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Tutbury, Staffordshire Habitat Enhancement and Management Strategy



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Report to:

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1 Summary

- 1.1.1 ECUS Ltd have been commissioned by Peveril Homes Ltd to produce a Habitat Enhancement and Management Strategy for a mixed-use, housing-led development scheme in Tutbury, Staffordshire.
- 1.1.2 The existing site comprises a mosaic of arable fields and species-poor, semi-improved grassland, with a hedgerow network across the site and a pond immediately adjacent to both the southern and northern boundary, though outside the red line boundary.
- 1.1.3 The development will incorporate numerous enhancements of habitats present within the application area and to benefit specific species that may use the site.
- 1.1.4 The hedgerows along the southern boundary will be enhanced and managed for wildlife, with gap planting and standard tree establishment where appropriate. A hedgerow margin will also be developed on the northern side of the hedgerow and planted with an appropriate wild flower/arable seed mix.
- 1.1.5 A wetland area will be created within the central section of the site, incorporating a permanently wet pond, which will be connected to two seasonally wet ponds by swales. This area will be planted with appropriate vegetation and seed mixes to provide a benefit for wildlife.
- 1.1.6 Soft landscaping is incorporated within residential areas, including substantial tree planting, use of native landscape planting and the inclusion of allotments and open space in the southern section of the site.
- 1.1.7 Bat roosting and bird nesting provision will be incorporated into housing on site.
- 1.1.8 Hibernaculum for common amphibian species will be incorporated within the wetland area.
- 1.1.9 A management schedule for the next five years has been produced, to include monitoring the development of the southern hedgerows and the wetland area to ensure successful and effective management. The usage of the bird and bat provision will also be monitored.

2 Introduction

- 2.1.1 Peveril Homes Ltd intend to submit a planning application for a mixed-use, housing-led development scheme, with associated infrastructure and landscaping, for a parcel of land at Tutbury, Staffordshire. The proposed development layout is shown in Figure 1 (Appendix 1).
- 2.1.2 As part of the planning application, Peveril Homes have commissioned ECUS Ltd to produce a Habitat Enhancement and Management Strategy for the proposed development.
- 2.1.3 This document identifies the key features of ecological interest associated with the site and details the agreed ecological management of these features, including retention and enhancement. The locations of existing wildlife features are provided in the habitat map in Figure 2.
- 2.1.4 Documents that inform this Habitat Enhancement and Management Strategy include the Ecological Assessment Report (ECUS Ltd, 2010a) and Great Crested Newt and Bat Survey Report (ECUS Ltd, 2010b).

3 Existing Conditions

3.1 General Site Description

- 3.1.1 The site at Tutbury comprises approximately 15 ha of arable fields and species-poor, semi-improved pasture, bordered by hedgerows and scattered trees. There are two ponds outside but adjacent to the site boundary.
- 3.1.2 The site is bordered to the north and west by the village of Tutbury and to the south and east by farmland. Burton Road (A511) runs along the eastern boundary of the site. The wider area comprises farmland, extensive hedgerow networks and the River Dove located approximately 1 km to the north of the village.
- 3.1.3 Tutbury Mill Fleam, a Biodiversity Alert Site (BAS), covers approximately 2.7 ha and is located approximately 750 m to the north of the application area. The BAS comprises amenity grassland of low ecological value with broadleaved, semi-natural woodland and a mill fleam containing abundant aquatic vegetation.
- 3.1.4 Full details of the habitat and species interests present on the site are presented within the initial ecological assessment report (ECUS Ltd, 2010) and summarised below.

3.2 Habitats

- 3.2.1 The site is characterised by a number of habitat types comprising arable fields, species-poor, semi-improved pasture, hedgerows and scrub. The characteristics of each habitat type are described below.

Arable

- 3.2.2 Approximately 50 % of the site comprises arable fields. These constitute a semi-natural habitat of low ecological value and at the time of survey did not contain features of interest to nature conservation, such as diverse field margins. These fields may provide some foraging habitat for a range of garden and farmland bird species, as well as occasional foraging habitat for badgers.

Species-poor, semi-improved grassland

- 3.2.3 Approximately half of the site comprises species-poor, semi-improved grassland, which was grazed by cattle at the time of survey. Species present included cock's foot (*Dactylis glomerata*), perennial rye-grass (*Lolium perenne*), creeping thistle (*Cirsium arvense*), white clover (*Trifolium repens*) and ribwort plantain (*Plantago lanceolata*).
- 3.2.4 This habitat is species-poor and contains species that are common and widespread both locally and throughout the UK. This habitat provides very limited value for nature conservation due to the limited diversity of plant species and the nitrogen enrichment resulting from regular cattle grazing. This habitat will however provide feeding areas for a range of garden and farmland bird species as well as occasional foraging habitat for badgers.

