



WOLD ECOLOGY LTD

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Sproatley Road, Preston, East Yorkshire

Construction Ecological Management Plan and Wildlife Enhancement Plan

	Staff Member	Position	
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Version :	2.0	02 December 2020	Draft
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1.0 EXECUTIVE SUMMARY.

1.1 In November 2020, Wold Ecology Ltd was commissioned by Ward Homes Yorkshire to write a Construction Ecological Management Plan (CEMP) and a Wildlife Enhancement Plan (WEP) and for land adjacent to Sproatley Road (national grid reference TA 18769 30846) in Preston, East Yorkshire.

1.2 A CEMP and WEP is a requirement of East Riding of Yorkshire Council Planning Permission decision (Ref: **19/00416/OUT**), as part of the planning application process. Conditions relating to the ecology of the site states:

18. The details required to be submitted in accordance with condition no. 1 (details of reserved matters) shall include a construction environmental management plan (CEMP: Biodiversity) to be approved in writing by the Local Planning Authority. The CEMP shall be compiled by a suitably qualified ecologist, include a timetable for implementation and a detailed plan. The scheme shall provide full details of all ecological mitigation and management measures along with a programme for implementation. The scheme shall include:
- a) A risk assessment of potentially damaging construction-type activities;
 - b) Full details of practical measures (both physical measures and sensitive working practices) to avoid or reduce impacts during construction, including action to be taken if any protected species are found during construction works;
 - c) The location and timing of sensitive works to avoid harm to biodiversity features;
 - d) Use of protective fences, exclusion barriers and warning signs;
 - e) Full details and plans of measures to protect water features from run-off, pollution, adverse changes in water quality and flow;
 - f) Details of a lighting strategy which secures dark corridors for foraging bats and nesting birds on the boundaries of the site;
 - g) Details of site induction information and tool box talks for all relevant on site working practices. Protocols to demonstrate that the site work force will be briefed about potential ecological issues on the site prior to commencement of construction shall be provided;
 - h) Details of personnel responsible for over-seeing the implementation of measures detailed in the CEMP.

Upon commencement of development all aspects of the approved construction environmental management plan (CEMP: Biodiversity) shall be implemented in full, unless otherwise agreed in writing by the Local Planning Authority.

This condition is imposed in accordance with policy ENV4 of the East Riding Local Plan to ensure that protected species and priority habitats would not be harmed by the development of this site having regard to the Wildlife and Countryside Act 1981 (as amended), The Conservation of Habitats and Species Regulations 2017 (as amended).

19. The development hereby permitted shall not progress beyond damp proof course level of the buildings until a Wildlife Enhancement Plan (WEP) has been submitted to and approved in writing by the Local Planning Authority. The WEP shall be compiled by a suitably qualified ecologist and must be over and above any avoidance, mitigation and compensation measures required to

neutralise the impacts of the development on wildlife in order to improve the ecological condition of the development site after the development is complete. It shall include:

- a) a timetable for implementation;
- b) a detailed plan showing the locations and specifications of the enhancement measures;
- c) the enhancement measures outlined in the Ecological Appraisal (Yorkshire Ecology Surveys, December 2018);
- d) a 25% bird box to building ratio;
- e) a 25% bat box to building ratio;
- f) details of the means of enclosure to demonstrate that boundary treatments will not result in a loss of habitat connectivity through the development, by creating 'hedgehog highways' which provide holes under boundary features for hedgehogs to pass through;
- g) insect boxes and log piles to increase the habitat for local biodiversity;
- h) the landscaping strategy shall incorporate wildlife friendly landscaping throughout the site and utilise British native species of local provenance wherever possible.

The development shall be carried out in accordance with the approved details and the enhancement measures retained thereafter unless otherwise agreed in writing by the Local Planning Authority.

This condition is imposed to secure biodiversity enhancements within the development to comply with the National Planning Policy Framework (NPPF), section 40 of the Natural Environment and Rural Communities Act (NERC) 2006 and East Riding Local Plan policy ENV4.

