

Phase 1
Preliminary Ecological Appraisal
Land at Bettisfield
Whitchurch



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NE class license: Bats: survey (level 2)

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SUMMARY

The Phase 1 preliminary ecological appraisal is undertaken in order to identify key ecological constraints to the proposed development; inform planning to allow significant ecological effects to be avoided or minimized; identify any further ecological surveys needed to inform an ecological impact assessment and to support the development of mitigation of compensation measures.

Methodology

The survey was conducted by carrying out a systematic walkover of the site by Dr. Stefan Bodnar to record habitats, species, and any notable features of interest with regard to flora & Fauna. This is in accordance with standard Phase 1 survey techniques and is a methodology recommended by the Institute of Environmental Assessment (1995) and guidance from CIEEM (2012, 2018).

Key Issues and Conclusions

The value of the majority of the site, in terms of ecological value to wildlife is moderate to high, with the semi-improved grassland native hedgerows and tree lines having highest ecological value. The site will require a Biodiversity Net Gain Plan which includes a baseline assessment of what is currently present on a site, an estimation how proposed designs will add to that level, and latterly supported by post-construction evidence that a biodiversity gain has been delivered.

- The on-site lighting should be carefully chosen to ensure it is low lux, cowled (directed downwards to prevent light splay), and used on timers or motion sensors to minimize the impact on local bat populations. This should conform the BCT lighting guidance, 2018.
- Safe working methods for minimising harm to reptiles and amphibians, as described in 4.3b below, with habitat creation on site post development. For reptiles, the creation of south facing log and brash piles, and /or open compost heaps along south facing site edges to create refugia for reptiles. For amphibians and invertebrates, specially designed wildlife ponds, within the attenuation area, not stocked with fish, planted with native vegetation and designed with appropriate sloping sides and depth for wildlife, as described in <https://www.froglife.org/wp-content/uploads/2013/07/JAW2014-for-printing-HLF1.pdf> and see appendixes.
- **The presence of great crested newts requires a license in respect of development to be obtained from Natural Resources Wales prior to works commencing.**
- Should any of the woodland fringes, tree belts or hedgerow be lost to enable access into the site, it should be replaced, above 1:1 ratio, in anticipation of the high failure rate of young trees, and their low ecological value in comparison with mature trees. Additional hedgerow and tree planting is recommended around the proposed new access roads, within public open space, along streets, around buildings, within car parks and within proposed gardens.
- There are no Statutory or Non-Statutory Designated Nature Conservation Sites within or adjacent to the site.
- The Biological Data Search no protected species were recorded within the site.
- There is no evidence of badger use of the site, therefore no further surveys are required.
- Ivy clad on site trees have low bat roost potential, these should be retained and protected within the development of the site, if they are to be lost to development, they will require at least one bat emergence survey.
- The site is of moderate to high suitability for reptiles, therefore although no further surveys are required, habitat creation post development and a series of precautions should be taken during development, as detailed in section 4.3b.

- The trees and hedges within the survey site are suitable for bird nesting. Site clearance should be undertaken outside of the bird breeding season (mid March to mid August) or undertaken under ecological supervision.
- A tree protection area and root protection zone should be established to avoid damage during the construction phase around all retained trees and hedges.
- Designs works to the gardens should ensure hedgehogs can move between the proposed gardens and the wider landscape, as well as ensure connectivity between the proposed gardens, via habitat creation and suitable gaps to allow hedgehog access within any walls or fences.

1. INTRODUCTION

1.1. Background

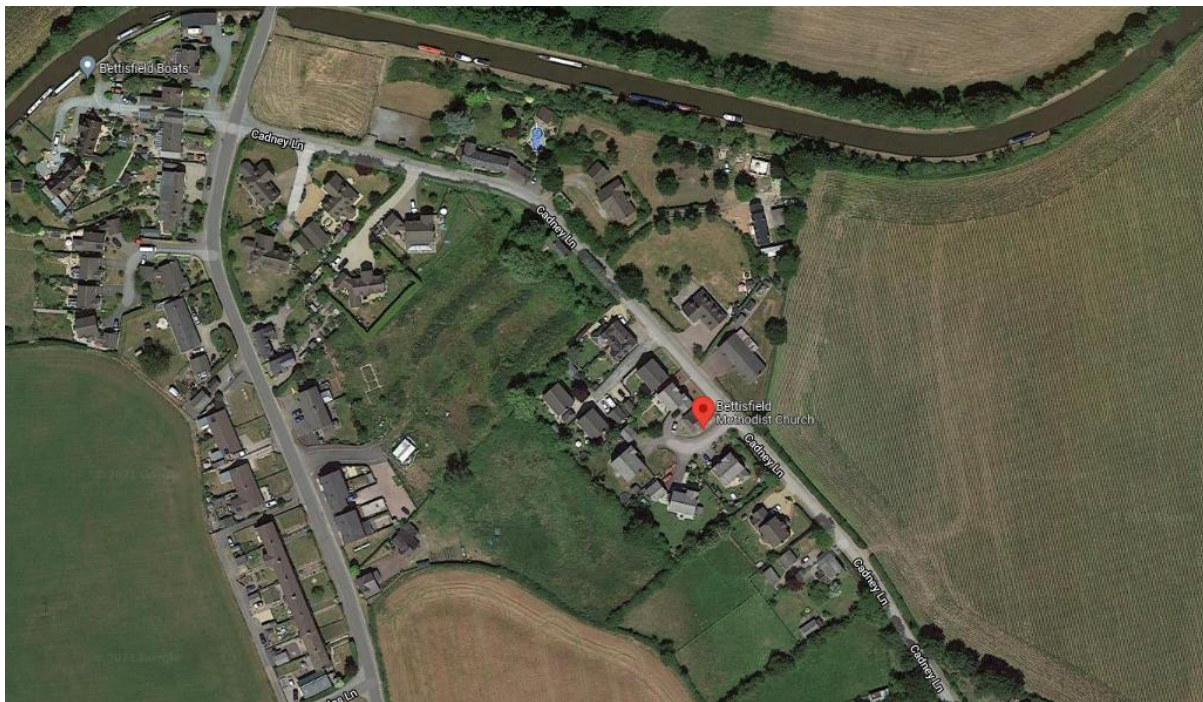
At the request of the client, a Phase 1 Preliminary Ecological Appraisal was carried out at an area of land in Bettisfield, to evaluate the habitats, describe any further surveys required and indicate the level of required mitigation/ compensation/ enhancement in relation to a planning proposal. The site was previously surveyed, via a phase 1 ecological appraisal in 2016 by Greenscape Environmental Ltd.

1.2. Site Location

The site is an area of land in Bettisfield, off Cadney lane, to the south is an agricultural hay meadow, the other edges of the site are surrounded by residential development. The postcode is SY13. The site location is described on the images below. A satellite image and Phase One diagram (see Appendices) also show the areas concerned.



Figure 1a & b. Showing site location



Map data 2021© Google.

1.3. Site Description

The site is located in the centre of the village of Bettisfield, Wrexham. It is set in an urban environment surrounded by dwellings, other than to the south where the site borders agricultural land. There is moderate connectivity to the surrounding countryside via the drain that runs along the northeastern boundary, the canal to the north and the fields to the south. Entrance to the site is gained from an access point along the western boundary.

The site comprises two sections of field. The northern section of the field is marshy grassland with raised elongated mounds running southwest-northeast through the site. These have been created by the clearance of land prior to development. The scrapes between the mounds have become water logged creating ponds, these were wet during the September survey, and were noted as holding water during the 2016 survey in June. The mounds are raised above the wetland level, creating a mosaic of wetland habitat ideal for reptiles and amphibians, small mammals which require good cover, such as weasels and voles, which also makes the site highly suitable for barn owl, and numerous protected bat species.

The southern section of the field is drier, and is an overgrown and unmanaged grassland. The site is bounded by houses and fences for the most part, but three of the boundaries on the eastern side are preceded by a drain/stream course which has been shown to support water vole in the past and retains suitable habitat for the species.

The site is accessed from a newly laid tarmac driveway in the western boundary, just inside this entrance there are rubble piles, piles of building material and general disturbed land, surrounding a static caravan. (See Phase 1 Habitat Map, appendix 1d). See satellite image above and below.

The site is located within an agricultural landscape, within the small village of Bettisfield.



Map

data 2021 © Google.

Figure 2. Satellite image of local area around proposed development site.

1.4. Brief Description of Project

See plans below for new build housing



1.5. Purpose of the Preliminary Ecological Appraisal

The phase 1 preliminary ecological appraisal report identifies key ecological constraints to the proposed development; informs planning to allow significant ecological effects to be avoided or minimized; identifies any further ecological surveys needed to inform an ecological impact assessment and supports the development of mitigation of compensation measures.

It is composed of two parts. A site visit, during which a preliminary ecological appraisal of the site is carried out to identify the major habitat types, plant, bird, reptile, mammal and other species using the site. Also a desk study, which gathers ecological data on the site and its surrounding area, to identify protected species and statutory protected sites in the vicinity of the proposed development site, in order to produce recommendations on the key ecological constraints to the proposed development.

2. METHODOLOGY

2.1 Desk Study Methodology

Information was gathered from a number of web-based data sources, published ecological reports and where appropriate, the authors own records. The ecological data search covers the following areas:

- ☐ Species of particular note
- ☐ Local Nature Reserves
- ☐ Protected species (badger, grass snake, great crested newts, otter, water vole and bats)

2.2. Survey Methodology

The survey was conducted by carrying out a systematic walkover of the site by Dr. Stefan Bodnar to record habitats, species, and any notable features of interest with regard to flora & Fauna. This is in accordance with standard Phase 1 survey techniques and is a methodology recommended by the Institute of Environmental Assessment (1995) and guidance from CIEEM (2013, 2018).

During the survey, emphasis was placed on searching for evidence of and potential of habitats and features supporting protected or notable species, especially those listed under the Conservation of Habitats and Species Regulations 2010, revised 2017, and the Wildlife & Countryside Act 1981 (as amended).

The range of methods used were as follows:

Bats

The trees within the site were appraised for their potential suitability to support breeding, resting and hibernating bats in accordance with survey methods documented in the Bat Surveys: Good Practice Guidelines (Bat Conservation Trust 2016). Features of medium and high potential for bats were searched for signs of use by bats, such as droppings, urine staining and scratches around entrance holes etc.

A visual inspection of the trees from ground level with the aid of binoculars was undertaken to search for evidence of actual bats as well as signs of bats (droppings, feeding remains, urine staining, scratch marks, noise and the remains of dead bats etc.). In addition, the trees were assessed for the presence of features likely to be attractive to roosting bats, such as cavities or rot holes in the trunk or branches, splits in the timber, delaminating bark, deep bark crevices, dead branches and dense ivy cover etc.