Hedgerow

- 3.2.5 There are 14 intact hedgerows (H1-14) on site and a single defunct hawthorn (*Crataegus monogyna*) hedgerow (H15). All are dominated by hawthorn or elder (*Sambucus nigra*), with frequently occurring blackthorn (*Prunus spinosa*), holly (*Ilex aquifolium*), English elm (*Ulmus procera*) and occasionally hazel (*Corylus avellana*). None of the hedgerows assessed on site qualify as 'Important' under the wildlife and landscape section of the Hedgerow Regulations (1997) due to their limited species diversity and their failure to meet criteria set out in Paragraph 4 of the Hedgerow Regulations.
- 3.2.6 Whilst none of the hedgerows are classed as 'Important', two of the 15 hedgerows on site (H4 and H11) are considered to be species-rich with both comprising five woody species. Whilst the remaining hedgerows comprise less than five woody species and are classed as species-poor, they still typically comprise three to four native species.
- 3.2.7 Hedgerows comprised predominantly (>80%) of one or more native woody species qualify as a Priority Habitat under the UK BAP and have their own Habitat Action Plan (HAP). As stated in the hedgerow HAP, hedgerows increase the biodiversity of the surrounding area, are important for protected species including farmland birds, bats and butterflies and can act as wildlife corridors within a wider landscape. Species-rich hedgerows are also included in the Staffordshire Local BAP.
- 3.2.8 The hedgerows on site are likely to provide foraging and over-wintering habitats for a variety of common invertebrate species as well as foraging habitat for birds, mammals and any amphibians and reptiles present in the locality. The hedgerows may also provide nesting habitat for common garden and farmland birds as well as facilitating the navigation of commuting and foraging bats within the wider landscape.

Pond

- 3.2.9 There are two ponds outside but immediately adjacent to the site boundary. A single pond was recorded to the south of the application area (P1) and an additional pond was recorded adjacent to the northern boundary (P2).
- 3.2.10 Pond habitat is declining and becoming increasingly degraded in the UK. Both ponds have been subject to littering and agricultural run-off and P2 has been used to deposit soil/silt from the working farm. As such, neither pond is of high intrinsic nature conservation value. The ponds are not rare in type or landscape context and they are not considered to qualify under the UK BAP priority habitat definition for ponds. However, they may support common amphibian species, such as common frog (*Rana temporaria*), common toad (*Bufo bufo*) and smooth newt (*Lissotriton vulgaris*), along with a limited diversity of common freshwater invertebrates.

Scrub

- 3.2.11 An area of blackthorn scrub exists to the south of the site adjacent to Pond 1 and H5, and bramble scrub surrounds Pond 2, adjacent to the northern boundary of the site.
- 3.2.12 Both patches of scrub are species-poor and contain species that are common both locally and throughout the UK. Whilst the scrub around P2 connects to a larger area of bramble scrub outside the red line boundary, the patch of scrub in the southern section of the site is limited in extent. This habitat may provide some shelter and foraging opportunity for badger and small mammals, as well as providing nesting and

foraging opportunity for common garden and farmland birds, and foraging opportunity for bats resident within the wider area.

3.3 Species

- 3.3.1 No species specifically protected under nature conservation law were identified as being resident on the site. Breeding birds may use the hedgerows on site, whilst species resident within the wider area that may use the site from time to time include foraging badgers and bats.

Birds

- 3.3.2 The site has the potential to support a range of common garden birds and also Red and Amber list farmland bird species, with the hedgerows providing both a nesting and foraging resource.
- 3.3.3 Whilst the habitats on site are not considered critical to any one species and there is an abundance of similar habitat in the surrounding area into which species currently using the site for foraging could readily relocate, farmland habitats are currently subject to degradation and decline in the UK, contributing to the loss of farmland bird species.

Badger

- 3.3.4 No badger setts were found on site at the time of survey. A disused badger hole was recorded adjacent to P2 during great crested newt survey in 2010, however this was monitored over four visits (April 2010 – May 2010) and no signs of activity were recorded. The hole is considered to be a disused outlier to a main sett elsewhere in the wider area. A total of two badger droppings (T2) were recorded during survey along the eastern boundary of the site but no other signs of activity such as prints or foraging evidence was noted.
- 3.3.5 It is possible that the site may provide a foraging resource for any badgers resident within the wider area, however the lack of badger signs indicates that any use of the site is on an occasional basis by a low number of individuals.

Bats

- 3.3.6 The mature ash tree in the central section of the site (T1) was surveyed by a licensed bat worker and assistant for roosting bats. An emergence survey was undertaken in May 2010, focussing on a south-facing woodpecker hole. No bat roost was identified, however bat activity was recorded within the boundary of the application area, including noctule (*Nyctalus noctula*) and common pipistrelle (*Pipistrellus pipistrellus*) bats, foraging along H12 and around the mature ash tree.
- 3.3.7 Whilst the arable fields and semi-improved grassland will provide sub-optimal habitat for foraging bats, the hedgerows running throughout the site may provide more favourable foraging opportunity and also act as navigational aids for foraging bats and bats commuting across the site.

