nesting birds. Heavy poaching should be avoided but light trampling can be beneficial in breaking down leaf litter and providing areas for seed germination.
- 3.5.8 An element of managed scrub, both within and fringing a field can be of importance to birds and invertebrates, as can a surrounding hedge. Careful maintenance of existing ditches and drains is usually acceptable practice, but abandonment or deepening of ditches can be harmful.

3.6 Scrub

- 3.6.1 Scrub succeeds naturally; favourable scrub habitat possess a varied size, extent and growth composition and comprise at least three native woody species, typical species include Bramble, Hawthorn, Gorse, Blackthorn as well as various Willow.
- 3.6.2 Any invasive non-native species INNS should be eradicated as part of enhancement of scrub.
- 3.6.3 Favourable scrub would ideally have a well-developed edge with scattered scrub and tall grassland and/or herbs present between the scrub and adjacent habitat(s).
- 3.6.4 Additionally, there should be clearings, glades or rides present within the scrub, providing sheltered edges.

3.7 Ponds

- 3.7.1 Where possible, rather than make a new pond aim is to enhance existing pools in the landscape that arise where water pools seasonally.
- 3.7.2 When dry start by digging a deep area centrally (dig to 2.0 metres) using a long-reach excavator or other light digger with toothed bucket. Ideally, first strip the topsoil and remove it before you start digging. This will reduce the amount of nutrients entering the water. Excess nutrients can pollute the water and encourage the growth of algae.
- 3.7.3 Ensure gradually shallower margins are created and or manipulated into the design. The edges of ponds are usually the richest areas for wildlife. To increase this habitat, create long, irregular shaped edges and shallow, undulating banks. Some species prefer cold, deep water, while others need warmer, shallower water.
- 3.7.4 Create plenty of shallow areas (less than 10cm deep) around the edges. Slopes should be no more than 1:5 (12 degrees) and preferably less than 1:20 (3 degrees). Use the teeth of the excavator bucket to create mounds and hollows around the pond or lake edge. This will create niches for different species to colonise.
- 3.7.5 Aim to vary the depth of the pond and use some subsoil to create different depths to the pond. At least part of the pond margin should be shallow to enable wildlife to enter and leave safely and create a boggy area suitable for moisture loving plants (prescribed species in Figure 5). The more varied the pond shape the greater mosaic of vegetation is possible.
- 3.7.6 Allow the pond or lake to fill and dry naturally. Ponds that dry up occasionally are more effective ponds for biodiversity due to absence of fish (predators).
- 3.7.7 Spread any remaining subsoil away from the site if possible. Do not spread any material, especially topsoil, uphill of the pond or lake because soil and nutrients will wash into the water. Spreading uphill will also block surface runoff and restrict the water supply.
- 3.7.8 You can use some of the spoil to create south-facing banks as basking sites for reptiles or as beetle banks.
- 3.7.9 Water levels should be allowed to fluctuate naturally throughout the year. These changes create important areas of marginal habitat, which are usually underwater in winter but exposed in summer.
- 3.7.10 Sufficient sunlight must be allowed to reach the pond water to enable photosynthesis of the pond plants, so do not plant a large number of trees around the pond. Leaf litter from surrounding trees will accumulate and cover the pond surface in Autumn, which reduces oxygen supply and leads to plant death, algae blooms and eutrophication. Therefore, any proposed tree planting close to the pond need to carefully considered along with wind direction to help direct tree debris away for the pond where possible.
- 3.7.11 The pond should be filled with rainwater only as is currently the case, so avoid using tap water. Water quality needs to be monitored periodically to maintain a healthy pond ecosystem. Consider a nutrient management plan.
- 3.7.12 Algae may bloom in the initial phase after pond is established due to high nutrient levels in water. Bundles of tightly bound twigs or straw will help keep the algae bloom down by providing a home for microscopic animals that live on algae, encouraging creatures to the pond like water snails that eat algae.