- 1.3 This document provides information which is relevant to discharge conditions 18 and 19 attached to the planning consent granted for the site.
- 1.4 As part of the CEMP, all personnel working at the construction site shall be made aware of this document and its contents. A copy of this document will remain on site during the construction period.
- 1.5 Following field surveys conducted by Yorkshire Ecology Surveys (December 2018) and Wold Ecology during November 2020, the following habitats and species have been targeted for enhancement and protection within this document.
- 1.6 The ecological/wildlife enhancements for the Application Site are summarised as (see pages 12 – 20):
 - Habitats
 - Trees
 - Hedgerows
 - Grassland
 - Habitat Piles
 - Species
 - Birds
 - Bats
 - Hedgehog
 - Bees

- 1.7 The responsibility for carrying out the functions of this CEMP and WEP will vary throughout the duration of the management period as follows:
- Pre-construction/Enabling Works Phase: All management and maintenance works of all features and species of ecological importance are the responsibility of the Principal Contractor appointed by the Developer and are to be completed by the Principal Contractor for sign-off by the Developer prior to the start of construction.
 - Construction Works Phase: All management and maintenance works of all features and species of ecological importance are the responsibility of the Developer, and are to be continued through to practical completion; and
 - Long-term Management Post-adoption: The responsibility for the management and maintenance works of all features and species of ecological importance postadoption will be the responsibility of the individual property owners, with exception to those areas of public open space that are to be the responsibility of the Private Management Company or similar appointed contractor.
- 1.8 The management scheme detailed within this CEMP and WEP covers the provision, management, inspection, maintenance, repair, and replacement as necessary, taking into account factors including ecological, landscape, social, wildlife and amenity use for the land.

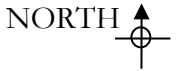
Table 1 – Timetable of works																
Method.	Construction Period – January 2021 to December 2021												Post development			
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year 1	Year 2	Year 3	
Hibernacula creation	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum				
Tree felling/vegetation/building clearance.	Sub optimum	Unsuitable*	Inspection from an ecologist.						Sub optimum					n/a		
Tree/hedge planting.	Optimum	Optimum	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*							
Replacement tree/hedge plants.	Optimum	Optimum	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*	Unsuitable*							
Watering trees and weed free zone.	Sub optimum	Sub optimum	Sub optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Sub optimum	Sub optimum	Sub optimum				
Provision of bat boxes.	No timing constraints.												Replace any damaged boxes			
Provision of bird boxes.																
Provision of bee boxes.																
Provision of hedgehog boxes/holes.																
Sowing of meadows.	Sub optimum	Sub optimum	Sub optimum	Optimum	Optimum	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Optimum	Optimum	Sub optimum			n/a	
Meadow management and remove cuttings.	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Sub optimum	Optimum	Sub optimum	Sub optimum	Sub optimum	Annual cutting			
On-site inspection.	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum	Optimum				

Optimum	
---------	--

Sub optimum	
-------------	--

Unsuitable*	
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*** Denotes timing constraints that do not comply with industry best practice or may result in an offence being committed under the Habitat and Species Regulations 2017 (as amended) e.g. disturbance to nesting birds.**



Not to Scale

Drawing title:
Lighting Plan

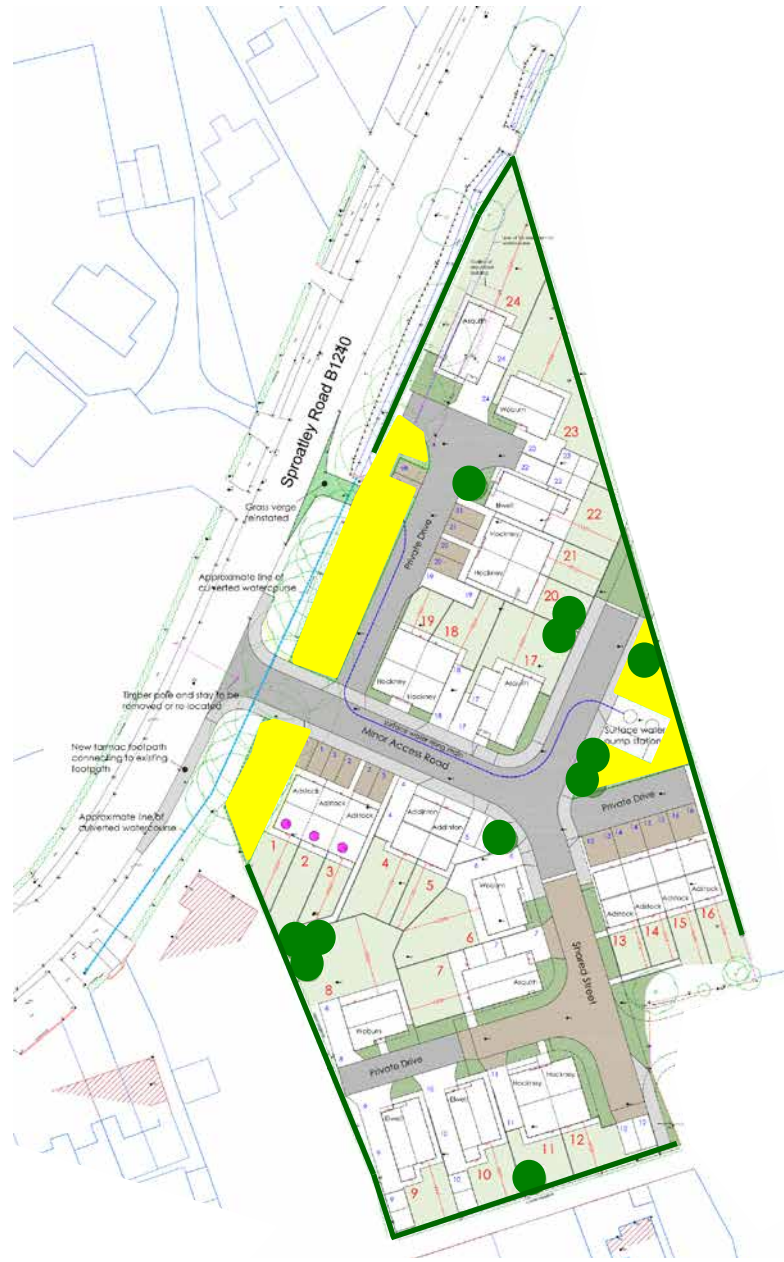
	<p>Illuminated area with no light overspill outside of this boundary</p>
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Not to Scale