4 Vision for Habitat Creation and Landscaping

- 4.1.1 The overall vision for habitat creation and soft landscaping associated with the proposed development is:
- To create a naturalistic and visually appealing environment surrounding the built development that will benefit local wildlife and promote a sense of well being.
- 4.1.2 This will be achieved with substantial, ecologically beneficial landscape planting throughout the development and the creation of a naturalistic central section, comprising permanently and seasonally wet swales and ponds. The design of the southern section of the site will maximise opportunities for local wildlife and soften the boundary of the development and the landscape beyond with soft landscaping and the inclusion of allotments.
- 4.1.3 The scheme will incorporate tree planting, hedgerow enhancement and wetland creation. Features likely to be of particular value to local wildlife, such as bird boxes and bat provision will be incorporated into the scheme design.
- 4.1.4 Works required can be divided into the following broad categories:
- Management and enhancement of hedgerow habitat;
 - Creation of permanently and seasonally wet swales and ponds;
 - Landscaping within residential areas, and
 - Incorporation of features to enhance the value of the site for specific species groups.
- 4.1.5 Proposals for achieving each of these elements are included in Section 4 below.

5 Management and Enhancement of Key Habitats and Species

5.1 Habitats

Hedgerows

- 5.1.1 The majority of hedgerows on site will be retained within the development, with the exception of the defunct hedgerow (H15), which will be completely removed. A number of retained hedgerows will suffer varying degrees of severance as a result of road, path and housing construction, including H10, H11, H12 and H13.
- 5.1.2 Hedgerows 11 and 12 in particular will be severed by numerous roads and the location of a number of houses. However, substantial tree planting is proposed adjacent to the existing hedgerows and throughout the site. This will provide replacement habitat for nesting and foraging birds, invertebrates and foraging bats. Where practicable, standard trees will be planted at the ends of severed hedgerows, allowing tree canopies to partly bridge the gaps and reduce the impact of severance on foraging or commuting bats that may use the hedgelines for navigation. Tree species should be typical of the local area and of UK provenance.
- 5.1.3 As a result of the development the land use surrounding the hedgerows will change from arable fields and semi-improved grassland to housing and related infrastructure. Whilst this is unlikely to have a significant adverse impact on common garden birds, it will reduce the suitability of the hedgerows for farmland bird species.
- 5.1.4 To compensate for the loss of farmland habitat around the majority of hedgerows on site, the hedgeline along the southern boundary, made up of H4, H5 and H14, will be enhanced in order to provide a benefit to farmland bird species, as well as other mammals or amphibians that may use the hedgerow.
- 5.1.5 Enhancement of the southern hedgerows will include thinning of any non-native species and planting with additional native species typical of the local area and of UK provenance, in order to thicken the hedgerow and increase its species diversity. Planting specifications should aim to maximise food and nectar sources for bird, invertebrate and common mammal species. Appropriate native shrub species to introduce within the hedgerow include field rose (*Rosa arvensis*), dog rose (*Rosa canina* agg.), guelder rose (*Viburnum opulus*), common dogwood (*Cornus sanguinea*) and wych elm (*Ulmus glabra*). However, when choosing additional species, those that currently occur within the local area are recommended, as they will thrive in local soil conditions and climate.
- 5.1.6 When gap planting or thickening a hedgerow, care should be taken to avoid new plants being shaded by the existing hedge and it may be appropriate to prune or coppice existing adjacent growth. Shade tolerant species, such as holly, could be planted beneath existing standard trees or in shady areas to increase the likelihood of survival.
- 5.1.7 A minimum hedgerow margin of 2 m will be retained along H4, H5 and H14 and planted with a wild/arable flower seed mix, such as WF10 Cornfield Annuals or RE9 Farmland Mixture (British Seed Houses, website accessed 17/11/10). This will provide seed and invertebrates for farmland birds and also provide a buffer strip

between the hedge and the rest of the development. Hedgerow margins are also beneficial for native bees, which are currently experiencing a decline in numbers. An annual mowing regime is recommended in late summer (late August/September) to allow flowers to seed and control the encroachment of woody species. Cuttings should be removed to reduce the nutrient content of the soil. Cuttings can be retained on site in discrete locations, where practicable, for the benefit of any amphibians and reptiles resident within the local area. The retention of areas of existing scrub along the southern boundary is also advisable.