- 3.7.13 Periodic removal of algae can be done by hand or using a small net. Leaving the removed algae at the side of the pond for a few days allows the microscopic pond creatures living in the algae can migrate back to the pond.
- 3.7.14 The pond's water level should be allowed to alter throughout the year as fluctuating water levels help accommodate a rich marginal habitat. Creating artificial floating islands helps attract birds, frogs and tiny organisms and a diverse ecosystem. Due to closeness to agricultural land surface water run-off and silt build can occur will need to be assessed periodically to maintain a viable wildlife pond.
- 3.7.15 Pollution / litter control should take place as part of a maintenance plan.
- 3.7.16 Be careful that you or your contractors do not introduce disease or invasive non-native species (INNS), such as Canadian waterweed (*Elodea canadensis*).
- 3.7.17 Ponds are a hazard to children and if protection is required an appropriate barrier should be provided. Wooden palisade fencing is recommended with vertical slats with a maximum gap between each of 100mm. Fencing must be at least 1100 mm high. All access gates must be lockable, and their padlocks or other locks kept in good working condition with access to be limited to authorised adults only.

Plant supply advice

- Avoid garden center plants as the root stock may contain invasive species,
- Use local/native plant species. If possible, let species colonize the pond naturally,
- Choose plants for all the water levels (zones) and areas of the pond,
- Do not plant in a crowded manner (see plant specification as a guide) to allow for the arrival of natural pond plants that allow no planting but space to grow.
- Only source desired plant stock from local reputable sources,
- Be careful that you or your contractors do not introduce disease or invasive non-native species (INNS), such as Canadian waterweed (*Elodea canadensis*).

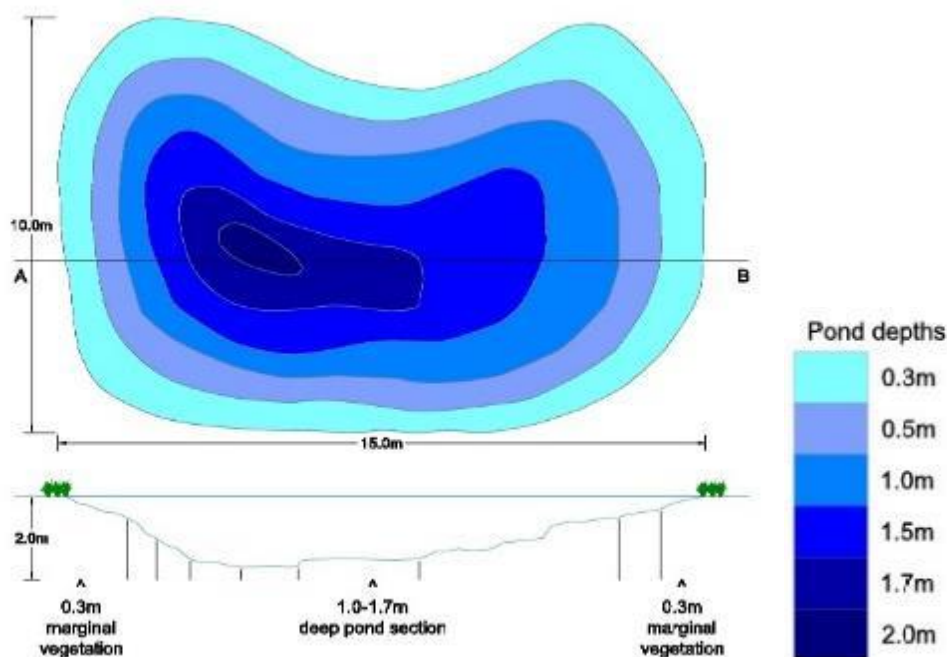
Desired native species for planting in various pond zones

Planting Zone				
Pond adjacent	Flat to margin zones		Deepening zones	Deep zones
Ragged robin <i>Lychnis flos-cuculi</i>	Meadowsweet <i>Filipendula ulmaria</i>	Water-forget-me not <i>Myosotis scorpioides</i>	Water Plantain <i>Alisma plantago-aquatica</i>	Water Crowfoot <i>Ranunculus aquaticus</i>
Soft rush <i>Juncus effusus</i>	Marsh Marigold <i>Caltha palustris</i>	Purple Loosestrife <i>Lythrum salicaria</i>	Frogbit <i>Hydrocharis morsus-ranae</i>	Common water-starwort <i>Callitriche stagnalis</i>
Cuckoo flower <i>Cardamine pratensis</i>	Marsh Cinquefoil <i>Potentilla palustris</i>	Water mint <i>Mentha aquatica</i>	Greater Spearwort <i>Ranunculus lingua</i>	Common Hornwort <i>Ceratophyllum demersum</i>
Jointed rush <i>Juncus articulatus</i>	Yellow flag-iris <i>Iris pseudacorus</i>	Brooklime <i>Veronica beccabunga</i>	Amphibius Bistort <i>Polygonum amphibium</i>	White water-lily <i>Nymphaea alba</i>