In accordance with the methodology outlined in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines (2016) trees were assigned to the following categories:

- ☐ **Known or Confirmed Roost** - signs of bats (droppings, etc) or actual bats recorded; or previous records of bats in tree
 - ☐ **High (Category 1*)** – trees with multiple, highly suitable features capable of supporting large roosts
 - ☐ **Medium (Category 1)** – a tree with definite bat potential; fewer features than category 1* or potential for single bats
 - ☐ **Low (Category 2)** – No obvious potential, although tree of size and age that elevated surveys may result in cracks/crevices being found; or tree has some features which have limited potential to support bats
 - ☐ **Nil (Category 3)** – no potential to support bats
-
- ☐ The site was also assessed for potential bat foraging areas and commuting routes.
 - ☐ Features of medium and high potential for bats were searched for signs of use by bats, such as droppings, urine staining and scratches around entrance holes etc. The site was also assessed for actual and potential bat foraging areas and commuting routes. Buildings within the site were assessed in accordance with the methodology outlined in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines (2016)

Reptiles

The site was assessed for its suitability to support reptiles based upon the abundance of suitable habitats such as structurally diverse habitats, hedgerows, scrub, rough grassland, wood piles, rubble, banks and compost heaps etc. The site was assessed with respect to its potential for use for hibernation and spring/summer use based on guidance provided in the Herpetofauna Workers' Manual (Joint Nature Conservation Committee 2003) and the Reptile Management Handbook (Edgar, Foster & Baker 2011).

Badgers

The whole site was searched systematically, with particular attention being paid to features likely to support badger setts (e.g. earth embankments, wooded copses etc.). The location of all badger signs such as runs, dung pits, prints, hair, foraging snuffle holes found during the survey were mapped and all setts characterised as either main, annex, subsidiary or outliers in accordance with guidance given in Surveying Badgers (Harris, Cresswell & Jefferies, 1988).

Birds

All birds observed during the field survey were recorded, in addition to features capable of supporting nesting birds (e.g. trees, hedgerows, buildings, bramble beds, ruderal vegetation and rough grassland etc). The site was also assessed for its actual and potential suitability to support Schedule 1 and Biodiversity Action Plan priority species (now included within Section 41 of the NERC Act).

Other Species

The site was also assessed for its actual and potential suitability to support other protected or notable fauna in accordance with the Guidelines for Preliminary Ecological Appraisal (Chartered Institute of Ecology and Environmental Management, 2013).

2.3. Site Location and Access

Land in Bettisfield, off Cadney lane. All areas of the site were available for access.

2.4. Date and Time of Survey

The site assessment was conducted on 28th September 2021.

2.5. Weather Conditions

The weather conditions during the survey were warm and dry.

2.6. Survey Constraints

Owing to the time of year the initial survey took place it can be considered to provide a reasonable, though not exhaustive plant list. This survey noted the habitat types on the site, and the dominant vegetation at the time of the survey, which is likely to be constant and a fair reflection of the habitat quality present.

3. RESULTS

3.1 Desk Study Results

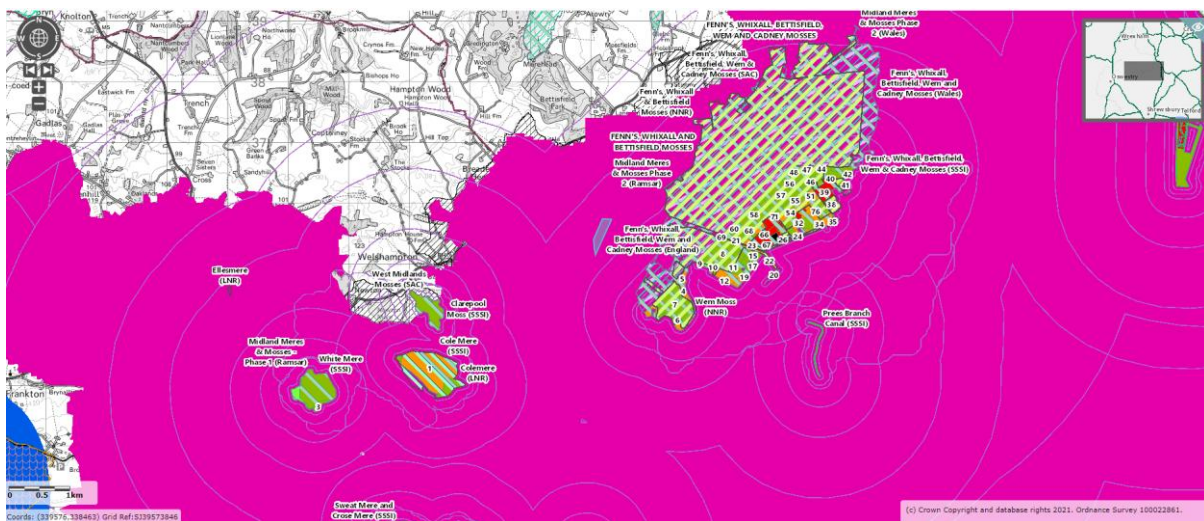
3.1a Statutory & Non Statutory Nature Conservation Sites

The maps below show all Statutory and Non Statutory Nature Conservation Sites (this includes Sites of Special Scientific Interest, Local Wildlife Sites, Local Nature Reserves, Special Areas of Concern) within 5km of the proposed development.

Statutory Protected Sites:

The site lies within a Nitrate Vulnerable Zone, a Drinking Water Safeguard Zone due to the presence of 10 different pesticides in the drinking water sources and the SSSI Impact Zone for Fenns, Whixall and Bettisfield Mosses SSSI.

The closest Statutory Protected Site is Fenns, Whixall and Bettisfield Mosses NNR, RAMSAR and SSSI which lie within 1 km East of the site.



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A Natural England 'Magic' data search (shown below) illustrates the locations of all European Protected Species license applications in the locality relating to bat roosts and herpetiles.



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Three species of bats are known to roost within 1 km of the site, (Common and Soprano pipistrelle and Brown long eared bat), Great Crested Newts are found on site (PEA 2016) and there are other populations within 1 km from the site.

3.1b. Protected & Notable Species Records

In relation to protected and notable species, the following were recorded from a variety of online web based resources, and in places, the authors own records, presented here with the approximate distances of the nearest record. In addition, a number of ecological survey reports within the area have been interrogated for protected species records. All records are post-2010 unless otherwise stated.

Protected Bat Species Occurrence Table

Species (Latin Name)	Common Name	Approximate distance of nearest record from the survey site (km)
<i>Pipistrellus pipistrellus</i>	Common pipistrelle	Within 1 km
<i>Plecotus auritus</i>	Brown long-eared bat	Within 1 km
<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	Within 1 km
<i>Myotis daubentonii</i>	Daubenton’s bat	Within 2 km

Protected & Notable Species Occurrence Tables

Species (Latin Name)	Common Name	Approximate distance of nearest record from the survey site (km)
<i>Triturus cristatus</i>	Great Crested Newt	Within 1 km – on site
<i>Lissotriton vulgaris</i>	Smooth newt	Within 1 km – on site
<i>Lissotriton helveticus</i>	Palmate newt	Within 1 km
<i>Bufo bufo</i>	Common toad	Within 1 km
<i>Rana temporaria</i>	Common frog	Within 1 km
<i>Anguis fragilis</i>	Slow-worm	Within 1 km
<i>Zootoca vivipara</i>	Common Lizard	Within 1 km
<i>Vipera berus</i>	Adder	Within 1 km
<i>Meles meles</i>	Badger	Within 2 km
<i>Erinaceus europaeus</i>	Hedgehog	Within 1 km
<i>Lutra lutra</i>	Otter	Within 1 km
<i>Arvicola amphibius</i>	Water vole	Within 1 km – formerly on site

3.1c
Interpretation
of
Availability
of
Biological
Data

The site is not directly adjacent to any statutory designated site, however, the drain running around the northeastern and eastern boundaries of the site originates in fields to the north, which are connected via other agricultural fields to the Bettisfield Mosses SSSI. Careful consideration of construction technique, drainage from the site, chemical storage on site and soil management, will be required to ensure development of this site does not damage these sites.

There are three species of bat found within 1 km of the survey site. Badger, Great Crested Newt, Smooth and Common newt, Common frog and common toad, Adder, Grass snake, slow worm and common lizard, otter and Hedgehog are also within 1 km from the site.

Great Crested Newt and Smooth newt are recorded on site.

3.2 Survey Results

3.2.1. Habitat Types Present & Baseline Ecological Conditions

The site comprises two sections of field. The northern section of the field is marshy grassland with raised elongated mounds running southwest-northeast through the site. These have been created by the clearance of land prior to development. The scrapes between the mounds have become water logged creating ponds, these were wet during the September survey, and were noted as holding water during the 2016 survey in June. The mounds are raised above the wetland level, creating a mosaic of wetland habitat ideal for reptiles and amphibians, small mammals which require good cover, such as weasels and voles, which also makes the site highly suitable for short eared owl and barn owl, and numerous protected bat species.

The southern section of the field is drier, and is an overgrown and unmanaged grassland. The site is bounded by houses and fences for the most part, but three of the boundaries on the eastern side are preceded by a drain/stream course which has been shown to support water vole in the past and retains suitable habitat for the species.

The site is accessed from a newly laid tarmac driveway in the western boundary, just inside this entrance there are rubble piles, piles of building material and general disturbed land (See Phase 1 Habitat Map, appendix 1d).

Habitats present:

- **Hardstanding:** J4 – a new tarmac access route to the site.
- **Ruderal growth:** C3.1 - There are also patches of ruderal growth, containing mostly bramble, nettles and rosebay willowherb in the southernmost corner of the site, and along the eastern boundary of the southern section of field.
- **Running water:** (Drain) G2 - The site is bounded by a drain along the eastern boundaries. This was assessed for water vole and it was considered to have suitable habitat, though no evidence of water vole was found. American mink are recorded within 1km of this site.
- **Marshy grassland:** B5 - The northern part of the field is an overgrown wetland area. The wetland has been generated by the high levels of ground water in the Bettisfield area, removal of topsoil and poor drainage. These ridges provide a mosaic of habitat that provides for a diverse range of plant and animal species.

- **Semi-improved grassland:** B6 - The drier areas had a diverse range of plant species, however none of these were notable or protected. The species found included; Yorkshire fog, cocks foot, meadow buttercup, broad-leaved dock, ragwort, nettle, red deadnettle, white clover, common vetch, oxeye daisy, ribwort plantain, speedwell, red campion, thistle sp, cleavers, dandelions, cow parsley, shepherd's purse, poppy, field pansy, field mouse-ear, wild raspberry, common fumitory, dames violet, foxglove sp., evening primrose and horseradish.
- **Ponds:** The water bodies on the site, lie as linear, possibly ephemeral, shallow ponds, between the bunds. Aquatic vegetation is well established, with sedges and bulrush as emergent vegetation. Netting in 2016 revealed Smooth newt breeding in the ponds. There is no evidence of fish within the ponds.
- **Hedgerows:** The site is bounded by hedgerows on the eastern and southern sides. The northern section of the eastern boundary contains a mature weeping willow, with other ornamental planting growing over from the far side of the drain that also runs along this boundary. The hedges around the southern section of the site are dominated by hawthorn, but there is one dead tree with low bat roost potential.
- **Rubble pile:** I2. Close to the site entrance, and possible also present within the bunds, loose soil and rubble from previous site clearance and digger activity on site has creates large linear piles of rubble and soil, adjacent to water bodies, creating ideal habitat for reptiles and amphibians.

See Phase 1 Habitat plan (appendix 1d) and images, Appendix 2.

