



Biodiversity Enhancement Strategy

Partridge Green

On behalf of: Roydon Homes

Issue: 02

Issue date: 12 January 2026

Version Control

Date	Issue	Description
09/12/2025	01	First issue
12/01/2026	02	Updates to include links to recommended enhancements

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1 Introduction

1.1 Background

Harper Environmental Ltd was commissioned by Roydon Homes Ltd to prepare a Biodiversity Enhancement Strategy (BES) for an area of land known as Land North of the Rise, Partridge Green, West Sussex, RH13 8JB, hereafter referred to as 'the site'.

1.2 Site Description

The site extends to 4.3 hectares (ha) area and is centred on Ordnance Survey Nation Grid Reference (OS NGR): TQ 19428 19692.

The site comprised two buildings, hedgerows, mixed woodland, modified grassland, other neutral grassland, a wet ditch, scattered trees, bramble scrub, blackthorn scrub, broadleaves woodland and areas of tall ruderal species.

The site is located north-east of the village of Partridge Green and south-east of West Grinstead. The wider landscape consists of roads, residential housing and associated gardens, with arable farmland to the north, east and west.

1.3 Consented Development

The consented development includes the demolition of a stable and wooden workshop, provision of 55 residential dwellings, internal access roads, garages, parking, two attenuation basins and open space hereafter referred to as 'the development'.

1.4 Purpose of the Report

This document aims to collate the site ecological enhancement design concepts and future monitoring regime at the site.

Enhancements are targeted at specific ecological receptors of note, known to be in the area, reflecting contemporary best practice and objectives of local conservation groups, Biodiversity Action Plans (BAPs) and planning policy.

The BES is required to discharge ecology related Schedule of Condition 9 (planning permission ref: APP/Z3825/W/23/3324144) which states:

'No development above ground floor slab level shall commence until a Biodiversity Enhancement Strategy for Protected and Priority species has been submitted to and approved in writing by the local planning authority. The content of the Biodiversity Enhancement Strategy shall include the following: a) Purpose and conservation objectives for the proposed enhancement measures; b) detailed designs to achieve stated objectives; c) locations of proposed enhancement implementing the enhancement measures; e) details of initial aftercare and long-term maintenance (where relevant). The works shall be implemented in accordance with the approved details and shall be retained in that manner thereafter.'

1.5 Ecological Background

A Preliminary Ecological Appraisal¹ (PEA) was undertaken in 2019 by ADAS which recorded the above mentioned habitats. During the field survey [REDACTED] some of the trees on site were noted with suitability for roosting bats. The habitats on site were noted with suitability for birds, reptiles, invertebrates and amphibians including great crested newt (GCN) (*Triturus cristatus*). A hollow within one tree on site was noted with suitability for barn owl (*Tyto alba*).

GCN surveys were undertaken in 2013, 2016 and 2019 by ADAS of waterbodies within 250m of the site, comprising a Habitat Suitability Index (HSI) Assessment, environmental DNA (eDNA) and population assessment. No presence of GCN was recorded during the surveys.

Reptile surveys were undertaken in 2019 by ADAS of the site, however no presence of reptiles were recorded and no further survey effort was therefore required.

A File Note was produced in 2022 by ADAS to confirm the validity of the original PEA undertaken in 2019, due to the time elapsed since the original survey date. Site visits were undertaken in 2020, 2021 and 2022 with the condition of the site remaining largely the same as 2019. [REDACTED]

[REDACTED] rabbit (*Oryctolagus cuniculus*) burrows recorded in this area. The woodland was identified with suitability for hazel dormouse (*Muscardinus avellanarius*), however due to the site being isolated and no records of dormice within 2km, they were scoped out of further assessment.

A Ground Level Tree Assessment (GLTA) was undertaken in 2023 by ADAS which recorded 13 trees on site with suitability for roosting bats. Two trees were noted with high suitability, nine trees with moderate suitability and two trees with low suitability. The trees are all to be retained as part of the development, with lighting impacts to be mitigated as part of a sympathetic lighting strategy, so no further survey effort was deemed necessary.