Drawing title:
**Habitat Mitigation
 Plan**

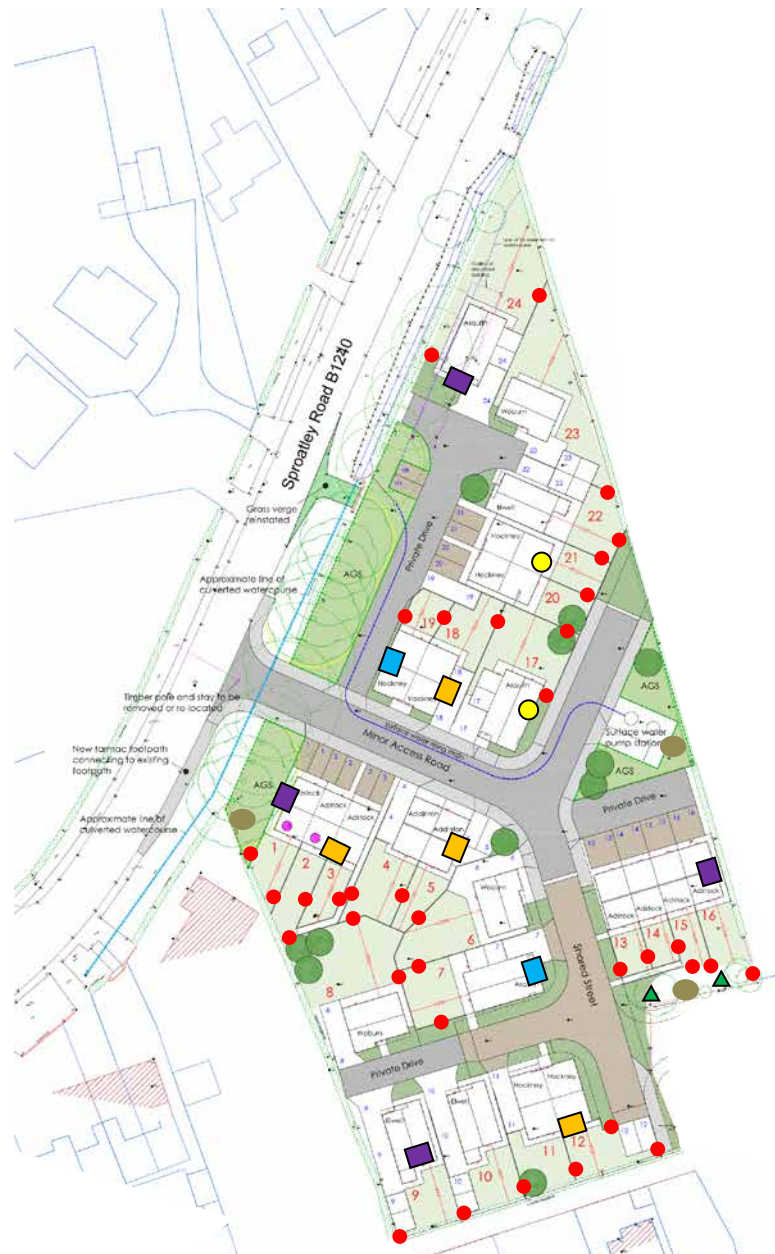
●	Tree planting
—	Hedgerow planting
■	Wildflower meadows

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Not to Scale
 Drawing title:
**Species Mitigation
 Plan**

	Sparrow Terrace x 2
	Swift Box x 2
	1FR Bat Box x 4
	Hedgehog House x 2
	Bee Brick x 4
	Hedgehog holes
	Hibernacula x 3

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2.0 GENERAL DESCRIPTION AND BACKGROUND.