3.2.2. Protected and Notable Species on Site

Bats:

There are 18 species of bat found in the UK, 17 of which are known to breed in the UK. All are small, nocturnal, flying, insectivorous mammals that are under considerable conservation threat and many having undergone severe population declines over the last century. Some species, such as pipistrelle bats (*Pipistrellus* sp) still remain relatively common and widespread in the UK, while others, such as greater horseshoe bats (*Rhinolophus ferrumequinum*), have an extremely restricted distribution. All species of bats and their roosting sites are afforded full protection under both UK and European legislation and are designated as 'European protected species'.

Bat Roost Potential of Trees:

The hedgerow edges and dead tree on site have low to negligible bat roost potential. The hedgerow boundaries of the site, have high bat foraging potential, due to their linear, unlit, wooded and sheltered character, adjacent to a site with high insect biomass. Ensuring lighting on site does not illuminate the hedges and tree lines which surround the site is a priority for this site. Lighting on site should be cowled, directed downwards, its use restricted to the minimal requirements for safety, and used on motion sensors where possible.

Badgers

Badgers (*Meles meles*) are protected in England and Wales under the Protection of Badgers Act 1992. Protection applies both to the animal itself and to its nesting burrows (setts), and current interpretation of the Act also confers some protection to key foraging areas. Badgers remain comparatively widespread and common throughout the UK. There is evidence of mammal tracks on site, this does not appear to be foraging badger activity on the site. The trackways are believed to be due to other mammals, including domestic cats, fox and other small mammals such as weasel, no snuffle holes and no latrines were found on site. It can be confirmed that there are no badger setts on site or within 30m of the site edges. No further surveys are recommended, although precautionary measures are recommended, in case badgers or other mammals enter the working areas at night:

- All excavations to be covered over or ramped so that any badgers could get out of an excavated structure. Further measures are detailed below:
- Any ground-works that are to be left open overnight will be provided with a means of escape should a badger enter. This could simply be in the form of a roughened plank of wood placed in the trench as a ramp to the surface. This is particularly important if the trench fills with water.
- Any trenches/pits will be inspected each morning to ensure that no badgers have become trapped overnight. Should a badger become trapped in a trench it will likely attempt to dig itself into the side of the trench, by forming a temporary sett.
-

Other mammals

The presence of other specially protected mammals, such as otter, is assessed as extremely unlikely, due to the unsuitable habitats on this site. Water voles are historically recorded on site and the habitat remains suitable for them. No signs of water vole were found on site during the 2016 or 2021 surveys, however, as the habitat remain suitable for them, and the site is connected to the canal, which could also support water vole populations, it is recommended that the areas within 10m of the stream course is left undeveloped and the vegetation maintained, supplemented with native planting to maintain water

vole habitat and allow for the recolonisation of the site, or precaution that they may be present on site in low density and undetected by recent survey work. Hedgehogs are recorded within 2km and could be present on the site.

Birds

The Wildlife and Countryside Act 1981 (as amended) makes it an offence (with certain limited exceptions) to intentionally kill, injure or take any wild bird, or to damage, take or destroy the nest of any wild bird whilst that nest is being built or in use, or to take or destroy its eggs. Furthermore, the Act affords additional protection to specific species of birds listed in Schedule 1 of the Act. In respect of these species, it is unlawful to intentionally or recklessly disturb such a bird whilst it is nest-building or is in, on or near a nest containing eggs or young; or to disturb their dependent young. Following recent revisions, fifty-nine species are listed on the UKBAP.

The following species were recorded on-site during the visit:

Bird Species:	Latin name:
Blackbird	<i>Turdus merula</i>
Jackdaw	<i>Corvus monedula</i>
Woodpigeon	<i>Columba palumbus</i>
Wren	<i>Troglodytes troglodytes</i>
Blue Tit	<i>Cyanistes caeruleus</i>
Goldfinch	<i>Carduelis carduelis</i>

The birds listed above were actually recorded on the site itself. The trees and hedges within the survey site could also provide suitable for nesting habitat for a number of other common woodland bird species.

The trees and hedgerow itself is ideal habitat for bird nesting. It is recommended that these trees be protected and retained within the proposed development. It is recommended that any site clearance of vegetation such as the hedgerow removal is undertaken outside of the bird breeding season (mid March to mid August). If site clearance is undertaken during these months, a suitably qualified and experienced ecologist should be employed to ascertain the presence of any breeding birds within the site.

Great Crested Newt

The Great Crested Newt (*Triturus cristatus*) is one of the two rarest amphibian species in Britain. It is primarily a terrestrial animal, spending much of its life on land, but returning to the water to breed. Great crested newts will often return to breed in the same waterbody where they were spawned. In addition, they are highly opportunistic and will also colonise suitable new waterbodies rapidly. Great Crested Newt is a 'European protected species' afforded full protection under both UK and European legislation. This protection extends to the habitats which support it. The habitats within 500m of a breeding pond are generally considered to be protected by the legislation. The Great Crested Newt is a priority species and subject to its own Biodiversity Action Plan.

There are several on-site ponds, and the majority of the terrestrial habitat is of high suitability for this species. There are records of GCNs from the site. It is considered likely that GCN's would be present on site and a license in respect of development from Natural resources Wales will be require to undertake the works on site. See section 4.2.

Reptiles

There are four widespread species of British reptile comprising grass snake (*Natrix natrix*), slow-worm (*Anguis fragilis*), adder (*Vipera berus*) and common lizard (*Zootoca vivipara*). These animals are protected under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000. They are given so called 'partial protection', which prohibits the deliberate killing or injury of individuals. The habitats of common reptiles are not specifically protected.

No slow worm were observed on site, but it is considered that the habitat is suitable for reptile species as it has been disturbed and more overgrown. Given the proximity of the SSSI that is known to contain adder and common lizard, all areas of bare ground and rubble piles have significant chances of sheltering reptile species. Recommendations will be made for the removal of these rubble piles.

To reduce risk to reptiles as a result of the proposed development it is recommended appropriate precautions should be taken during development and habitat for reptiles should be created on site post development, including south facing log piles and areas of long grass within the attenuation areas and public open spaces.

Including where possible:

- Undertaking ground-works along field boundaries when reptiles are active (March to October).
- Ensuring storage of piles of materials and excavated earth on the site should be kept to a minimum.
- Storing piles of materials and excavated earth away from the field boundaries to deter reptiles from using them for temporary cover.

4.0. DISCUSSION

It is important that this proposed development should demonstrate Net Biodiversity Gain, in accordance with National Planning Policy Framework 2021. There is also a duty to ensure no net loss of biodiversity placed on Local Authorities in the Natural Environment and Rural Communities Act 2006, Section 40. There are requirements noted for this under The National Planning Policy Framework (2021) which refers to compensation/ mitigation. It is confirmed that the enhancement, mitigation and compensation within this section will comply with all the relevant UK and EU legislation relating to protection and enhancement of ecology.

4.1. Ecological Constraints

The value of the majority of the site, in terms of ecological value to wildlife is moderate to high, with the semi-improved grassland native hedgerows and tree lines having highest ecological value. The site will require a Biodiversity Net Gain Plan which includes a baseline assessment of what is currently present on a site, an estimation how proposed designs will add to that level, and latterly supported by post-construction evidence that a biodiversity gain has been delivered.

The on-site lighting should be carefully chosen to ensure it is low lux, cowled (directed downwards to prevent light splay), and used on timers or motion sensors to minimize the impact on local bat populations. This should conform the BCT lighting guidance, 2018.

Safe working methods for minimising harm to reptiles and amphibians, as described in 4.3b below, with habitat creation on site post development. For reptiles, the creation of south facing log and brash piles, and /or open compost heaps along south facing site edges to create refugia for reptiles. For amphibians and invertebrates, specially designed wildlife ponds, within the attenuation area, not stocked with fish, planted with native vegetation and designed with appropriate sloping sides and depth for wildlife, as described in <https://www.froglife.org/wp-content/uploads/2013/07/JAW2014-for-printing-HLF1.pdf> and see appendixes.

The presence of great crested newts requires a license in respect of development to be obtained from Natural Resources Wales prior to works commencing.

Should any of the woodland fringes, tree belts or hedgerow be lost to enable access into the site, it should be replaced, above 1:1 ratio, in anticipation of the high failure rate of young trees, and their low ecological value in comparison with mature trees. Additional hedgerow and tree planting is

recommended around the proposed new access roads, within public open space, along streets, around buildings, within car parks and within proposed gardens.

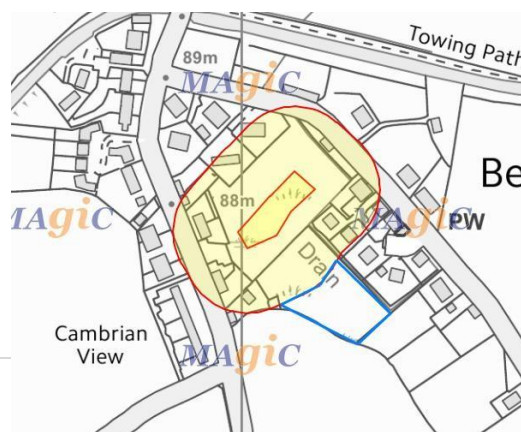
The habitats present within the area consists of the following elements (see Phase 1 Habitat Map in Appendix 1d).

- Semi-improved grassland
- Ruderal
- Hard-standing
- Running water
- Marshy grassland
- Ponds
- Hedges
- Rubble mounds

4.2. Additional Ecological Surveys Recommended

Great Crested Newt Licensing and method statement:

A license in respect of development From Natural Resources Wales for great crested newt will be required for works on this site. One great crested newt was found on site and the habitat on site itself was considered to be of improving quality for the species. It is considered that any clearance or development on this field cannot commence without first obtaining and implementing a derogation licence from Natural Resources Wales. A rigid method statement will need to be followed. This will need to cover any re-grading of other parts of the site, not directly impacted by the development. 1.1ha of land will be damaged or destroyed as a result of the development.. It could be assumed that as the conditions of the wetland on site improve, this may in future end up being a breeding pond.



Land to be damaged or destroyed	Area, m ² /ha
Core terrestrial area up to 50m from pond	0.95ha
Intermediate terrestrial area 50-250m	0.15
Distant terrestrial habitat 250m +	0

Core terrestrial habitat in the area will need to be compensated and provision made for the loss of terrestrial habitat. This may be in the form of habitat piles and open area left for newts. As these wetland areas exist on site, leaving some as part of the open land would also be beneficial for biodiversity.

1. Pre-and mid-development impacts- assuming medium population

i. Core terrestrial habitat

Vegetative clearance and clearance of the piles of rubble and bunds could result in the killing and injuring of individual newts. There will be damage of core refuge sites close to the wetland area on site. This will lead to moderate-high impact on the population.

ii. Intermediate Terrestrial habitat (50-100m) and long term impacts

Vegetative clearance in the area outlined in blue could kill and injure individual newts, this would have a moderate impact on the population.

Creation of trenches and foundations and other building infrastructure could lead to killing and injury of individual newts and the loss of terrestrial habitat for foraging and hibernacula. Moderate negative impact on population.

Creation of gardens in along with buildings and road is likely to reduce the terrestrial habitat for newts.

There is not likely to be a loss of connectivity with any other newt populations in the longterm.