1.6 Local Nature Recovery Strategy (LNRS)

In accordance with the aims and objectives of this document a review of the relevant LNRS and local conservation targets was undertaken. This review, along with the results of the PEA and further survey reports, were then able to form the context for ecological enhancement at the site.

The site is subject to the West Sussex Local Nature Recovery Strategy, which sets out the main principles and priorities for nature recovery in West Sussex and the actions needed to deliver them. Receptors of relevance to this strategy which should accordingly be considered within the scheme design are:

- West European hedgehog (*Erinaceus europaeus*);
- Stag beetle (*Lucanus cervus*);
- House martin (*Delichon urbicum*);

¹ ADAS (2019); Preliminary Ecological Appraisal. Land at Littleworth Lane, Partridge Green, Horsham, West Sussex.

- Lesser spotted woodpecker (*Dryobates minor comminutus*);
- Starling (*Sturnus vulgaris*);
- Swift (*Apus apus*);
- Common toad (*Bufo bufo*); and
- Great Crested Newt (*Triturus cristatus*) (GCN).

1.7 Competencies

Luke Measey BSc (Hons) MCIEEM, is an ecologist with over seven years of experience and has an undergraduate degree in Ecology and Environmental Management BSc (Hons). He holds a Natural England Level 1 Class Survey Licence for GCN, Natural England Level 2 Class Survey Licence for bats and is a certified tree climber.

Dr Stephanie Harper has a BSc (Hons) and PhD in Environmental Sciences, and holds a Natural England Level 1 class licence for bats. She has 18 years of experience in ecological survey and consultancy.

This report was written by Luke Measey and reviewed by Stephanie Harper who hereby confirms in writing that the report is in line with the following:

- Represents sound industry practice;
- Reports and recommends correctly, truthfully and objectively;
- Is appropriate given the local site conditions and scope of works proposed; and
- Avoids invalid, biased and exaggerated statements.

2 Ecological Enhancements

2.1 Overview

The proposed development has the potential to provide enhancements at the site for the above-mentioned ecological receptors. This will be achieved through the implementation of enhancement features within the landscaping proposals and actions within the long-term management regime for the site.

The creation and enhancement of habitats on site and introduction of ecological enhancements will seek to enhance the site for the following species:

- Foraging and roosting bats;
- Birds;
- Hedgehog;
- Invertebrates including stag beetle;
- 
- Amphibians including GCN; and
- Reptiles.

The following enhancements are to be included at the site:

- Attenuation ponds;
- Scrub creation;
- Woodland enhancement;
- Wildflower meadows (known as the natural and semi-natural greenspaces);
- Insect hotels;
- Log piles;
- Bird boxes;
- Bat boxes; and
- Wildlife sensitive management.

The habitats proposed on site which provide benefit to the above receptors include woodland enhancement, tree and shrub planting, creation of attenuation ponds, hedgerows, wildflower meadows, ditch enhancement and ornamental planting. The location of ecological enhancements and proposed habitats are provided in Appendix A. For full details of the habitat enhancements and management strategies, please see the associated Habitat Management Monitoring Plan (HMMP).

A summary of the enhancements per species is set out in Table 1 below.

Details on the features and specifications for species enhancements are provided in the sections below.

Table 1 Enhancement per species

Receptors	Enhancements	Number	Habitats that will support this species	Link to enhancement measures
Foraging bats			Attenuation pond, wildflower meadow, scrub, hedgerows, ditches	
Roosting bats	Ibstock bat brick	20 built into the walls of houses		https://www.ibstock.co.uk/product/ecohabitats/bat-box
	Habibat bat box			https://www.habibat.co.uk/bat-boxes
	2FN bat box	2 on trees		https://www.wildcare.co.uk/schwegler-2fn-bat-box-55.html
	1FW bat box	2 on trees		https://www.nhbs.com/1fw-bat-hibernation-box
Birds	Garden bird boxes	15 boxes all mounted on trees or posts within landscaping • 5 small hole • 5 larger hole • 5 open front	Attenuation pond, wildflower meadow, scrub	https://www.nhbs.com/vivara-pro-seville-28mm-woodstone-nest-box?bkfno=233158 https://www.wildcare.co.uk/schwegler-3s-starling-box-10126.html https://www.nhbs.com/2hw-schwegler-nest-box
	House sparrow terraces	10 terraces (each with 3 boxes) mounted on walls	All soft landscaping	https://www.wildcare.co.uk/schwegler-1sp-sparrow-terrace.html
	Swift bricks	15 integrated / built into buildings	Attenuation pond, wildflower meadow, scrub, hedgerows, ditches	https://www.ibstock.co.uk/product/ecohabitats/swift-box?page=1&
Hedgehog	Hedgehog house	3 in areas of scrub	Wildflower meadow	https://homeandroost.co.uk/collections/hedgehog-houses/products/predator-proof-hedgehog-house