- 5.1.8 Standard trees are beneficial within hedgerows as they provide perches for birds and foraging opportunity for bats resident within the wider area, as well as possible roosting bat habitat in the future. Standard trees should be kept at a density of approximately one tree per 50-100 m and can be incorporated in the hedgerow by retaining saplings when cutting/trimming or by planting at intervals. Species that could be planted include English oak (*Quercus robur*), sessile oak (*Quercus petraea*), rowan (*Sorbus aucuparia*), ash (*Fraxinus excelsior*), wild cherry (*Prunus avium*), beech (*Fagus sylvatica*), hornbeam (*Carpinus betulus*) or crab apple (*Malus sylvestris*). Newly planted or existing saplings should be marked with a stake or tag to avoid these being cut when hedge trimming.
- 5.1.9 Hedgerow translocation could also be considered for any sections of hedgerow that need to be removed. A translocated hedgerow (or section) will typically establish more quickly than newly planted saplings and the ecosystem within the base of the hedgerow will also be translocated, therefore retaining hedgerow structure and helping to establish a natural field layer. Sections of hedgerow that have been removed could be translocated to areas of public open space within the development and incorporated in the landscaping scheme.
- 5.1.10 The scale, phasing and timings of works is likely to be governed by resources. However it is recommended that initial thinning and planting should be undertaken during autumn/winter, where practicable, to avoid breeding bird season and also to increase the survival chances of newly planted whips/trees. These works should commence as close to the beginning of the development scheme as possible to provide alternative habitat for any birds displaced by site works.

Semi-improved grassland

- 5.1.11 All existing grassland on site is expected to be subject to landtake as a result of the development as proposed. The existing grassland is species-poor and provides little benefit to nature conservation. It is recommended that, where practicable, areas of amenity grassland to be included within areas of public open space are planted with a seed mix of increased species diversity.
- 5.1.12 Grass mixes of increased species diversity will also be used along the ditch banks and pond edges, as detailed below in section 5.1.18 – 5.1.19.

Wetland habitat

- 5.1.13 The two existing ponds adjacent to site are outside the site boundary and do not fall within the ownership of the developers. Whilst no enhancement of these ponds will be undertaken, good site management practice will ensure that the potential for any adverse impacts to the ponds to occur will be minimised.
- 5.1.14 Best Practice Guidelines (CIRIA, 2001) should be adopted to minimise the risk of accidental introductions of silt or chemicals for all works near the newly created

ponds and the two existing ponds that are outside but immediately adjacent to the site boundary. This requires proper storage and transport of chemicals and management of any waste controlled by waste regulations. Procedures should also be implemented to prevent run-off entering the ponds during development and contingency plans in place to deal with accidental spillages. In addition, the advice set out in the relevant Environment Agency Pollution Prevention Guidelines should be applied (Environment Agency, website accessed 12/05/09).

- 5.1.15 Whilst the site is not considered to support any amphibian or reptile species protected by wildlife conservation legislation, pond and wetland habitats are ecologically valuable and increase the diversity of habitat within the proposed development. As such, as part of the Sustainable Drainage Scheme, one permanently wet pond and two seasonally wet ponds/depressions and connecting swales will be created.
- 5.1.16 A wetland system is proposed for the site, incorporating a permanently wet pond in the north-east of the site, joined to two seasonally wet ponds/depressions in the centre of the site by swales. The swales will be culverted under roads to maintain connectivity throughout the wetland system.
- 5.1.17 The ponds and swales will provide water attenuation/storage for the site, with a permanent waterbody maintained in the north-east and the ponds/depressions and the swales comprising damp grassland/marshy habitat that is able to be submerged during storm events.
- 5.1.18 As it is important to maintain the functionality of the swales for water flow, when required, planting within the base of the channel is not recommended. However, ecologically beneficial species mixes will be used along the banks to provide structural diversity to the habitat and to provide a benefit to invertebrates and provide cover for common amphibians, small mammals and small wildfowl species, such as ducks and moorhens.
- 5.1.19 The ponds and swales will be planted with appropriate vegetation for damp/marshy conditions, such as a wet meadow seed mix and areas of rush (*Juncus* spp.) and sedge (*Carex* spp.). Suggested seed mixes include WFG9 Wetland and Pond Areas (British Seed Houses, website accessed 17/11/10). It is important only to introduce species that are relatively slow growing and will not rapidly dominate these areas.
- 5.1.20 Over time, should conditions be damp enough, taller species such as meadowsweet (*Fillipendula ulmaria*), reed canary-grass (*Phalaris arundinacea*) and great willowherb (*Epilobium hirsutum*) will colonise the ponds/depressions and swales. Whilst areas of taller vegetation would be ecologically beneficial, strimming on a yearly or two-yearly basis would prevent blocking of the ponds/depressions and swales and maintain their functionality.
- 5.1.21 It is recommended that the permanently wet pond should consist of scalloped edges to increase the structural diversity of the pond and improve the nature conservation value. Islands or submerged reefs/shoals in the centre of the pond would also increase the diversity of habitat available. See Figures 3 and 4 (Appendix 1) for example pond diagrams.

Planting scheme

- 5.1.22 Areas of native planting can provide a valuable contribution to the nature conservation value of a site and therefore such areas are included within the landscape plan. Plant species will be selected, where practicable, to maximise food

and nectar sources for birds, invertebrates and small mammal species, such as hedgehog.