2. Post development interference impacts

Providing there is consideration of the existing population of newt(s) and the creation of suitable terrestrial habitat and aquatic habitat, post development there is unlikely to be any interference with the population of newts..

3. The Mitigation Solution

The residential development would lead to a net loss of habitat. This has to be taken into consideration at the planning stage and an area for compensation and enhancement has to be identified. This will be managed long term for newts.

An area to the north of the site has been highlighted as potential for compensation and mitigation as currently it is of low ecological value for newts and is closest to the canal.

It is recommended that a new pond is planned, along with hedge planting/improvement and

scrub/tree planting, the creation of hibernacula and refugia. This will be designed to meet the requirement for habitat creation.

The site will be protected with newt fencing during the preparation of the land and development. Suitable trapping out will involve buckets and mats placed around the fencing and drift fences around the site and clearance will be conducted for 30 consecutive days.

The land to the south east will be enhanced prior to development. This will provide an instant area for receptor site for newts. This will then be cleared to the north where the new habitat has been prepared.

Work will follow a strict method statement outlining reasonable precautions for securing the safety of individual newts.

Summary

The development will need to be conducted under licence from Natural Resources Wales as there will be disturbance of land within 50m of the pond and there will be potential of the damage and or destruction of individual newts. (One female found on site) With suitable compensation on the site it is considered that favourable conservation status will be maintained.

It is considered impossible for the work to be conducted on site by reducing the risks without erecting newt fencing therefore a licence will be necessary.

The licence application will entail mitigation for newts and compensation for the loss of terrestrial land. The development area will need to be with the erection of exclusion fencing for the duration of the project.

Compensation will be provided by providing a site with terrestrial features and aquatic features suitable for newts.

Further details:

A medium population is assumed. This assumption will be used in the application for a derogation licence from Natural Resources Wales, which is also required before work can commence on clearing the land or development.

1. A consultant will be employed as the Ecological Clerk of Works (ECoW) to oversee the work in areas sensitive to GCN on site. This person will need to be licensed and an experienced surveyor for GCN.
2. The ecologist and developer will work in conjunction to complete the licence application forms once planning permission has been granted. Planning permission is required before the licence can be applied for.

Method Statement

Pre-construction Phase

1. Newt fencing will be erected around the site once the licence has been granted.

It will be cleared of newts by the ECoW using buckets and refugia and any newts will be placed to the north of the site. (At any time between April to October when newts are active).

2. Clearance will be for 30 consecutive days with weather conditions being suitable for newt movement.
3. The ECoW will be on site to monitor the clearance by hand of the piles of rubble and plant growth prior to development occurring.
4. Once the land has been cleared then the site set up and development can commence.

4. Site set up

- The ECoW will provide contractors with a toolbox talk prior to work commencing. This will include information about the legal status of newts and responsibilities of the construction company to ensure no offence is committed. A document to assist the identification of newts will be left on site and available for all contractors to view.
- The site will be checked thoroughly by the ECoW prior to construction commencing with a walkover and fingertip search. This will confirm there are no newts present and that there are no places where newts could be sheltering, prior to commencement.
- Soil and vegetation will be stripped prior to setting up the site compound to ensure the compound contains no vegetation which could potentially attract GCN.
- All cabins and equipment will be located on firm compacted ground, preferably a stone or concrete base.
- Contractors are advised not to handle newts at any time.

5. Construction phase

- The Site Forman will be responsible for ensuring all contractors are aware of the potential to find newts and that they are familiar with the appearance of newts. If in doubt the ECoW will be contacted.
- Stored subsoil must not be tipped onto any tall vegetation. The location of the storage area will be checked by an ecologist immediately before the topsoil is moved to the storage area.
- Any plants around the site will be kept short to stop the development of a long sward suitable for the terrestrial habitat for newts.
- All groundwork will be conducted during daylight hours as newts are least likely to move during this time.
- Trenches will be dug and filled in on the day created or will be covered over with close fitting boards at the end of each working day and checked the following morning. This is particularly important when newts are most active, between March and November.
- If necessary a ramp will be placed in trenches to allow newts and small mammals to escape.
- Any heavy machinery will be stored in the compound of the site to avoid refugia

- being created.
- Stored material will be raised on pallets to reduce the potential they might act as a temporary resting place. This reduces the potential for damage or destruction of individual newts.
- All waste will be placed straight into skips to reduce the potential of creating refugia.
- If a newt is found then work WILL stop immediately and the ECW contacted for advice.
- It is recommended that regular site visits are carried out by the ecologist to ensure compliance with the legislation and the Method Statement. A record of these visits will be made as part of the audit trail.

6. Personnel awareness and emergency procedures

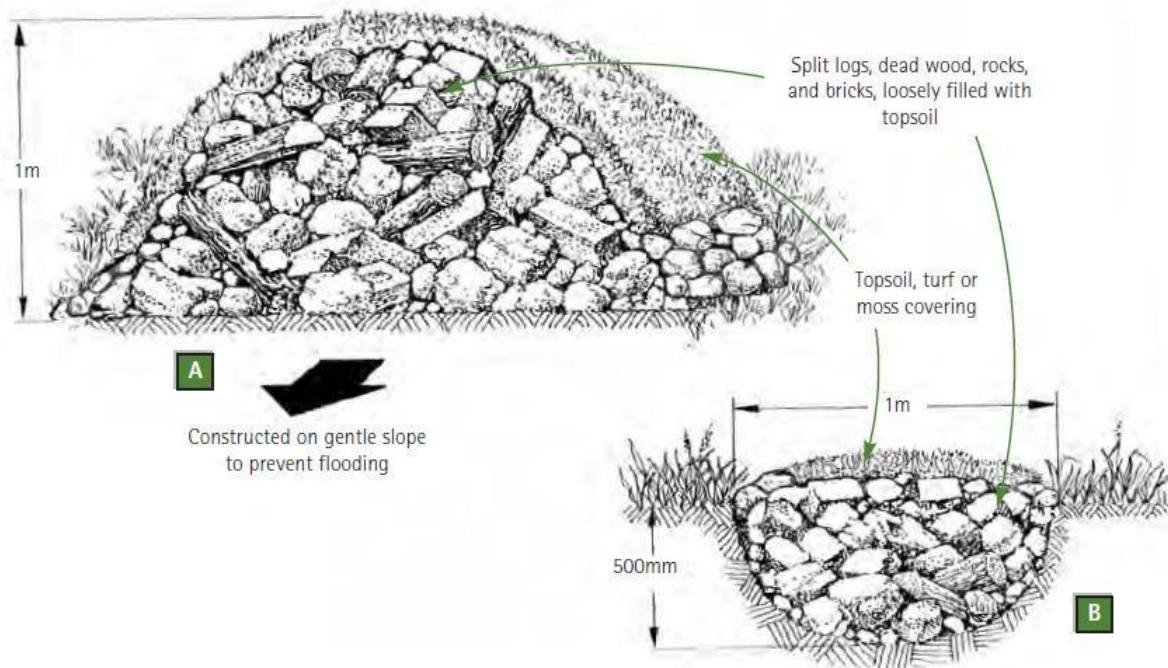
- It will be ensured all construction workers and personnel are aware of GCN legal protection. This will be by a toolbox talk and the ongoing briefing of contractors by the site foreman.
- A copy of this document will be on site at all times during construction work.
- If any GCN are found on site at any time, the consultant will be contacted immediately for advice.
- If a GCN is found on site, all construction activities should be stopped immediately until the consultant has advised how to proceed.
- If a GCN is found on site, the animal should not be handled or moved from its resting place and any sheltering material should be carefully replaced. If there is immediate danger of injury (eg if the newt is found on a road) then the animal will be placed in a clean lidded bucket and stored in a cool but frost free place for the ecologist to attend to.

Enhancement for Newts

The landscaping features will be designed to enhance the terrestrial features for newts. This will include new hedges and trees along the northern boundary of the site.

Hibernacula Creation

A hibernaculum is a generic term describing a place specifically designed to provide refuge for the local fauna. In this case, the design will focus on the needs of great crested newts.



A suggested design for a great crested newt hibernaculum (taken with permission from the “Great Crested Newt Conservation Handbook (2001)” by Froglife©). Note part A is for impermeable land, B is for free-draining soils.

- It is recommended that at least 2 hibernacula will be created to the north of the site.
- These will be comprised of a pile of clean rubble, notably largestones/bricks/concrete, logs or branches. Over this, topsoil should be poured but not compacted. If possible, some grass should be placed over the top.
- This will ultimately create a mound with large interstitial gaps, allowing space for newts to take refuge. The soil and grass covering will keep the mound warm and moist – ideal habitat for refuging and hibernating newts.
- The ECoW will be present for the construction of these refuges to advise on materials to use, and specific location for placement.

Concluding Remarks

This development cannot proceed without first obtaining a derogation licence for great crested newts. Works, including clearance of the land of plants or material conducted before this is obtained is likely to constitute an offence. There are no other ecological constraints to the development as planned.

4.3. Minimising Ecological Impact

This section states how the negative impacts of the development can be addressed.

4.3a. Protecting the Ecological Value of the Site

The trees and hedges within the development area should be retained and enhanced. The trees are of high suitability for breeding birds and potentially will have a number of nests during the breeding season.

Any trees/hedges unavoidably lost to accommodate the development should be replaced with appropriate compensation planting at a minimum of 1:1 ratio, preferably 1:2 in anticipation of the high failure rate of young trees. Ensure landscape planting uses species which are beneficial to wildlife. See appendices for recommended species planting lists.

In addition, the on-site lighting should be carefully chosen to ensure it is low lux, cowed (directed downwards to prevent light splay), and used on timers or motion sensors to minimize the impact on local bat populations.

Bird boxes should be installed on 50% of the new building once works are complete. These should be erected in accordance with the manufacturers recommendations. Generally, this will entail mounting the box between 3 – 4 m above the ground, with a north / northwest aspect. Care should be made to make the nest box inaccessible to predators, and generally, nest boxes should not be sited too close to each other.

It is also suggested that at least one bat box be attached to 50% of the new buildings. Details can be found in appendix 5.

For reptiles, retention of habitat value can be approached via the creation of south facing log and brash piles, and /or open compost heaps along south facing site edges and within the attenuation area, to create refugia for reptiles.

For amphibians and invertebrates, wildlife ponds not stocked with fish, planted with native vegetation and designed with appropriate sloping sides and depth for wildlife, as described in <https://www.froglife.org/wp-content/uploads/2013/07/JAW2014-for-printing-HLF1.pdf> and see appendixes.

4.3b. Precautionary Measures during Development

The trees, hedges and garden planting could all provide suitable nesting structures, therefore site clearance should be carried out outside of the bird breeding season. Bird breeding season is between mid March and mid August, although certain species can breed outside these months and if breeding birds are found then work should cease and the advice of an ecologist sought.

All retained trees should be treated in accordance British Standard BS5837 (2012) Trees in Relation to Design, Demolition and Construction – Recommendations, to ensure require adequate root protection fencing.