Seasonal Pond Plant Management Plan

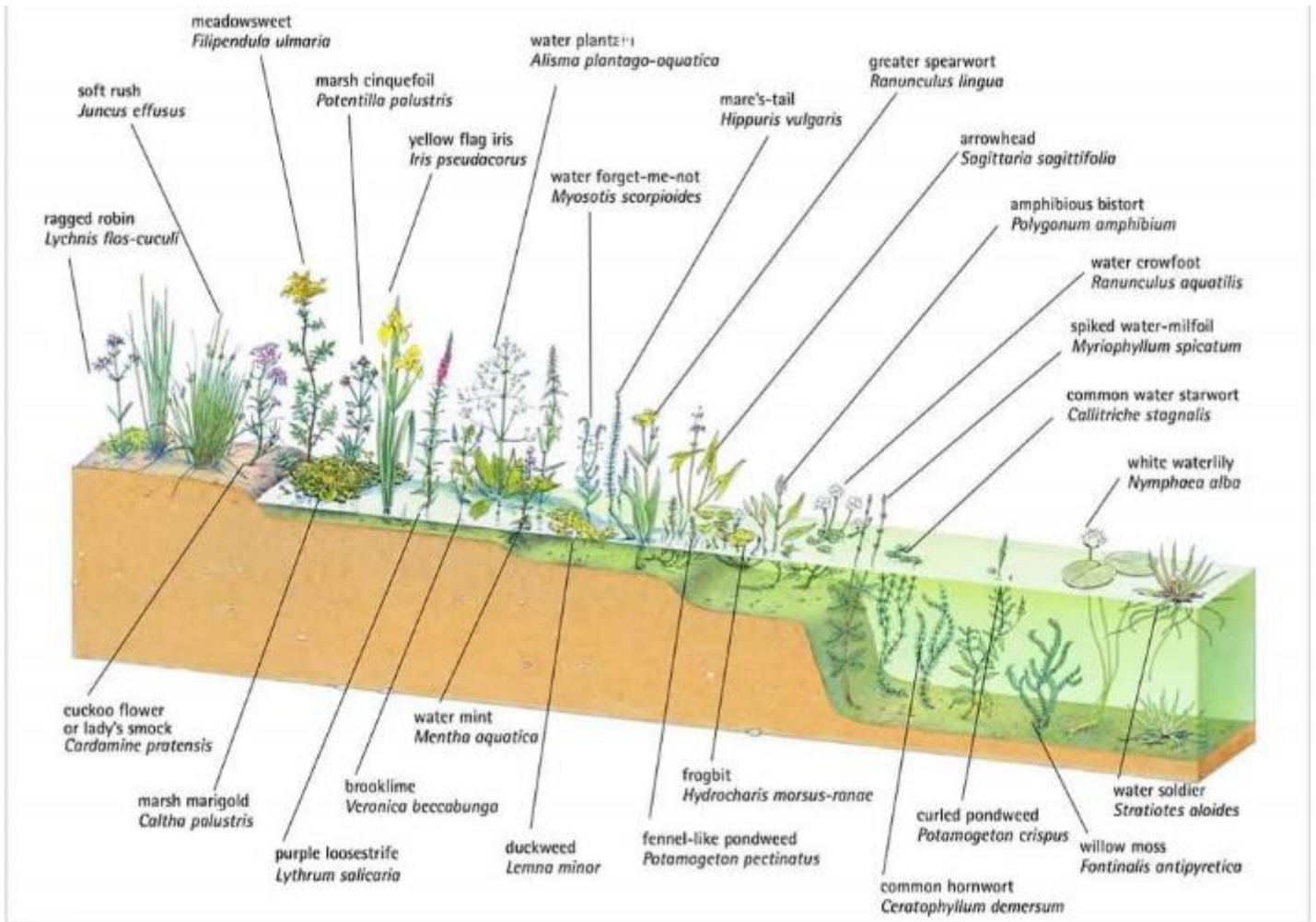
Spring	Summer	Autumn	Winter
Addition of new plants	Top up with rainwater if level drops too low depending on the weather	Remove silt using a net as required when pond is less active	Remove heavy snow fall and ice fall from the pond surface
Add Barley straw pads to reduce algae	Remove blanketweed taking care not to disturb wildlife	Remove fallen leaves to allow adequate light to the pond	Create a small hole if ice has covered the pond surface completely
Divide and thin plants Compost the excess	Cut back vigorous plants and faded flowers where possible	Remove fallen twigs, branches after windy weather	Leave a fresh water supply in a bowl near to pond for birds who normally rely on the pond water to drink and bath
Minimal disturbance below the surface to prevent damage to wildlife	Allow some grass at pond edges to grow long to provide wildlife shelter	This is a good time to dig out for a new pond	Place a few small stones in the bird bowl to prevent the water freezing
	Check for yellowing leaves and general plant indicating nutrient imbalance. Look for signs of pests and disease	Fence repairs as required	Study plant catalogues if further planting is required and place orders