- 5.1.23 Appropriate shrub and tree species include hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), field rose (*Rosa arvensis*), dog rose (*Rosa canina*), holly (*Ilex aquifolium*), hazel (*Corylus avellana*), crab apple (*Malus sylvestris*), spindle (*Euonymus europaeus*), English oak (*Quercus robur*), ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*), rowan (*Sorbus aucuparia*), wild cherry (*Prunus avium*), bird cherry (*Prunus padus*) and field maple (*Acer campestre*).
- 5.1.24 Plants for borders in areas of public open space may include foxglove (*Digitalis purpurea*), common mallow (*Malva sylvestris*), cowslip (*Primula veris*), primrose (*Primula vulgaris*), devil's bit scabious (*Knautia arvensis*), goldenrod (*Solidago virgaurea*), great mullein (*Verbascum thapsus*) and teasel (*Dipsacus fullonum*). Climbers may include honeysuckle (*Lonicera periclymenum*) and old man's beard (*Clematis vitalba*).
- 5.1.25 It should be noted that the list of species given above is not exhaustive and that alternative or additional native species may be appropriate.

5.2 Species Specific Mitigation and Enhancements

Birds

- 5.2.1 Nesting birds are protected under the Wildlife and Countryside Act 1981 as amended. Vegetation clearance and any arboricultural works will be undertaken outwith the bird-breeding season, which falls between March to July (inclusive), where possible to minimise risks of disturbance to nesting birds. Should clearance within the breeding season be unavoidable, no such works will be undertaken until the site has been inspected by an appropriately trained, qualified and experienced ecologist to ensure that no nests are disturbed.
- 5.2.2 Should active nests be found, works should cease in the immediate area to avoid disturbance and no works should be undertaken until young have fledged. The nest will be monitored by an ecologist to establish when the young have fledged.
- 5.2.3 Managing the southern hedgerow for wildlife (as detailed in Sections 5.1.4-5.1.10) will enhance nesting and foraging potential for birds currently using the site and the local area, in particular farmland bird species. Tree planting throughout the development will also provide a benefit to a range of bird species.
- 5.2.4 Bird boxes will be erected on one in five houses within the development, including general Schwegler-style bird boxes, as well as species-specific boxes. General nest boxes include the Schwegler Avianex bird box that may be attached to walls. These boxes are constructed from 'woodcrete', which is long-lasting and maintenance free. The 32 mm entrance holes provide nesting opportunities for small common and garden bird species, including tits, nuthatches and wrens. The box should be installed at least 3 m from the ground, avoiding south facing aspects and facing away from the prevailing wind.
- 5.2.5 House sparrows were once common in residential areas but are now included on the Red List for Birds of Conservation Concern (BoCC) (Eaton *et al*, 2009) due to their status as a Species of European Conservation Concern (SPEC). They have experienced a severe decline in the UK breeding population of more than 50% over 25 years and in the longer term since 1969. It would therefore be considered a positive benefit to house sparrows if the development includes nesting provision aimed at this species.
- 5.2.6 House sparrows prefer to nest together and the Schwegler Sparrow Terrace provides nesting opportunity for three families. It is also made from woodcrete and therefore long-lasting, with a stable internal temperature. A total of six terraces will be incorporated within the development, clustered within a section of the site to provide colonial nesting opportunity.
- 5.2.7 Swifts are experiencing a decline due to lack of suitable nesting habitat. They are listed on the Amber List for Birds of Conservation Concern, due to a decline in breeding population by more than 25 % (but less than 50 %) over 25 years. Swifts prefer to nest in cavities at height. A number of Schwegler swift boxes are suitable for this development including No 17, which can be attached to the outside of a building, and No 25, which can be built into the wall of a building. A total of six swift boxes will be incorporated within the development, clustered within a section of the site to provide colonial nesting opportunity.

Bats

- 5.2.8 The recent decline in the populations of a number of bat species can be attributed to the reduction in suitable roosting sites caused by modern building designs and materials. Incorporating bat roosting provision within new housing developments comprises good practice and helps to off-set this trend.
- 5.2.9 Incorporating bat roosting provision within the fabric of new build housing provides discreet and secure roosting opportunities for bats in the local area and is preferential to external bat boxes. Suggested models include specialist Ibstock bat bricks or Schwegler 1FR and 2FR bat tubes. These can provide a self-contained cavity for roosting bats to occupy but do not provide access into the cavity walls or roof voids. Bricks or tubes should be positioned at a minimum of 4 m from the ground, with unobstructed access for bats, and avoiding heavily lit areas. Final positioning should be determined by an ecologist.
- 5.2.10 It is understood that bat roosting provision, similar to that described above, will be incorporated into between five and ten houses within the scheme. It should be incorporated into houses that back onto major hedge lines within the development or onto areas of public open space. Buildings in the southern section of the site would be particularly suitable, as bats could fly directly out into the farmland, using existing the hedgerow network.
- 5.2.11 To maintain a beneficial environment for wildlife in the southern section of the site, lighting will be kept to a minimum. Should extra lighting be required for the sports pitches, the impact of this will be controlled using shades or timing limitations.
- 5.2.12 Foraging habitat will be retained within the site. The mature ash tree will be retained within the development and protected with a suitable Root Protection Zone (RPZ) in accordance with British Standard 5837 (2005). Whilst no roosting bats were found to be using the tree during survey in 2010, bats were observed foraging around the canopy. Connectivity between the ash tree and the wider landscape will be maintained by retaining the majority of H10, H11 and H12, as well as substantial additional tree planting within the development, which will help to mitigate for the loss of some sections of the hedgerows.