To protect any reptiles or common amphibians which might be using the site, it is recommended appropriate precautions should be taken during development. These include;

- All site staff involved with site clearance and construction works are to be made aware of the potential for encountering great crested newts and reptiles through a tool kit talk and the appropriate measures to be taken if great crested newts are encountered.
- Keep duration of groundworks as short as possible.
- Undertake during the day works that might only affect newts above ground.
- Backfill trenches and other excavations before nightfall, or leave a ramp to allow newts to easily exit.
- Raise stored materials (that might act as temporary resting places) off the ground, e.g. on pallets.
- Ensuring storage of piles of materials and excavated earth on the site should be kept to a minimum.
- Storing piles of materials and excavated earth away from the field boundaries to deter reptiles from using them for temporary cover.

Appropriate precautionary measures are recommended, in case badgers enter the working areas at night:

- Ensure that all those in work are aware of the potential for setts or badgers to be encountered, and the actions to be taken if these are discovered at anytime.
- All excavations to be covered over or ramped so that any badgers could get out of an excavated structure. Further measures are detailed below:

- Any ground-works that are to be left open overnight will be provided with a means of escape should a badger enter. This could simply be in the form of a roughened plank of wood placed in the trench as a ramp to the surface. This is particularly important if the trench fills with water.
- Any trenches/pits will be inspected each morning to ensure that no badgers have become trapped overnight. Should a badger become trapped in a trench it will likely attempt to dig itself into the side of the trench, by forming a temporary sett. Should a trapped badger be encountered the Ecologist should be contacted immediately for further advice who, if necessary, will contact Natural England in respect of legislative and licensing issues.
- The storage of topsoil or other ‘soft’ building materials on site will be given careful consideration. Badgers will readily adopt such mounds as setts; so as to avoid the adoption of any mounds, these will be kept to a minimum and any essential mounds subject to daily inspections (or nightly patrols if 24 hour security is present on site), with consideration given to temporarily fencing any such mounds to exclude badgers.

4.4 Opportunities for Biodiversity Gain and Off-setting Requirements

It is important that this proposed development should demonstrate Net Biodiversity Gain, in accordance with National Planning Policy Framework 2021.

This site will require a Biodiversity Net Gain Plan which includes a baseline assessment of what is currently present on a site, an estimation how proposed designs will add to that level, and latterly supported by post-construction evidence that a biodiversity gain has been delivered. Measurement of pre and post-construction biodiversity levels will be based on DEFRA’s ‘Biodiversity Metric 2.0’ in terms of its Distinctiveness, Condition, Significance and Connectivity.

Mitigation is likely to include, but not be limited to:

1. Retention and enhancement of value of existing woodland, hedges and trees. To include supplementary planting with native species, additional hedgerow and tree planting.
2. Creation of reptile habitat features.
3. Creation of amphibian habitat feature and ponds and other features in line with the NRW derogation license.

4. Introduction of bat and bird friendly native planting schemes, hibernacula, and wildflower hedgerow edge mix seeding. (further information can be found in Appendix 4-8)
5. Bird and bat boxes incorporated within or on the new buildings or other built fabric, in particular should be included. (further information can be found in Appendix 4-8)
6. Selection of wildlife-friendly shrub/planting species as part of the terrestrial landscaping scheme within the development. The specification should include elements of landscaping details selected from a palette of species beneficial to wildlife (further information can be found in Appendix 4-8)
7. Wildflower seeding areas, use of flowering lawn seed mixes.
8. Use of FSC certified timber.
9. No use of peat on site.

5. CONCLUSION

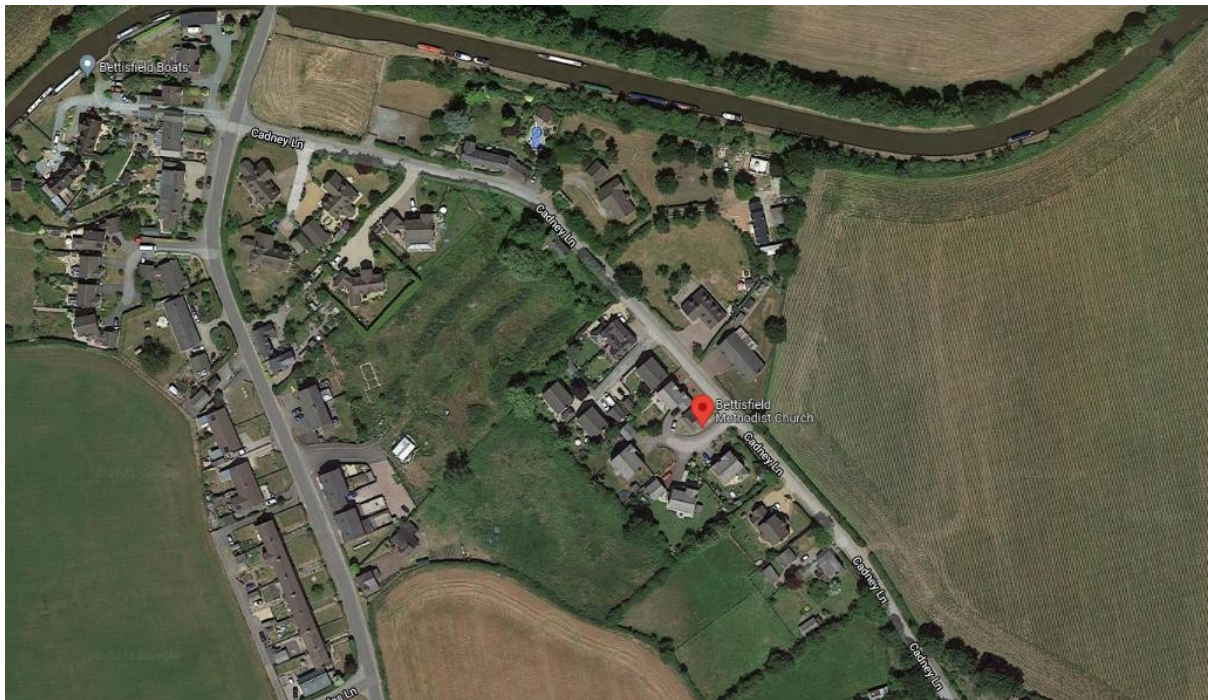
The value of the majority of the site, in terms of ecological value to wildlife is moderate to high, with the semi-improved grassland native hedgerows and tree lines having highest ecological value. The site will require a Biodiversity Net Gain Plan which includes a baseline assessment of what is currently present on a site, an estimation how proposed designs will add to that level, and latterly supported by post-construction evidence that a biodiversity gain has been delivered.

- The on-site lighting should be carefully chosen to ensure it is low lux, cowled (directed downwards to prevent light splay), and used on timers or motion sensors to minimize the impact on local bat populations. This should conform the BCT lighting guidance, 2018.
- Safe working methods for minimising harm to reptiles and amphibians, as described in 4.3b below, with habitat creation on site post development. For reptiles, the creation of south facing log and brash piles, and /or open compost heaps along south facing site edges to create refugia for reptiles. For amphibians and invertebrates, specially designed wildlife ponds, within the attenuation area, not stocked with fish, planted with native vegetation and designed with appropriate sloping sides and depth for wildlife, as described in <https://www.froglife.org/wp-content/uploads/2013/07/JAW2014-for-printing-HLF1.pdf> and see appendixes.
- **The presence of great crested newts requires a license in respect of development to be obtained from Natural Resources Wales prior to works commencing.**
- Should any of the woodland fringes, tree belts or hedgerow be lost to enable access into the site, it should be replaced, above 1:1 ratio, in anticipation of the high failure rate of young trees, and their low ecological value in comparison with mature trees. Additional hedgerow and tree planting is recommended around the proposed new access roads, within public open space, along streets, around buildings, within carparks and within proposed gardens.
- There are no Statutory or Non-Statutory Designated Nature Conservation Sites within or adjacent to the site.

- The Biological Data Search no protected species were recorded within the site.
- There is no evidence of badger use of the site, therefore no further surveys are required.
- Ivy clad on site trees have low bat roost potential, these should be retained and protected within the development of the site, if they are to be lost to development, they will require at least one bat emergence survey.
- The site is of high suitability for reptiles, although no further surveys are required, habitat creation post development and a series of precautions should be taken during development, as detailed in section 4.3b.
- The trees and hedges within the survey site are suitable for bird nesting. Site clearance should be undertaken outside of the bird breeding season (mid March to mid August) or undertaken under ecological supervision.
- A tree protection area and root protection zone should be established to avoid damage during the construction phase around all retained trees and hedges.
- Designs works to the gardens should ensure hedgehogs can move between the proposed gardens and the wider landscape, as well as ensure connectivity between the proposed gardens, via habitat creation and suitable gaps to allow hedgehog access within any walls or fences.

Date	Prepared by	Checked and Verified by
22nd November 2021	Dr Louise Sutherland MIALE Ecologist	Dr Stefan Bodnar MCIEEM Principal Ecologist

Appendix 1a Satellite Image



Map data 2021 © Google.

Appendix 1d Phase 1 Habitat Map

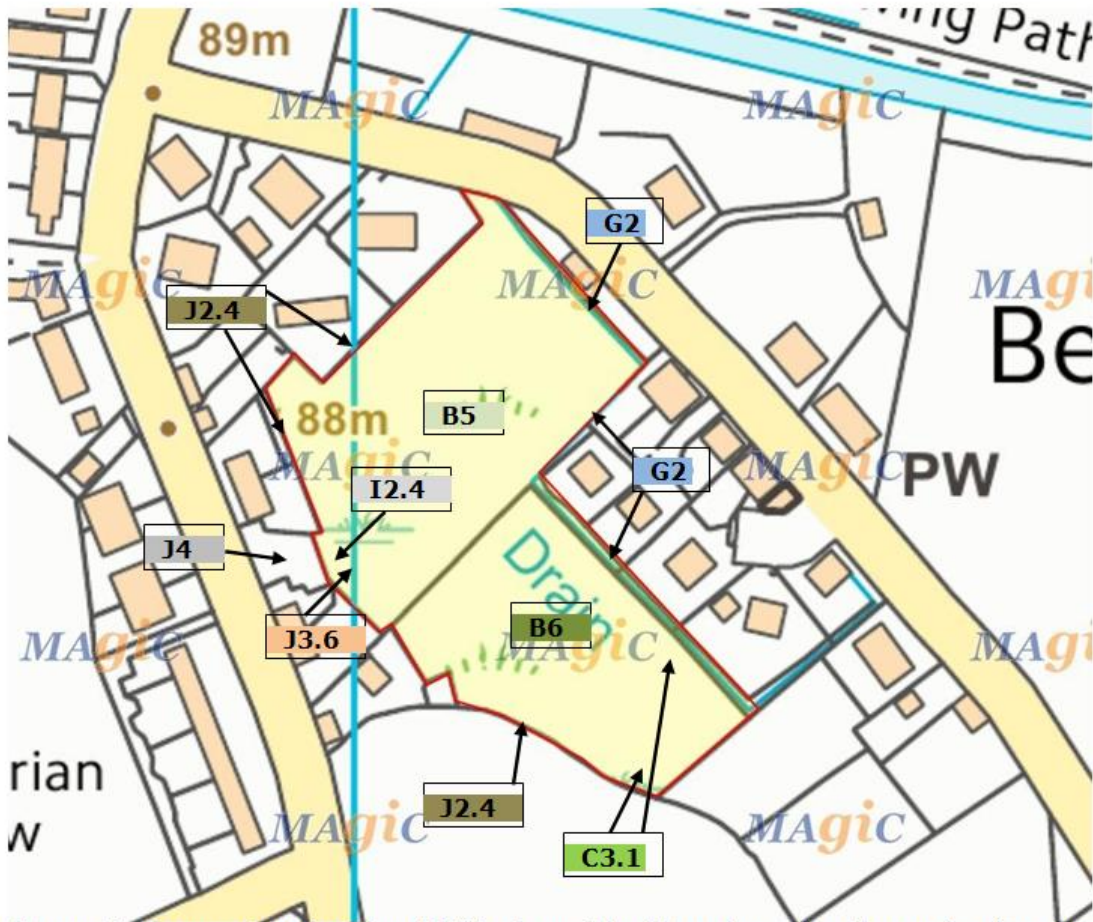


Figure 2. A map showing the JNCC phase 1 habitat classification codes for the site