- 2.1 Location : Land Adjacent to Sproatley Road
County : East Yorkshire.
Parish and District : Preston
OS Grid Reference : TA 18769 30846
- 2.3 The habitats within the Application Site comprise improved grassland bounded by scattered broadleaved trees and hedgerows located within a rural landscape.
- 2.4 The Application Site is located on the northern edge of Preston village, in a rural location. The Application Site is approximately 0.78ha and is immediately surrounded by arable/grazed pasture and residential dwellings.
- 2.5 Habitats within 2km surrounding the village of Preston is primarily low-lying agricultural land dominated by arable production with some grazed pasture. Woodland cover within 2km is low and occurs as small shelterbelts and plantations adjacent to farms and small holdings. Whilst the Application Site is not connected to any ecologically valuable habitat, connectivity within 2km is provided by hedgerows, hedgerows with trees and ditches that drain the predominant arable land and link the site with the wider countryside.
- 2.6 A summary of the surrounding habitat is (radius of < 2km from the site):
- Buildings – farm buildings and residential properties
 - Hedgerow
 - Mature trees and woodland
 - Arable
 - Mature private gardens
 - Ponds and watercourses
 - Wyton Drain
 - Grazed pasture
- 2.7 A field survey was undertaken by Wold Ecology Ltd on 24th November 2020. During the site visit, the whole of the Application Site and accessible neighbouring land was examined in detail.

3.0 ECOLOGICAL CONSTRUCTION MANGEMENT PLAN.

3.1 The CEMP recommends the following measures which will be adopted to ensure potential adverse impacts to wildlife are avoided.

3.2 Birds

3.2.1 The applicant is reminded that, under the Wildlife and Countryside Act 1981, as amended (section 1), it is an offence to remove, damage or destroy the nest of any wild bird while that nest is in use or being built. Planning consent for a development does not provide a defence against prosecution under this act.

3.2.2 No removal of hedgerows, trees, shrubs, vegetation, or buildings shall take place between mid-February and mid-September inclusive, unless a competent ecologist has undertaken a careful, detailed check of aforementioned for active birds' nests immediately before the vegetation is cleared and provided written confirmation that no birds will be harmed and/or that there are appropriate measures in place to protect nesting bird interest on site. Any such written confirmation will be submitted to the local planning authority.

3.2.3 Thick and overgrown hedgerows are often difficult to inspect fully and removal of a hedges/scrub during the spring/summer period is not recommend.

3.2.4 If nesting birds are found during the watching brief, works that will impact upon the nest will need to stop until the young have fledged.

3.3 Mammals (deer, badgers, hedgehogs etc.)

3.3.1 During the construction phase of the development, it is necessary to undertake a number of additional measures to safeguard any mammals which may become present within the development site. The following measures are recommended in respect to the Application Site:

- Site personnel are to be made aware of the potential presence of mammals using the Application Site, prior to site works finishing on an evening;
- Any dangers within the construction site to mammals are to be identified and measures undertaken to minimise any such risk, in relation to the Application Site, this includes the following:
 - Any trenches or deep pits within the development site that are to be left open overnight will be provided with a means of escape should a mammal enter or be covered up. A means of escape could include a roughened plank of wood or similar, placed in the trench as a ramp to the surface. This is particularly important if the trench/pit is liable to fill with water.
 - Any trenches/pits will be inspected each morning to ensure no mammals have become trapped overnight. Should a mammal become trapped in a trench/pit, Wold Ecology will be contacted immediately for further advice.
 - The storage of any chemicals on site will be contained in such a way that they cannot be accessed or knocked over by any commuting mammals.
 - Open pipework greater than 75mm outside diameter will be blanked off at the end of each working day.
 - Care must be taken whilst carrying out vegetation clearance, or strimming. A thorough check of the vegetation prior to removal will help ensure that no hedgehogs are injured or killed during development works. Sleeping

- hedgehogs frequently suffer severe injuries from strimmers.
- Avoid setting fire to piles of vegetation unless they have been turned, checked, or moved immediately prior to burning. Hedgehogs often get killed or injured in fires during vegetation removal and during early November.

3.4 Trees

- 3.4.1 An Arboricultural Method Statement has been produced separately by a qualified Arboricultural Consultant.

4.0 ECOLOGICAL ENHANCEMENT TARGETS.

4.1 Conservation of features

- 4.1.1 Following field survey conducted by Wold Ecology during November 2020, the following habitats and species have been targeted for enhancement and protection within this management plan document.