- Aim for varying pond depths



**Wyreside Master Plan
Biodiversity Management Advice**

- Typical wildlife favourable pond plant community






4.0 Species Enhancement

Bats

4.1 Enhancement for bats typically comprises the planting of woodlands, dark corridors and linear habitat such as hedgerows and treelines supplemented by the provision of bat boxes on trees and structures such as buildings, bridges and walls.




4.2 Suitable bat boxes are given below (list non-extensive and other models are available).

Bat boxes		
Large Twin Crevice		Primarily for use by roosting bats but may also be used by small birds as a safe roost site. Two curved internal voids narrowing down to tight crevices at the top. Suitable for a range of bat species, mating roosts and spring and autumn roosts where the thermal mass is a benefit. Top loop for more comfortable carrying and quick initial attachment to the tree and two <i>through the box</i> nail holes for secure attachment of this heavy box.
Kent type twin crevice		Two parallel crevices for roosting bats with internal connection to move between the two. Light internal finish for helping to spot bats, droppings and rub marks. Top loop for quick and easy initial attachment to the tree, plus two 'through the box' nail points for maximum security.
Bat chamber		Primarily for use by roosting bats including as an autumn mating roost, particularly for pipistrelles. Also likely be used by small birds as a safe roost site. 16mm hole for endoscope inspection in the base facilitating inspection, potentially avoiding working at height with the right equipment. Light internal finish facilitates detection of droppings or rub marks. Top loop makes initial attachment to the tree easier – with two further attachment points for 6" nails for security.
Timing	Bat boxes can be installed at any time of year.	
Other Notes	Note that once bats have inhabited a roost they may only be disturbed by licensed bat workers.	
References	https://www.barkboxes.co.uk/product/large-twin-crevice/	

	https://www.barkboxes.co.uk/product/large-twin-crevice/ https://www.barkboxes.co.uk/product/bat-chamber/
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Breeding birds

- 4.3 Enhancement for birds typically comprises the retention and maintenance of nesting habitats; birds will nest in a wide variety of habitats from the various levels of trees to scrub, buildings, even bare earth in the ground. Optimal breeding bird habitat will offer a range of nesting and feeding opportunities and be subject to low disturbance.
- 4.4 Suitable breeding bird boxes are given below (list non-extensive and other models are available).

Breeding bird boxes		
Great tit / tree sparrow nest box		Nest box and roost site with 28mm entrance suitable for great tit or tree sparrow. Likely to be used by roosting birds, one of these was adopted by a blue tit whilst still in production, and with potential for use by roosting bats.
Branch stub		Replicating a rotting branch stub with void. More likely to be used by nesting and roosting birds than roosting bats.
Open fronted nest box		For birds such as robin <i>Erithacus rubecula</i> and pied wagtail <i>Motacilla alba yarrellii</i> . Open fronted but with a generous canopy to screen from aerial predators. Place in good cover not in the open.
Timing	Bird boxes will be erected outside of the breeding bird season, to eliminate the possibility of disturbing birds currently utilising the trees for nesting.	