Appendix 2 Photographs















Appendix 3 Species Lists

Ommitted

Appendix 4: Specifications for Biodiversity Gain

Appendix 4a: British Native Trees to Attract Wildlife

Species	Average mature / ultimate height			Growth rate			Soil/ground conditions					Tolerant of sites that are				Valuable for	
	0.5-5m	6m-15m	16m+	Fast	Medium	Slow	Wet ground	Light sandy soils	Heavy soils	acid	alkaline	Shaded	Polluted	Coastal	Exposed	Birds	Insects
Alder		•		•			■		•		•	•	•		•		•
Ash			•		•		▲	•	•		•	•	•	•	•		
Aspen		•		•					•	•	•		•	•	•		•
Beech			•			•		•			•	•					•
Birch, Downy		•		•			▲			•			•		•		•
Birch, Silver		•		•				•		•			•		•		•
Blackthorn	•			•				•	•	•	•			•	•	•	•
Broom	•				•			•		•	•	•	•	•	•		•
Buckthorn, Alder	•					•	▲			•							
Cherry, Wild		•			•			•	•		•		•				
Cherry, Bird		•			•			•	•	•		•				•	•
Crabapple		•				•		•	•	•	•	•				•	•
Elder		•		•				•	•	•	•	•	•	•	•		•
Elm, Wych		•			•				•		•	•	•	•	•		•
Gorse	•				•			•		•	•					•	•
Hawthorn	•				•			•	•	•	•		•	•	•	•	•
Hazel		•		•					•		•	•					•
Holly		•				•		•	•	•	•	•	•	•	•	•	
Lime, small-leaved			•		•				•			•					•
Maple, Field		•			•				•		•	•	•				
Oak, Pedunculate			•			•			•		•				•	•	•
Oak, Sessile			•			•	▲	•	•	•		•			•	•	•
Pine, Scots			•		•			•		•					•		•
Poplar, Black			•	•			▲	•	•		•						•
Rose, Dog	•				•			•	•		•	•	•		•		•
Rose, Guelder	•				•		▲		•		•	•					•
Rowan		•		•				•		•			•	•	•	•	
Spindle	•				•				•		•	•					
Whitebeam, Common		•			•			•	•		•						•
Wild Service	•					•			•		•	•		•		•	
Willow, Crack		•		•			■				•		•	•	•	•	•
Willow, Goat		•		•	•		■		•		•	•	•	•	•	•	•
Willow, White			•	•			■				•		•	•	•	•	•
Yew		•				•		•			•	•			•	•	

■ Only species to survive waterlogged sites with anaerobic conditions.

▲ Will tolerate wet ground if there is some seasonality of "flushing (water movement) within the soil.

Appendix 4b: Non-native plants to attract wildlife

Buddleja X weyeriana cultivars

You can plant the orange-flowered B. X weyeriana hybrids with a clear conscience as they don't appear to produce viable seed, they also attract a broad spectrum of insects including both butterflies and bees, and they flower late into the season when nectar is scarce. The beautiful B. x fallowiana 'Lochin' with silver leaves is attractive to butterflies and is also said not to produce seeds. The orange ball Buddleja (B. globosa) from South America seems to attract bees rather than butterflies.

Bupleurum fruticosum ('Shrubby Hare's Ear')

A shrubby evergreen umbellifer from Southern Europe, where it is often cultivated. It has leathery aromatic foliage and umbels of yellowish flowers, a bit like those of Fennel, that are very attractive to hoverflies and other small insects. Well worth growing for this reason.

Ceanothus X 'Gloire de Versailles'

Ceanothus come from the Western United States. Most Ceanothus have bunches of very small flowers that don't seem very attractive to insects. 'Gloire de Versailles' however is a hybrid with loose bunches of pale blue tubular flowers that are very attractive to butterflies and bees.

Caryopteris X clandonensis 'Kew Blue'

A deciduous shrub from China for a sunny position, has small tubular blue flowers attractive to insects.

Clethra alnifolia ('Sweet Pepper Bush')

A deciduous shrub from the Eastern United States that likes damp, acid or woodland soil. Has spikes of small scented white flowers attractive to moths and butterflies.

Hebe X 'Great Orme' and H. X 'Midsummer Beauty'

Hebes are close relatives of the herbaceous genus Veronica, and come from New Zealand. Some are much more attractive to insects than others. 'Great Orme' is a medium-sized hybrid with pale pink flowers that are attractive to butterflies. It is a distinctive cultivar and available true to name in the nursery trade.

'Midsummer Beauty' seems to be more of a generic name for a series of large shrubs with blue or grey-blue flowers in long spikes, attractive to both bees and butterflies. There are a number of other blue and white flowered Hebes that seem very popular with bumblebees.

Myrtus communis ('European Myrtle')

An attractive evergreen shrub from the South of France and Spain with small evergreen aromatic leaves. It has been grown in our gardens for centuries, but is susceptible to hard frost and prefers a site against a warm sunny wall. Fluffy white flowers in early summer are bumblebees' heaven. Purplish berries follow later which are stripped by blackbirds in January.

Amelanchier species ('Shad Bush')

Shrubs with white cherry-like blossoms early in the year, followed by blackish berries in late summer. Valuable for the berries as a source of food for berry-eating birds when most other berries are not yet ripe.

Erica terminalis ('Corsican Heath')

A shrubby heather-like plant popular with bumblebees. The Cornish Heath, Erica vagans, from the Atlantic fringes of Europe is also a good bee plant. Erica manipuliflora, from Southern Europe, and its hybrid Erica X griffithii have fragrant flowers that attract butterflies.

Eupatorium ligustrinum

A late-flowering evergreen bush that looks very like a privet, but has bunches of white fluffy flowers in September and October. These flowers seem very attractive to range of insects, especially hoverflies.

Ribes sanguineum (Flowering Currant)

It is a very good early flower for bumblebees, as indeed are the flowers of the closely related blackcurrants and gooseberries.

Appendix 4c: Plants good for moths, with species of moth they encourage beside

Plant	Moths
Bird's Foot Trefoil (<i>lotus corniculatus</i>)	<i>Burnet, Belted Beauty, Chalk Carpet, Latticed Heather</i>
Bladder Campion (<i>silene vulgaris</i>)	<i>Campion, Marbled Coronet, Nettle Pug, Marbled Clover, Dark Brocade, Sandy Carpet</i>
Borage (<i>borago officinalis</i>)	<i>Crimson Speckled</i>
Wild Clary (<i>salvia horminoides</i>)	<i>Twin-spot Carpet</i>
Biting Stonecrop (<i>sedum acre</i>)	<i>Yellow Ringed Carpet, Northern Rustic</i>
Cowslip (<i>primula veris</i>)	<i>Plain Clary, Northern Rustic</i>
Dropwort (<i>filipendula hexapetala</i>)	<i>Satyr Pug</i>
Evening Primrose (<i>oenothera biennis</i>)	<i>Elephant Hawk</i>
Field Scabious (<i>kanutia arvensis</i>)	<i>Marsh Fritillary, Narrow Bordered Bee Hawk, Lime Speck Pug, Shaded Pug</i>
Foxglove (<i>digitalis purpurea</i>)	<i>Lesser Yellow Underwing, Foxglove Pug</i>
Golden Rod (<i>solidago</i>)	<i>Lime Speck Pug, Bleached Pug, Golden Rod, Wormwood Pug, V Pug</i>
Greater Stitchwort (<i>stellaria holostea</i>)	<i>Dart, Yellow Underwing, Marsh Pug, Plain Clary</i>
Hedge Bedstraw (<i>gallium mollugo</i>)	<i>Ruddy Carpet, Royal Mantle, Common Carpet, Wood Carpet, Water Carpet, Beech Green Carpet, Mottled Grey, Green Carpet</i>
Hedge Woundwort (<i>stachys sylvatica</i>)	<i>Rosy Rustic, Plain Golden Y, Sub-angled Wave</i>
Hemp Agrimony (<i>eupatorium cannabinum</i>)	<i>Wormwood Pug, V Pug, Lime Speck Pug, Marsh Pug, Gem, Scarce Burnished</i>
Herb Bennet (<i>geum urbanum</i>)	<i>Riband Wave</i>
Herb Robert (<i>geranium robertianum</i>)	<i>Barred Carpet</i>
Hollyhock (<i>althaea rosea</i>)	<i>Mallow</i>
Kidney Vetch (<i>anthyllis vulneraria</i>)	<i>6-belted Clearwing</i>
Lady's Bedstraw (<i>gallium verum</i>)	<i>Hummingbird Hawk, Small Elephant Hawk, Gallium Carpet, Plain Wave, Riband Wave, Bedstraw Hawk, Archer's Dart, Red Chestnut, Ruddy Carpet, Royal Mantle, Common Carpet, Water Carpet, Beech Green Carpet, Red Twin Spot Carpet, Wood Carpet, Mottled Grey, Green Carpet</i>
Lady's Mantle (<i>alchemilla mollis</i>)	<i>Red Carpet</i>
Lesser Knapweed (<i>centaurea nigra</i>)	<i>Silver Y, Lime Speck Pug, Satyr Pug</i>
Lesser Meadow Rue	<i>Marsh Carpet</i>
Maiden Pink (<i>dianthus deltoides</i>)	<i>Marbled Coronet</i>
Marjoram (<i>majorana originaum</i>)	<i>Sub-angled Wave, Lace Border</i>