Herpetofauna

- 5.2.13 Whilst no protected amphibian or reptile species were found on site during ecological survey work, habitat for common reptiles and amphibians can be easily enhanced by simple and management-free techniques.
- 5.2.14 Hibernacula comprising small woodpiles will be created around the wetland area. It is also recommended that where possible, grass clippings and hedgerow cuttings should be left in discrete areas of the site in the hedge bottom to provide habitat for reptiles and amphibians.

6 Monitoring

6.1.1 A program of monitoring will be undertaken to assess the effectiveness of management prescriptions and enhancements. The following is a summary of the monitoring to be undertaken:

- **Hedgerow:** Annual review of the success of previous year's management regeneration to include growth rates, numbers of bird's nests and hedgerow margin establishment.
- **Wetland:** The success of the wetland establishment will be monitored annually and recommendations for alteration to management regime made as appropriate.
- **Bird and bat provision:** monitoring the usage of bird and bat provision.

6.1.2 All monitoring will be reviewed in year 5 plan that will be and updated version of this document to include any changes required resulting from the monitoring of works. The year 5 plan review will include required prescriptions for the medium to long term – the following 10 years.

7 Phasing and Timing of Works

Table 1. Timing of management and monitoring activities

Year	Hedgerow management	Hedgerow margin management	Wetland habitat management	Bat	Birds	Herpetofauna
1	Gap planting and identification/ planting of standard trees.	Prepare ground and sow margin seed mix.	Sow seed mixes and establish appropriate vegetation.	N/A	N/A	Build hibernacular
2	Trim hedgerow in January/February or October/November, avoiding newly planted areas and standard trees.	Mow grassland area in August and remove cuttings.	Monitor newly planted vegetation and supplement planting if required. Strim where required.	Monitor use of bat provision between May and August by bat worker to assess usage.	Monitor use of bird boxes to assess usage. Consider relocation or replacement, if necessary.	N/A
3	Break from cutting or cut south side of hedgerow only if required by adjacent landowner.	As above.	As above.	N/A	N/A	N/A
4	Trim hedgerow in January/February or October/November, avoiding standard trees.	As above.	As above.	N/A	N/A	N/A
5	Break from cutting or cut south side of hedgerow only if required by adjacent landowner. Review management success. Develop prescriptions for the ongoing management of the site	As above. Develop prescriptions for the ongoing management of the site	Develop prescriptions for the ongoing management of the site	Monitor use of bat provision between May and August by bat worker to assess usage. Develop prescriptions for the ongoing management of the site	Develop prescriptions for the ongoing management of the site	Survey hibernacular and assess condition and usage by amphibians and/or reptiles. Repair hibernacular as appropriate. Develop prescriptions for the ongoing management of the site.