4.1.2 Habitats

- Trees
- Grassland
- Hibernacula

4.1.3 Species

- Birds
- Bats
- Hedgehog
- Bees

5.0 HABITAT MANAGEMENT PRESCRIPTIONS.

5.1 Trees

5.1.1 The tree planting schedule has been designed by Sangwin Architects and referenced in the Site Plan document : 3190/09.

5.1.1 Native and local provenance trees and shrubs that are typical for the area will be planted. Species from the following list of standard sized (2-3m) trees will be planted on site, these will be:

- Rowan *Sorbus aucuparia* x 2
- Wild cherry *Prunus avium* x 2
- Whitebeam *Sorbus aria* x 2
- Field maple *Acer campestre* x 2
- Apple (see 5.1.6) *Malus spp.* x 3

5.1.2 Planting operations shall be carried out in general accordance with the requirements of Sections 7, 8 and 9 of B.S. 4428: 1989 'Recommendations for General Landscape Operations (Excluding Hard Surfaces)'.

5.1.3 Planting Season: Unless otherwise specified, all transplanting shall be carried out between the end of October and the end of March. Container grown trees may be transplanted at times other than these at the discretion of the Project Manager.

5.1.4 All tree stock must comply in all respects with the current edition of B.S. 3936. Trees shall be well grown nursery stock free from disease, true to type and of a size scheduled in accordance with the approved method of measurement.

5.1.5 All trees will be suitably supported by stakes and tree ties. Trees to be protected for 5 years with a 75cm biodegradable or compostable tree tube and stake.

5.1.6 Apple trees

5.1.6.1 The soft landscaping scheme will include the planting of apple trees; the table below identifies the apple varieties that are suitable for the north of England.

Cultivar	Type	Comments
Hornsea Herring	C	At one time in Hornsea, it was a condition for some tenants that a Hornsea Herring had to be planted and tended. The apple originates from circa 1855.
Hunthouse	C	Legend has it that Hunthouse or Hunt House was taken by Captain Cook when he sailed out from Whitby. It helped to prevent scurvy amongst his crew and dates back to pre-1800.
Ribston Pippin	D	Also known as the Glory of York, this is the most famous Yorkshire variety. It's a strong-tasting 'aromatic' traditional apple. If you like a classic English dessert apple, then this is one to try.

D = Dessert; C = Culinary; B = Both.

5.1.6.2 It is imperative to the success of each tree that it is kept weed free and watered after planting. All trees will be protected by a 0.6m tube and stake. This will be removed and replaced with a stake and tie, after approximately 5 years.

5.1.6.3 The table below summarises suitable rootstock:

Rootstock	Height in metres	Age of first fruiting (yrs)	Comments
'M26'	3m (10 – 12 ft)	3-4	Doesn't require staking unless in really exposed areas. It will withstand moderate competition from weeds and grass
'MM106'	4.5m (15 – 17 ft)	4-5	The most widely planted rootstock for apples in commercial orchards.

5.1.7 Maintenance of tree planting

5.1.7.1 The contractor will be responsible for programme of maintenance of new tree planting. The maintenance work is to ensure that all newly planted trees that fail to make active growth are replaced during the first available planting season for the first 12 months.

5.1.7.2 The contractor shall ensure that a weed free area of 1m is maintained around all newly planted trees for the first 24 months following planting.

5.1.7.3 During the first 24 months from the date of planting, the contractor will be responsible for adequate watering during periods of dry weather all newly planted, trees, shrubs, turf, and grass seeded areas so as to ensure their survival. All deaths of trees will be replaced at the contractor's expense.

5.2 Hedgerows

5.2.1 The new and existing hedgerows will consist of:

- Hawthorn *Crataegus monogyna* 20%
- Blackthorn *Prunus spinosa* 20%
- Holly *Ilex aquifolium* 5%
- Hazel *Corylus avellana* 25%
- Dogwood *Cornus sanguinea* 10%
- Crab Apple *Malus sylvestris* 10%
- Guelder rose *Viburnum opulus* 10%

5.2.2 Planting will be carried out between October and March. Six plants will be planted per metre in two staggered rows.

5.2.3 Areas of hedgerow planting will be sprayed with an approved herbicide at least 4 weeks prior to planting to produce an overall kill of ground vegetation. The ground will then be cultivated to a depth of 150mm before planting work commences. This work will ensure that any ground compaction will be broken up and weed competition removed. Topsoil will be provided to ensure a minimum of 500mm of topsoil for all planting areas.

5.2.4 All hedgerow plants will be protected with 90cm biodegradable or compostable spirals and canes, this is pivotal at this site due to the abundance of rabbits.