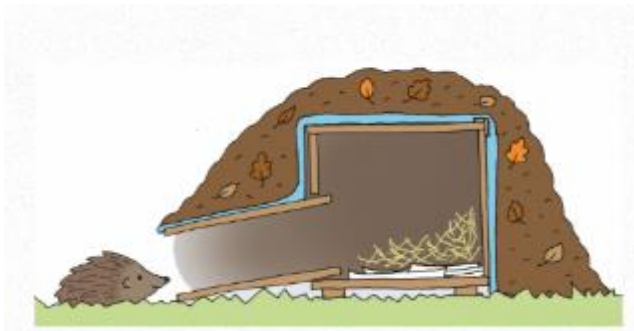
Other Notes	Note that bird boxes should not be opened between the months of March to September to avoid disturbing nesting birds.
References	https://www.barkboxes.co.uk/product/great-tit-tree-sparrow/ https://www.barkboxes.co.uk/product/branch-stub/

Barn Owl Box	
Eco Barn Owl Nest Box	 <p>The recycled plastic means that this nest box is extremely robust and requires virtually no maintenance and has a long life expectancy. The wooden base, made from FSC certified chip-board, absorbs moisture from the nest and should be replaced every few years. The black and green colouration ensures the nest box blends into its surroundings. The curved roof integrates with the sides of the box and overlaps the back and the front of the box to ensure the inside of the box remains dry.</p>
Siting	<p>The box is secured at least 3 metres above ground level, using a separate fixing bracket that can be fitted to a tree or wall, with screws or straps. Once the bracket is fixed in place the nest box simply hooks onto the bracket.</p> <p>The box should be fixed to a mature tree with a thick trunk, isolated, in a hedgerow or on the woodland edge. Preferably with few or no low branches and a high canopy; where the nestbox access hole would be visible to a passing owl, even when the tree is in full leaf and seen from a distance.</p> <p>The box should also be positioned quite close to strips or patches of rough grassland (in this instance suitable grassland is included as part of the landscape proposals).</p>
Timing	The box should be erected outside of the breeding bird season, to eliminate the possibility of disturbing birds currently utilising the trees for nesting.
Other Notes	Please note that Barn Owls are a Schedule 1 species and so an occupied box must only be disturbed or inspected by a licensed individual.
Reference	Eco Barn Owl Nest Box The Nestbox Company

Mammals - terrestrial

- 4.5 Mammals are highly adaptable and use a range of habitats likely to broadly benefit from any management plan.
- 4.6 The number of hedgehogs in the UK has plummeted over recent years; while there were estimated to be around 1.5 million in 1995 it is believed hedgehogs now number two thirds less at 500,000. Hedgehog homes could be provided as part of enhancement in close proximity to commercial works; a design suggestion can be found below.
- 4.7 Hedgehogs need homes just like humans, so making one for them is a great way to encourage them. Some tips include:
- Find a location - It should be sited in a quiet position out of prevailing wind in an area with some nearby cover. The front entrance should be out of the wind.

- Cover the outside - Cover the outside in a pile of woody garden cuttings and leaves. You can also cover it with soil, as long as the entrance hole and ventilation pipe is clear.
- Aftercare - It's worth clearing out the hedgehog home, every year or two. You can do this in April, after their hibernation but before hedgehogs start producing hoglets. However, the ideal time is in October before they go into hibernation, and after most of the litter have been weaned.
- Monitoring your hedgehog home - Remember that you won't see any activity between October and March/April when they're hibernating.
- If you'd like to find out if your box is being used, put something in front of the entrance that won't blow away but can be easily moved by a hedgehog, like a scrunched-up piece of newspaper. If a hedgehog is at home, you'll find it will have been moved by the next morning.



For Hedgehog Homes - [Hedgehog House, with weatherproof lid : Riverside Woodcraft](#)

Herpetofauna

- 4.8 Hibernacula are underground chambers that amphibians and reptiles use throughout the winter to protect themselves from the cold. Creating a hibernaculum will provide a safe space for amphibians and reptiles to hibernate over winter, as well as a spot for solitary bees to soak up the sun and for birds to relax. These habitats can be integrated into a wide variety newly created or enhanced habitats and attract herps to new areas.