Marshmallow (<i>althea officinalis</i>)	<i>Marshmallow</i>
Meadow Clary (<i>salvia pratensis</i>)	<i>Brown Spot Pinion, Hebrew Character, Powdered Quaker, Emperor</i>
Mullein	<i>Mullein, Striped Lychnis</i>
Navelwort (<i>umbilicus rupestris</i>)	<i>Weaver's Wave</i>
Pink	<i>Hawk</i>
Primrose (<i>primula vulgaris</i>)	<i>Pearl Bordered Yellow Underwing, Double Square Spot, Green Arches, Triple Spotted Clary, Ingrained Clary, Silver Ground Carpet</i>
Purple Loosestrife (<i>lythrum salicaria</i>)	<i>Emperor, Small Elephant Hawk, Powdered Quake</i>
Ragged Robin (<i>lychnis flos cuculi</i>)	<i>Campion, Lychnis, Twin-spot Carpet, Marbled Clover</i>
Red Campion (<i>melandrium rubrum</i>)	<i>Rivulet, Campion, Lychnis, Twin-spot Carpet, Sandy Carpet, Marbled Clover</i>
Red Clover (<i>trifolium pratense</i>)	<i>Latticed Heath, Chalk Carpet, Belted Beauty, Mother Skipton, Shaded Broad Bar, Narrow-bordered 5-spot Burnet</i>
Red Valerian (<i>centranthus ruber</i>)	<i>Elephant Hawk</i>
Rock Rose (<i>helianthemum mummularium</i>)	<i>Amulet, Cistus Forester, Silky Wave, Ashworth's Rustic, Argus, Wood Tiger, Northern Brown</i>
Rosebay Willowherb	<i>Twin-spot Carpet, Small Phoenix, White Banded Carpet</i>
Small Scabious (<i>scabiosa columbaria</i>)	<i>Lime Speck Pug, Shaded Pug</i>
Soapwort (<i>saponaria officinalis</i>)	<i>Marbled Clover</i>
St John's Wort	<i>Treble Bar</i>
Sweet Violet (<i>viola odorata</i>)	<i>Broad Bordered Yellow Underwing, Lesser Broad Bordered Yellow Underwing</i>
Tansy (<i>tanacetum vulgare</i>)	<i>Essex Emerald</i>
Thrift (<i>armeria maritima</i>)	<i>Amulet, Feathered Ranunculus, Thrift Clearwing, Black Banded</i>
Thyme	<i>Thyme Pug, Satyr Pug, Lace Border</i>
Toadflax (<i>linaria vulgaris</i>)	<i>Toadflax Pug, Marbled Clover</i>
Valerian (<i>valeriana officinalis</i>)	<i>Valerian Pug, Lesser Cream Wave</i>
White Campion (<i>silene latifolia alba</i>)	<i>Marbled Coronet, Marbled Clover, Sandy Carpet</i>
Wild Clematis (<i>clematis vitalnba</i>)	<i>Lime Speck Pug, Haworth's Pug, Small Emerald, The Fern, Pretty Chalk Carpet, Least Carpet, Pug, Chalk Carpet, Small Waved Umber</i>
White Clover (<i>trifolium repens</i>)	<i>Cloudy Wing Skipper, Orange, Clouded Sulphur</i>
Wild Pansy (<i>viola tricolor</i>)	<i>Pluvia</i>
Wild Strawberry (<i>fragaria vesca</i>)	<i>Amulet, Yellow Shell, Beautiful Carpet, Dark Marbled Carpet</i>

Wild Wallflower	<i>Flame Carpet</i>
Wormwood (<i>artemesia absinthium</i>)	<i>Wormwood Pug</i>
Yarrow (<i>achillea millefolium</i>)	<i>Essex Emerald, Lime Speck Pug, Straw Belle, Wormwood Pug, Ruby Tiger, Yarrow Pug, V Pug, Sussex Emerald, Grey Pug, Tawny Speckled Pug, Common Pug, Mullein Wave</i>
Yellow Flag Iris (<i>iris pseudacorus</i>)	<i>Belted Beauty, Water Ermine</i>
Barberry	<i>Scarce Tissue, Wheat</i>
Blackthorn/Sloe	<i>March, Common Emerald, Little Emerald, Mottled Pug, Feathered Thorn, Orange, Scalloped Hazel, Scalloped Oak, August Thorn, Brimstone, Early Thorn, Pale Brindled Beauty, Blue Bordered Carpet, Broken Barred Carpet, November, Pale November, Winter, Sloe Pug, Green Pug, Sharp Angled Peacock, The Magpie</i>
Broom	<i>Grass Emerald, The Streak, Broom-tip, Lead Belle, Spanish Carpet, Frosted Yellow</i>
Dog Rose	<i>V Pug, Little Thorn, Shoulder Stripe, Barred Yellow, Streamer</i>
Hawthorn	<i>March, Common Emerald, Little Emerald, November, Pale November, Winter, Mottled Pug, Pinion Spotted Pug, Common Pug, Grey Pug, Peppered, Brindled Beauty, Pale Brindled Beauty, Feathered Thorn, Scalloped Hazel, The Magpie, Scalloped Oak, Large Thorn, Early Thorn, Oak Tree Pug, Broken Barred Carpet</i>
Hazel	<i>Oak Beauty, Small White Wave, The Magpie, Clouded Border, Barred Umber, Winter, Pale November</i>
Oak	<i>Brindled Pug, Oak Tree Pug, Spring Usher, Peppered, Oak Beauty, Brindled Beauty, Pale Brindled Beauty, Small Brindled Beauty, Feathered Thorn, Orange, Lunar Thorn, Purple Thorn, Scalloped Hazel, Scalloped Oak, Scorched Wing, Large Thorn, August Thorn, November, September Thorn, Pale November, Winter, March, Blotched Emerald, Common Emerald, Little Emerald, False Mocha, Maiden's Blush, Marbled Pug, Red-green Carpet, Broken Barred Carpet</i>
Rowan	<i>Orange Underwing, Welsh Wave, Mottled Pug, Red-green Carpet</i>
Wild Privet	<i>Lilac Beauty, Barred Toothed Striped, Yellow Barred Brindle,</i>

Appendix 4d: Plants and Habitats to attract Bats

2. Flower Borders and Lawns

Larvae and adults of many insects will be catered for by introducing a wide range of food, in the form of nectar, seeds and fruit as well as vegetation.

- Grow night scented flowers. These attract moths and other night flying insects of particular importance to bats.
- Plant herbs and old fashioned cottage-garden annuals attractive to insects.
- Leave part of your lawn un-mown from about mid-May to encourage insect larvae which feed on grass. Allow to seed before cutting, and rake up the hay afterwards.
- Sow wild flower seed collections in your borders.

3. Trees and Shrubs

At woodland edges space and sunshine combine with the trees to give shelter and warmth, and insects will concentrate there. So even in the smallest garden try to have at least one tree or shrub. Native trees are more attractive to insects than foreign species.

If space is limited, silver birch and goat willow are quick growing and are host to many insect visitors. With a little more space, try to make a bank of vegetation to give your garden a woodland edge structure.

4. Shelter Belts

Rows of bushes or trees can be created or improved, encouraging concentrations of insects and providing a feeding area for bats,

- Plant up gaps in natural hedges,
- A row of fast-growing cypress can be valuable.
- Train climbers using battens against a wall or fence, to provide possible roosting sites.
- Create a sheltered corner by using any combination of walls, fences, hedges or woodland edge at two angles.

Scented herbs

Chives, Borage, Lemon balm, Marjoram, Mint - many varieties

Night scented flowers for the border (in approximate order of flowering)

Bedding Plants

Nottingham catchfly	Silene nutans
Night-scented catchfly	S. noctiflora
Bladder campion	S, vulgaris
Night-scented stock	Matthiola bicornis
Sweet rocket	Hesperis matronalis
Evening primrose	Oenothera biennis
Tobacco plant	Nicotiana affinis
Cherry pie	Heliotropium x hybridum
Soapwort	Saponaria officinalis

Climbers

European honeysuckle	Lonicera caprifolium	July-November
Italian honeysuckle	L. etrusca superba	July-August
Japanese honeysuckle	L. japonica halliana	August-October
Honeysuckle (native)	L. periclymenum...	July-August
White jasmine	Jasminium officinale	
Dogrose	Rosa canina	
Sweetbriar	R. rubiginosa	
Fieldrose	R. arvensis	
Ivy	Hedera helix	
Bramble - many species		

Large trees, small trees and shrubs

Oak	Quercus robur & Q. petraea
Ash	Fraxinus excelsior
Silver birch	Betula pendula
Field maple	Acer campestre
Hawthorn	Crataegus monogyna
Alder	Ainus glutinosa
Goat willow	Salix caprea
Guelder rose	Viburnum opulus
Hazel	Coryllus avellana
Blackthorn	Prunus spinosa
Elder	Sambucus nigra
Buddleia davidii	

Rock plants for walls

Ivy-leaved toadflax	Cymbana muralis
Wall pennywort	Umbilicus rupestris

Appendix 4e: Plants and Habitats to Attract Birds

Plants to Feed Birds.

Many shrubs, climbers, trees, garden and 'wild' plants provide food, directly or indirectly, through berries, seeds or the insects they attract.

Berry or fruit bearing trees and shrubs will attract members of the Thrush family, Blackbird, Fieldfare, Mistle and song Thrush, Redwing and Robin. Also Starlings and, in some winters, Waxwing and even some Warblers, e.g., Blackcaps who eat berries in the early autumn before they migrate. Unless mentioned, the berries attract all the above birds plus others as specified.

Shrubs with Berries.

- Aronia arbutifolia (Red Chokeberry) : bright red fruits
- Berberis: most forms have black/purple berries, especially loved by Blackbirds.
- Callicarpa 'Profusion': bright violet coloured berries.
- Cornus (Dogwood): blue tinted white berries (not C.Mas).
- Cotoneaster : prolific red, orange or yellow berries - birds often choose red first, through orange to yellow last. (Note berries are poisonous to humans).
- Euonymus europaeus (spindleberry: large bright red fruits which open to emit orange red seeds.(Note berries are poisonous to humans).
- Ilex (Holy): red, orange or yellow berries - red berries preferred (need partner to fruit).(Note berries are poisonous to humans).
- Mahonia: decorative black berries.
- Rosa rugosa : large red hips, particularly attractive to Greenfinches which pick out the seeds.
- Sambucus (Elder): red or black berries - over 32 species reported eating them, especially Blackcap and, occasionally, Collar Doves.
- Viburnum opulus (Guelder Rose) : translucent berries
- Viscum album (Mistletoe): familiar white globular berries of this parasite that grows in trees, especially apple, are a good food source for Blackbirds.

Climbers with Berries.

- Chaenomeles (Flowering Quince/Cydonia): Autumn Quinces.
- Hedera (Ivy) : shiny black berries
- Lonicera (Honeysuckle: red or black berries attract Thrushes plus Bullfinches and Marsh and Willow Tits. (Note berries are poisonous to humans).
- Pyracantha (Firethorn) :red, orange or yellow berries - choose red for the birds to eat before Christmas usually with orange or yellow to follow in a hard winter.
- Clematis vitalba (Old Man's Beard): seed heads are enjoyed by many birds.

Trees with Berries or Fruits.

- Crataegus monogyna (Hawthorn : red berries.

- Malus (Crab Apple: red fruited varieties are best for birds.
- Prunus (Cherries): fruits quickly picked off.
- Sorbus aucuparia (Mountain Ash/Rowan) :red, orange or pink flushed white berries. The darker the fruits the more attractive they are to birds. Occasionally bring Spotted Flycatchers to the garden.
- Taxus (Yew): sparse red berries attract a wide range of birds. Attractive also to Badgers.(Note berries are poisonous to humans).

Trees with Seed Cones.

- Alnus glutinosa (Alder), and Betula (Birch): seeds from cones enjoyed by Goldfinches, Greenfinches, Redpolls, Siskins and Tits.
- Pinus sylvestris (Scots pine) : pine cones from which Crossbills and Great Spotted Woodpeckers prize seed.

Trees with Blossom.

- Although not always welcome, Bullfinches strip the buds of fruit trees in late winter and early spring.

Garden Plants.