5.2.5 All standing trees will be maintained within the hedgerow and existing gaps may be filled with trees to create new hedgerow trees.

5.2.6 Maintenance of hedge planting

- 5.2.6.1 The contractor shall ensure that a weed free area of 1m is maintained around all newly planted hedges for the first 3 years following planting.
- 5.2.6.2 During the first 3 years from the date of planting, the contractor will be responsible for adequate watering during periods of dry weather all newly planted, hedging so as to ensure their survival. All deaths of hedge plants will be replaced at the contractor's expense.
- 5.2.6.3 The hedgerows should be trimmed every two years at the end of winter (January), avoiding periods of hard frost. Hedgerows less than 2m in height will be lightly trimmed along the sides annually until a desired height of at least 2.5m is reached. Trimming hedgerows on alternate sides every year should be encouraged where feasible.
- 5.2.6.4 A vegetated strip of between 1 and 3m should be encouraged around the bases of all of the hedgerows on site; this will improve the hedgerows wildlife value and offer the hedge more protection.

5.3 Grassland

- 5.3.1 Wildflower seed will be of British native origin. A good supplier state where their seeds are sourced. For a list of suppliers of British native flora see the Flora Locale website: www.floralocale.org.
- The ground will be prepared following industry best practice.
 - Meadows will be cut annually during September and all arisings removed.
- 5.3.2 Ground preparation for sowing
- In late summer/early autumn cut the grass to create as short as sward as possible aiming for a height of between 3cm and 5cm. Remove the cuttings.
 - Create bare ground by harrowing or raking the area immediately after removing the cuttings aiming for a coverage of 40-50% bare ground.
 - Sowing will be undertaken in late summer or early autumn. Spring sowing is possible, but many species will not germinate in the first year and there is a greater risk of failure due to drought.
 - Broadcast the seeds by hand, use a hand-held seed broadcaster, a push along seed broadcaster or a broadcaster on the back of an ATV. Do not cover seeds after sowing as most wildflower seeds cannot germinate if they are buried. In dry weather conditions, lightly rolling after sowing can improve the success rate by ensuring the seeds are in contact with the soil however this will not be carried out under wet conditions.
 - After sowing, the sward will be kept short until November by mowing to allow light to penetrate and assist germination.
- 5.3.3 The planting scheme for this site will encourage bumblebees and insects through species choice and will comprise:
- Birds-foot trefoil *Lotus corniculatus*
 - Lady's bedstraw *Galium verum*
 - Yarrow *Achillea millefolium*
 - Common knapweed *Centaurea nigra*
 - Oxeye daisy *Leucanthemum vulgare*

- Ribwort plantain *Plantago lanceolata*
- Cowslip *Primula veris*
- Selfheal *Prunella vulgaris*
- Meadow buttercup *Ranunculus acris*
- Yellow rattle *Rhinanthus minor*
- Meadow cranesbill *Geranium pratense*
- Devils-bit scabious *Succisa pratensis*
- Wild carrot *Daucis carota*
- Red clover *Trifolium pratens*
- Rough hawkbit *Leontodon hispidus*
- Field scabious *Knautia arvensis*

5.3.4 These species can be bought as plug plants, grown on from seed and planted into the grassland or sown directly. Whichever technique is applied, the use of yellow rattle is highly recommended to increase the success rate. Yellow rattle is a parasitic plant which feeds off grasses reducing their vigour and creating open areas within the sward which other wildflowers are then able to take advantage of. Yellow rattle is an annual plant which must be sown while still fresh directly into the prepared sward from late summer to autumn.

5.3.5 Meadow management

5.3.5.1 Meadow management in the first year after creation

- The following spring (late March early April), meadows will be cut, and vegetation removed to allow light to reach the seeds and young plants and to keep the grass growth in check.
- Cut the meadow again after July 15th and remove the cuttings.

5.3.5.2 Meadow Management

- Once the wildflowers have established, cut the meadow annually during September, leave cuttings for 7 days and remove the cuttings from the grassland to maintain reduced nutrient levels.
- Cutting paths into meadow areas through the growing season also provides diversity of structure and increases the variety of habitats for invertebrates.

5.4 Deadwood and habitat stacks (Hibernacula).

5.4.1 Deadwood is an important and ever decreasing habitat feature and the rich invertebrate community associated with deadwood offers an important food source to other animals.