You will need:

- A spade
- Logs and branches
- Rocks and bricks
- 2-3 drainpipe cut-offs or cement pipes (if using plastic drainpipes, roughen the insides with sandpaper, so that they are not too slippery for animals to climb)
- Turf or meadow flower seeds (optional)

How to make your hibernaculum yourself:

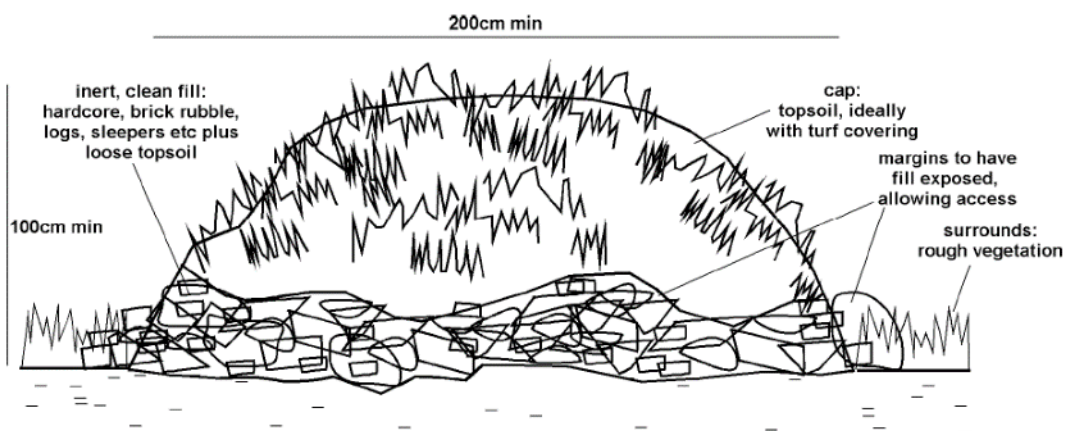
- In a sunny spot, dig a hole about 50cm deep and 1.5 metres across.
- Fill with logs, branches, bricks and rocks, leaving plenty of gaps in between.
- Insert entrance tubes (drainpipes) at ground level into the hole.
- Cover the pile with soil (to about 50cm high).

- Plant meadow seeds or long grasses over the mound to create a feast for summer pollinators.

To construct a hibernaculum to Natural England standard:

- in desired areas, remove the turf from the footprint of the hibernaculum and set aside.
- On well-drained soil excavate to a depth of approximately 500 mm and set aside spoil (this is unnecessary on poorly drained soils).
- Fill the footprint or pit with core material. Materials likely to retain moisture are preferable, such as cut timber, brash and grubbed up tree roots. Other material such as inert hardcore, bricks, rocks, and building rubble may also be used. Materials that will decompose should not be placed beneath heavy components such as bricks or rocks, to reduce the risk of collapse.
- Pack the larger spaces within the core materials with wood chippings, loose topsoil or spoil.
- Cover the hibernaculum with the turves removed from the footprint.
- Take care not to create structures that might attract rodents, such as piles of rubble with many entrance holes. There has been no rigorous investigation of the optimum size of hibernacula, but larger hibernacula are probably more useful than small constructions because they contain a variety of different microhabitats and are more likely to maintain stable conditions.
- A suggested minimum size is 4.0 m long by 2.0 m wide by 1.0 m deep. 2.0 x 2.0 x 1.0 metres (length x width x height) as a minimum.

Illustrative aid for hibernaculum:



Invertebrates

- 4.9 This group would benefit from the range of habitat enhancement recommended in section 3.0; for visual amenity insect hotels could be introduced along tracks and trails or close to commercial services.

Insect hotels provide a habitat for a variety of insects. Designs can be small or large enough to create a focal point in a wildlife garden and sturdy enough to last for years. Ensure hotels are made from untreated wood, which is important as insects need natural materials to thrive, and split into sections that each contain a different nesting material. There should be pine cones for ladybirds, wood slits for butterflies and moths, bamboo canes for solitary bees, and loose pieces of wood for beetles.

Placement: Size against walls or fences and fix to prevent toppling. The feet keep the main body off the damp ground. You could push bricks against them to keep the bug hotel upright, which would also encourage woodlice and even frogs that enjoy cool stone conditions.



Examples of larger insect hotels



Examples of smaller insect hotels

External Appendix

Wyreside Master Plan – Tyrer Ecological Consultants Ltd, November 2022