Receptors	Enhancements	Number	Habitats that will support this species	Link to enhancement measures
Invertebrates	Invertebrate hotel	4 Schwegler clay and reed boxes 4 Pinta Apex	Woodland management	https://www.wildcare.co.uk/schwegler-insect-nesting-aid-10318.html https://www.nhbs.com/pinta-apex-insect-house
Stag beetle	Log piles	8 log piles	Woodland management	
Amphibians including GCN	Hibernacula Basking mound (refuge)	8 log piles (same as for stag beetle) 1 refuge (as per reptiles)	Attenuation pond	
Reptiles	Basking mound / refuge	1 refuge within sunny well-drained unshaded site area	Scrub habitat	

2.2 Bats

To enhance the site for roosting bats, four bat boxes comprised of two Schwegler 1FW and two Schwegler 2FN (or suitable alternative agreed with the suitably qualified ecologist) will be installed on suitable mature trees on site. Twenty Ibstock bat brick or Habibat bat box (or similar) will be built into the design of the newly constructed buildings on site during construction. Suggested locations are provided on Figure A.1 in Appendix A.

General recommendations for the positioning of bat boxes are given as follows:

- Boxes should be located close to suitable bat foraging habitat, e.g. close to the woodland or central hedgerow that can all be used as commuting and foraging routes;
- The flight-path leading from each box should be kept clear (i.e. cut away branches);
- Boxes should be sited to provide shelter from wind, rain and strong sunlight, with an orientation from south to south-west for summer roosting bat boxes and north-east to east for winter hibernation boxes;
- Placing boxes on trees facing in different directions, through the orientations described above, gives bats a choice of roosting conditions across seasons and times of day;
- Boxes should be placed over 3m from the ground to limit disturbance (some species such as noctule prefer boxes around 5m in height); and
- Boxes attached to trees will be attached with a strap or other method to avoid damage to the tree.

The Schwegler 2F and 2FN boxes are made from long-lasting woodcrete. The 2FN is slightly larger with an increased internal height and so has been known to accommodate the bigger British bats such as noctule and Bechstein's bat. The Schwegler 1FW is for year-round use including for hibernation and suitable for species such as pipistrelle species (*Pipistrellus* sp.), brown long-eared bat (*Plecotus auritus*), noctule and Bechstein's bat. Should an alternative model be required, due to supply issues etc, a suitable alternative box model can be discussed and agreed with an ecologist but will still be required to be of woodcrete construction.

Where bat boxes will be placed in public areas, consider locating the boxes carefully to reduce the risks of vandalism. Consideration should be given to tree growth.

Bat boxes should not require any maintenance other than replacement or repair if damaged. Roosting bats are protected from disturbance; therefore, if any boxes need to be repaired or removed this must be done by a licensed bat worker.

The woodland enhancement planting, wildflower meadows, scrub planting and attenuation basins will provide additional foraging and commuting habitat for bats.

2.3 Birds

A total of 40 bird boxes will be installed across the site on suitable mature trees and on buildings. These will comprise:

- 15 garden bird boxes with five small hole, five larger hole and five open-fronted nest boxes to be installed on suitable mature trees;
- 15 integrated swift bricks (built into new buildings) in groups of three such as the Ibstock Swift Eco Habitat (or similar); and

- 10 sparrow terraces such as the built-in Woodstone Half Open Nest Box will be installed on buildings on site during construction.

Suggested locations are provided on Figure A.1 in Appendix A.