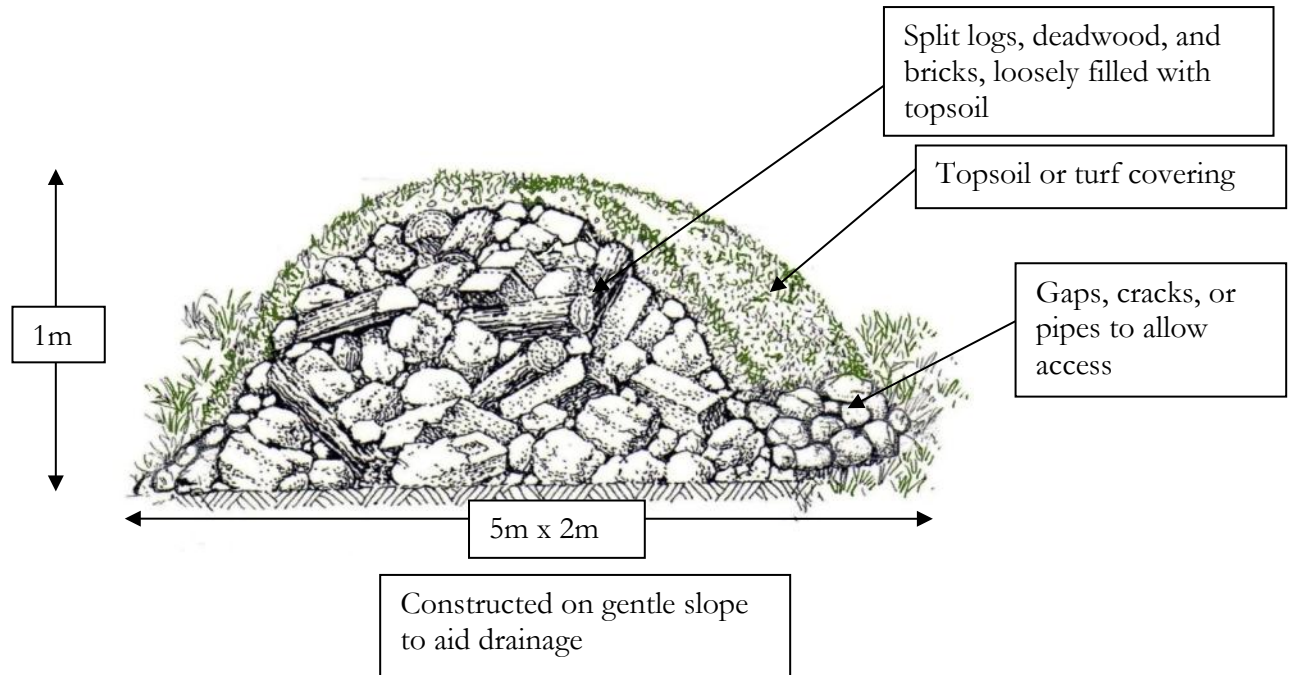
5.4.2 Terrestrial hibernaculum/refugia

5.4.2.1 Terrestrial hibernaculum/refugia will be created by:

- Stack logs of various dimensions in a criss-cross pattern up to about 1m high.
- Fill the gaps between each layer of logs with brash and other woody material.
- When positioned in sunnier locations, log piles can be great places for reptiles and if smothered in grass cuttings provide them with somewhere to both hibernate and or lay their eggs in.
- Stack the logs as above, but only to 0.5m high, filling the gaps as before with brash and other woody material.

- This can now be topped off with a mix of pruning's, grass and other soft vegetation to between 1 and 1.5m high.
- The pile will heat up during summer and attract many animals including slow worms and grass snakes (if present in the locality) that require heat to incubate their young and eggs.
- They create different 'micro-habitats' for wildlife and should not be disturbed. They will be left as a permanent feature with new material added each year as required. New piles can be created close to existing ones as they decompose to provide new refuges.

Figure 1 - Terrestrial hibernaculum/refugia (modified from *Langton et al 2001*)



5.4.3 Three Hibernacula will be created on site.

6.0 SPECIES MANAGEMENT PRESCRIPTIONS.

6.1 Birds

6.1.1 It is concluded that the Application Site is suitable habitat for hedgerow, urban and agricultural bird species with various designations.

6.1.2 In order to increase nesting opportunities for birds, 4 Schwegler bird boxes will be erected throughout the site. These boxes will target species of conservation concern, namely house sparrow and swift. A summary of recommended bird boxes are listed below:

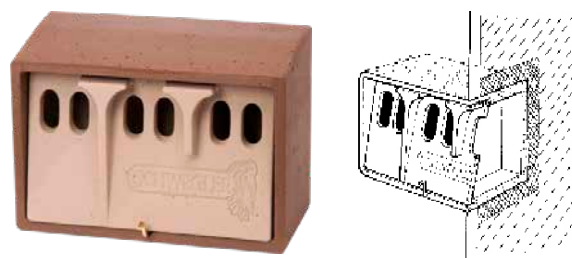
Name	Description	Number
Schwegler swift box #604	Building box for eaves	2
Schwegler sparrow terrace #1SP	Brick building box	2

6.1.3 Boxes will be placed so that the entrance does not face the prevailing wind, rain, and strong sunlight. The sector from north to south east should be used, with south facing boxes positioned in more shaded areas.