- Crocus: yellow and orange flowers are attractive to Sparrows because they contain yellow pigment carotene to brighten up their plumage for the breeding season.
- Echinops ritro (Globe Thistle: seed heads are eaten by Goldfinches and flower heads attract insects.
- Helianthus (Sunflower: seed heads are eaten by Greenfinches. The nectar attracts a wide range of insects.
- Lavandula (Lavender): flowers going to seed are attractive to Goldfinches.
- Primula (Polyanthus/Primrose): yellow and orange flowers are attractive to Sparrows.

Wild Plants.

You can provide a haven for wild plants to exist in their own right recreating a wild meadow to attract insects which, in turn, attract birds and other wildlife. We sell nursery grown 'wild' plants throughout the year so that you can go wild in a corner of your garden.

- Betony.
- Bird's Foot Trefoil.

- Common Poppy - seeds are favourite food of Finches.
- Field Scabious.
- Greater Knapweed.
- Meadow Cranesbill.
- Musk Mallow.
- Ox Eye Daisy.
- Oxlip.
- Primrose.
- Rough Hawkbit.
- Self Heal.
- Teasel - seed heads are a favourite food of Goldfinches.
- Wild Strawberry

The Lawn.

This is one of the principal sources of food for birds who enjoy feeding on insects including:-Ants eaten by Green Woodpeckers; Leatherjackets by Starlings; Snails by Song thrushes; Slugs by Toads and Worms by Blackbirds, Robins and Thrushes.

Cover and Protection.

By surrounding your garden by thick and often prickly hedging and dotting suitable shrubs around, you can provide safe nesting havens that are protected from marauding cats and even the unwelcome attention of unfriendly humans.

The most successful shrubs and trees for this purpose include:-

- Conifers especially chamaecyparis, Taxus (Yew) and Thuja Placata.
- Crataegus.
- Eleagnus.
- Hedera (Ivy) up a tree.
- Ligustrum (Privet) especially for Blackbirds.
- Lonicera (Honeysuckle).
- Pittosporum.
- Salix caprea (Weeping Kilmarnock Willow).

Appendix 4f: Plants and Habitats to attract Bees

Native Plants for Bees

Native plants should be your first choice to help our native bees. Listed below are some plants that are good sources of nectar or pollen for bees. Both the common and Latin names of the plant genus are given. This list is not exhaustive; there are many other plants good for bees. Individual species have not been included because we hope the list will be useful across the U.S. Not all of these genera will have species in your local area, but they do represent plants that will grow in a variety of environments. Use a wildflower guide or contact local nurseries to find your local species.

- Aster *Aster*
- Black-eyed Susan *Rudbeckia*
- Caltrop *Kallstroemia*
- Creosote bush *Larrea*
- Currant *Ribes*
- Elder *Sambucus*
- Goldenrod *Solidago*
- Huckleberry *Vaccinium*
- Joe-pye weed *Eupatorium*
- Lupine *Lupinus*
- Oregon grape *Berberis*
- Penstemon *Penstemon*
- Purple coneflower *Echinacea*
- Rabbit-brush *Chrysothamnus*
- Rhododendron *Rhododendron*
- Sage *Salvia*
- Scorpion-weed *Phacelia*
- Snowberry *Symphoricarpos*
- Stonecrop *Sedum*
- Sunflower *Helianthus*
- Wild buckwheat *Eriogonum*
- Wild-lilac *Ceanothus*
- Willow *Salix*

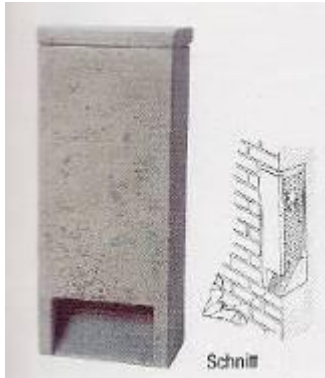
Garden plants for bees

Flower beds in gardens, business campuses, and parks are great places to have bee-friendly plants. Native plants will create a beautiful garden but some people prefer "garden" plants. Many garden plants are varieties of native plants, so this list only includes plants from other countries--"exotic" plants--and should be used as a supplement to the native plant list.

As with the native plants, this list is not exhaustive.

- Basil *Ocimum*
- Cotoneaster *Cotoneaster*
- English lavender *Lavandula*
- Giant hyssop *Agastache*
- Globe thistle *Echinops*
- Hyssop *Hyssopus*
- Marjoram *Origanum*
- Rosemary *Rosmarinus*
- Wallflower *Erysimum*
- Zinnia *Zinnia*

Appendix 5: Bat Boxes and Bat Brick Specifications to Provide Bat Habitat on Buildings



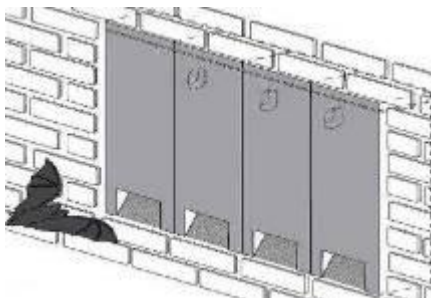
Schwegler 1FR can be installed within brick masonry just leaving the entrance and can be rendered over.



Ibstock Enclosed Bat Box B is designed specifically for the pipistrelle bat.



Schwegler W1 integral Summer & Winter Bat Box.



Schwegler 2FR Bat Tube is the same design as the 1FR but with holes in the sides. Multiple tubes to be placed next to each other to form a much larger roost.



Schwegler 27 wall can be installed within brick masonry. It can be rendered over.



Schwegler 1FQ wall-mounted bat box.



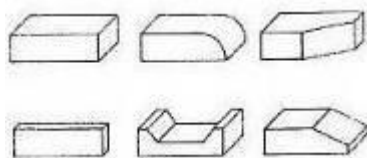
Schwegler 1FE Bat Access Panel can be surface-mounted or integrated. The open back enables bats access through exterior walls.



Ibstock Bat Box with Engraved Motif C is designed specifically for the pipistrelle bat and is available in all brick colours.



Ibstock Free Access Bat Box allows bats to access the cavity wall of the building.



Modified bricks for creating bat access points. A standard brick is shown top left. Purpose made bat bricks can also be used.



Norfolk Bat Brick allows bats to access the cavity wall of the building. The slits are the perfect size for Natterer's bat, Daubenton's bat, Brandt's bat and Brown long-eared.



Marshall's Bat Access Brick (Also available in stone) allows bats access into the cavity wall of the building.

APPENDIX 6: Insect Box Specifications

A variety of insect boxes is recommended to encourage a diversity of insect species and encourage bats.

Wooden Insect House

A general insect habitat for beneficial insects in summer and, later in the year, over wintering ladybirds and lacewings. Locate in a sheltered place near nectar or pollen plants or by a pond. Durable and strong construction in acacia, oak or larch with no maintenance necessary. Dimensions: 22 × 13.5 × 13.5cm.



Woodcrete Insect House

An insect nest made from long-lasting, insulating, woodcrete, with holes of different sizes providing homes for a variety of beneficial insects such as bees and solitary wasps. Dimensions: 14 × 8 × 26cm; Weight: 3.65kg



Insect House with Inspection Tubes

This nesting and hibernation box for insects has a woodcrete exterior with a wooden front panel which can be removed for observation. Through the transparent tubes you can see the usually hidden lifecycle of many solitary types of bees and hymenoptera including egg-laying, development of larvae and sealing of brood chambers. Typical inhabitants are wild bees and thread-waisted wasps. All the species attracted to this box are harmless non-aggressive pollinating insects.

Dimensions: 33 × 21 × 51 cm; Weight: 7.1kg.



Appendix 7. Bird Box Specifications

Schwegler boxes have the highest occupation rates of all box types. They are carefully designed to mimic natural nest sites and provide a stable environment for chick rearing and winter roosting. They can be expected to last 25 years or more without maintenance.

2. Schwegler No 11 House Martin Nest (Code: 002097D)



It is increasingly difficult for swallows and house martins to find suitable nest-building material. The mud they do find, if any, is often poor quality. In addition, the walls of buildings are nowadays often very smooth. As a result, nests tend to fall down, sometimes with the nestlings inside. In many places, the vibration caused by heavy vehicles shakes the nests loose. This nest has been developed to enable House Martins to breed successfully on external facades without overhanging eaves and has proved highly successful.

3. Schwegler No 16 Swift Box (Code: 002087D)

The design of this box mimics bell tower louvres. It has a removable panel for easy inspection of the nest chamber.



4. 2H Robin Box (Code: 002015D)



This box is attractive to robins, pied wagtails, spotted flycatcher, wrens and black redstarts. Best sited on the walls of buildings with the entrance on one side.

5. Sparrow Terrace



House sparrows are gregarious and prefer to nest close to each other, so this woodcrete box provides room for three families under one roof. Made from long-lasting, breathable woodcrete. No maintenance required. Designed for fixing to walls (not suitable for fences or sheds due to the weight of the box). Available in choice of stone colour (pictured) or brown.

6. Schwegler 1B Bird Box

The most popular box for garden birds, the 1B appeals to a wide range of species, and is the official nest box of National Nest Box Week. The box can be nailed to the trunk of a tree, or hung from a branch. Woodcrete, 23cm high x 16cm diameter. Available in choice of four colours - brown, green, red or white. Available with 32mm entrance hole (standard) or with 26mm hole



7. Schwegler Built-in Multi-System Main Cavity Bird Box (Code: 002101D)



The multi-system has exchangeable front panels for kestrels, jackdaws or swifts. The system can be installed in all types of buildings, whether constructed of concrete, brick or timber. To meet the needs of various species of bird, different types of front panel are available for use with the main cavity. The main cavity is supplied without a front panel which should be ordered separately. **Positioning:** At heights of 5m or more on a sheltered external wall. **Suitable for:** Dependant on the type of front panel chosen. **Material:** Woodcrete **Height:**415mm **Width:** 445mm **Depth:**415mm **Weight:**2.8Kg

Appendix 8: Measures specifically for hedgehogs

Hedgehog boxes or domes; a variety of types are shown below:

Hedgehog homes



Hedgehog Dome with insulated base

for use as summer home and hibernation in winter



[Pic. 1]: SCHWEGLER
Hedgehog Dome with
Hedgehog family

Hedgehogs are a protected species.

They usually construct nesting places in hollow tree stumps, piles of wood, dense vegetation and piles of leaves, all of which are becoming harder to find.

They will readily occupy our Hedgehog Dome, which provides year round accommodation, including hibernation quarters. Hedgehogs are welcome visitors to gardens because their diet consists of Snails, Caterpillars, Millipedes, etc.



[Pic. 2]: Hedgehog Dome
(occupied)

Material: SCHWEGLER wood-concrete. Brown protective coating for a balanced temperature

Siting: Choose somewhere protected from wind and rain. Try and avoid placing the Dome where the animals have to cross a lawn because these are mainly damp at night.

Nesting material: Ideally fill with hay (supplied with the Dome) but alternatively use dry leaves and straw, as well as cut up newspaper and wood shavings.

Dimensions:

Interior: $\diamond$ 44 cm Height: 28 cm Entrance: 11 x 12 cm
Exterior: ca. $\diamond$ 50 cm

Colour: Classic Brown

Weight: ca. 17 kg

Detailed instructions are supplied.



[Pic. 3]: Hedgehog Dome

(incl. nesting material, ready to use)

Hedgehog Dome with insulated base

order no.: 00 390 / 4