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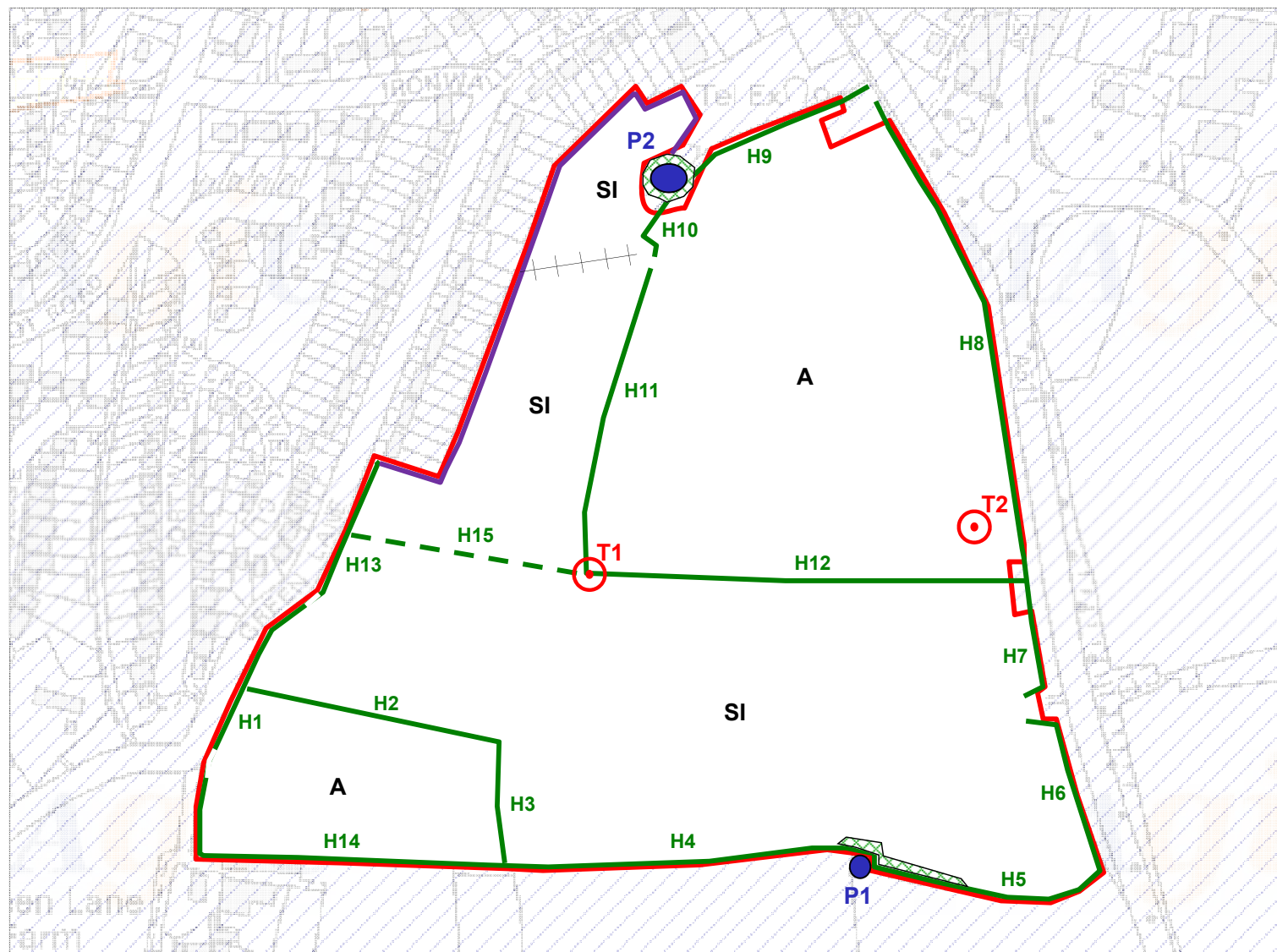
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Appendix 1: Illustrative Diagrams





Legend:

- | | |
|-----------|--|
| A | Arable fields |
| SI | Species-poor semi-improved grassland |
| | Dense scrub |
| H1 | Hedgerow |
| | Defunct hedgerow |
| | Fences and hedgerows bordering dwellings |
| | Site boundary |
| | Pond |
| | Target note |



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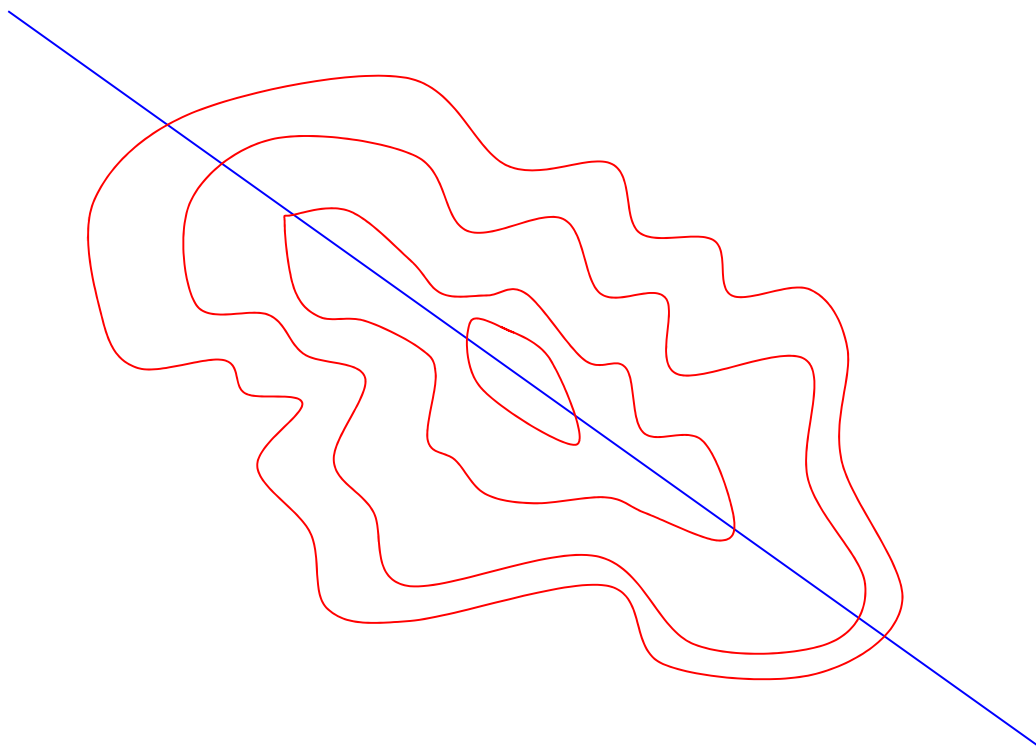
Figure 2
Phase 1 Habitat Map