Figure 2 – Schwegler #604 Swift box



Figure 3 – Schwegler sparrow terrace



6.2 Bats

6.2.1 Lighting

6.2.1.1 Lighting has a detrimental effect on bat activity; many bats will actually avoid areas that are well lit. Lighting can cause habitat fragmentation by preventing bats from commuting between roosts and foraging grounds (A.J Mitchell-Jones 2004).

6.2.1.2 It is recommended that a lighting consultant is employed to design a lighting plan based on the following principles:

- Luminaire and light spill accessories - Lighting should be directed to where it

is needed, and light spillage avoided. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

- If applicable, the height of lighting columns in general should be as short as is possible as light at a low level reduces the ecological impact. However, there are cases where a taller column will enable light to be directed downwards at a more acute angle and thereby reduce horizontal spill. For pedestrian lighting, this can take the form of low level lighting that is as directional as possible and below 1 lux at ground level.
- Aim for lighting column of 5m or less, hooded and cowed to prevent light spill, for main lighting columns.
- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill.
- The use of specialist bollard or low-level downward directional luminaires to retain darkness above can be considered.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used.
- Luminaires should always be mounted on the horizontal, i.e. no upward tilt.
- Any external security lighting should be set on motion-sensors and short (1min) timers.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.
- Light spill can be successfully screened through soft landscaping and the installation of walls, fences and bunding

6.2.1.3 At this site, new lighting design will ensure lights will **not** be mounted where they will shine directly on to bat boxes or the boundary trees/hedgerows that will be used by foraging and commuting bats. A light intrusion lux level besides woodland edges, hedgerows and bat boxes will be 1 lux or below.

6.2.2 Bat boxes

6.2.2.1 Four Schwegler 1FR bat tubes will be sited on buildings. Schwegler Bat Boxes are recommended and well tested boxes. Bat boxes should be erected on south, east or west elevations; close to the eaves/ridge apex or 3-5 metres above ground level with free flight paths.

Figure 4 - Schwegler 1FR Boxes



6.2.2.2 These boxes are self-cleaning as they are designed so that the droppings fall out of the entrance. This reduces the possibility of smell during the summer months. For more information on designs and installation of bat boxes see: www.schwegler-natur.de and www.bct.org.uk.

6.2.3 Timber treatment must be carried out using Permethryn type chemicals on the Natural England list of approved safe chemicals. New pre-treated timbers i.e. tanalised timber will be allowed to dry thoroughly before use, if applicable. New timbers will be thoroughly brushed with a stiff yard brush to remove any crystalline residues before use.

A list of Natural England approved paints and timber treatments are available at http://www.naturalengland.org.uk/Images/Bat%20roost%20timber%20treatment_tcm6-10167.pdf

6.3 Hedgehogs

6.3.1 Two hedgehog houses will be positioned around the site within the margins of grassland or shrub planting. These will provide important breeding and hibernation sites for hedgehogs within the local area. Boxes should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation. The boxes will be situated away from busy roads or areas of high disturbance.

Figure 5 - example of a hedgehog house



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6.3.2 Hedgehogs can roam around 2km a night and hedgehog holes will be incorporated into each of the garden dividing fences and perimeter fences. These small holes will be placed at ground level and will measure 130mm in diameter and enable hedgehogs to roam freely through gardens and communal areas, so they can forage for food and find suitable nesting areas.

- 6.3.3 Hedgehog holes will be created in all partition fences, allowing free movement between gardens. Perimeter boundary fencing will include a hedgehog hole every 20m.

Figure 6 – example of a hedgehog hole.



6.4 Bee Bricks

- 6.4.1 The bee brick is designed to be used in place of a standard house brick within construction to create nesting habitat for solitary bees. Bee Brick contains cast cavities for solitary bees to lay their eggs. Each cavity goes part way into the brick, which is solid at the back, ensuring bees cannot enter the building. Bee bricks will be based on standard house brick dimensions – 215mm x 105mm x 65mm. Most bee bricks are classed as a non-load bearing.

- 6.4.2 Bee bricks constructed of concrete will be used and be positioned in a warm sunny spot, on a southerly facing wall, with no vegetation in front of the holes. They will be positioned at least 1m from the ground with no upward limit.

Figure 7 – example of bee bricks



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- 6.4.3 Six bee bricks will be located in pairs on the south elevations of new buildings on site.