Date:
 November 2010

Scale:
 Schematic

ECUS Ref:
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A



B



Indicative depth contours
(approx 0.3 m)



Indicative cross section



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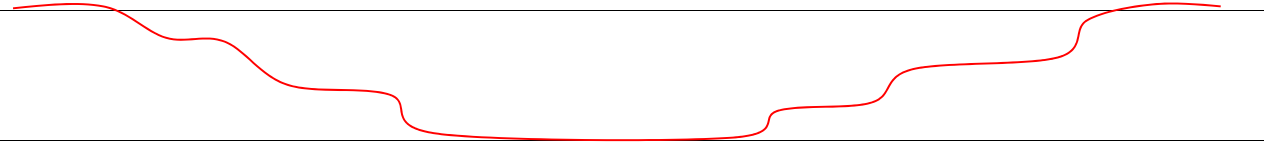
Figure 3: Indicative
pond design

Date: November 2010

Scale:
Schematic

ECUS Ref:
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A



B

0 m

- 1.5 m



Marginal herbs and reeds



Emergent reeds



Emergent herbs



Submerged macrophytes



Water lilies



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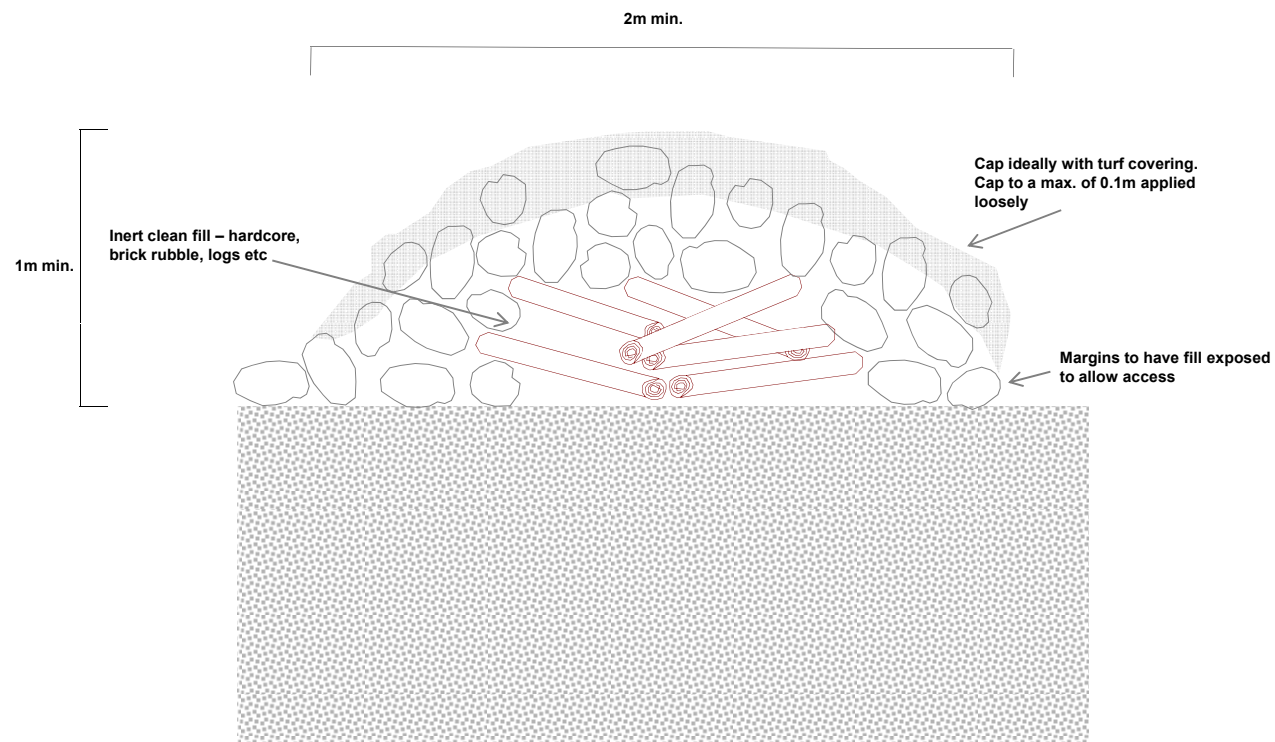
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Figure 4: Indicative
 pond planting

Date: November 2010

Scale:
 Schematic

ECUS Ref:
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Figure 5:
Suggested hibernacula
design

Date: November 2010

Scale:
Schematic

ECUS Ref:
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