A mix of hole-fronted and open-fronted boxes are to be used to maximise the number of bird species that could use the boxes. Smaller holes will suit species such as tits, house sparrow and wren (*Troglodytes troglodytes*) whilst larger ones suit species such as starling (*Sturnus vulgaris*). Open-fronted boxes are favoured by species such as robin (*Erithacus rubecula*), song thrush and blackbird (*Turdus merula*). Swift bricks are a universal nest brick for small bird species, including red-listed species such as common swift, house sparrow, house martin (*Delichon urbicum*), and starling. Guides to nest box opening sizes are as follows:

- Schwegler 2HW open-fronted nest box has been designed specifically for species that nest in cavities and prefer a balcony-type entrance, such as black redstart;
- Larger wood or woodcrete boxes with a larger hole entrance (around 45mm in diameter) suitable for species such as starlings; and
- Small wood or woodcrete boxes with a small hole entrance (around 25 to 32mm in diameter) suitable for smaller bird species such as blue tit (*Cyanistes caeruleus*) and great tit (*Parus major*), which will readily colonise the native woodland.
- It is recommended that hole-fronted boxes are protected with metal plates to limit predation by grey squirrels (*Sciurus carolinensis*), woodpeckers (*Picidae* spp.) and other larger birds. This may also limit the use of boxes by ring-necked parakeets (*Psittacula krameri*).

General recommendations for the positioning of bird boxes are given as follows:

- Boxes should be sited to provide shelter from wind, rain and strong sunlight, with a north, east to south-east orientation;
- Boxes should be positioned between 5m and 10m from the ground to deter predators;
- Boxes on trees should ideally be secured with strapping to avoid damage to the tree;
- Boxes should be placed in areas where disturbance is likely to be minimal, i.e. away from public footpaths, and not too close to bird feeders or other boxes (apart from those designed for colonial species); and
- Boxes are best put up between August and February as most birds will not be nesting at this time;
- Swift bricks should be integrated into the fabric of the new buildings during construction. Boxes should be positioned close together (0.6-1.0m between bricks) as swifts prefer to nest gregariously; and
- The boxes should be placed at least 5m above ground level under the eaves of the buildings, on north or east elevations, where they will be sheltered from prevailing wind, rain and strong sunlight. To be suitable for swifts, the bricks require an open aspect with no trees or large shrubs potentially obstructing the birds' flight path up to 5m from the brick.

The non-integrated bird boxes will be cleaned out once a year (if used during the previous nesting season) and put back in place ready for the following nesting season. This can be carried out by any members of staff at the development and is not required to be an ecologist. Hole-fronted boxes should be cleaned out in October. Open-fronted boxes should be cleaned out in late winter (February). Some boxes may be used over-winter as roosting sites for smaller birds, such as wrens, so

should be left undisturbed during this time. The boxes should preferably be cleaned with boiling water to kill-off any remaining parasites. Any damaged boxes should be repaired or replaced as necessary. The boxes should then be replaced in their original positions.

The proposed shrub and woodland planting with fruiting species will provide additional nesting and foraging habitat for birds.

2.4 Hedgehog

A total of three hedgehog boxes, such as the Riverside Woodcraft hedgehog house (or similar) will be installed in areas of scrub on site. These will be in areas away from footpaths to reduce disturbance, on a flat surface with the entrance kept clear of obstructions. Once it has been installed, it will be left alone to reduce the likelihood of disturbing any occupants, especially during the hibernation or breeding season.

The boxes are to be inspected in April (after the hibernation period) or in October (before hibernation). To check for occupancy, it is best to place a twig in the entrance the evening before and checked if it has been moved the following morning. Gloves will be used to remove all old bedding or debris and the box cleaned thoroughly with boiling water to kill any parasites and bacteria. They will be left to dry completely before being placed back in the same location. If the box is occupied, it will be left in situ and cleaned in the appropriate time of year.

Small hedgehog highways will be installed into fencing to allow hedgehog to freely commute across the site. Hedgehog highways are circular or square holes at the base of fencing. Guidance on the location of the highways is as follows:

- Highway holes will be located at close to the ground as possible.
- Holes will be 130x150mm square (fence) or 150mm diameter circular (brick wall).
- At least one hole will be located between a garden and every other garden and outdoor space it shares a boundary with.
- Where possible holes will be located adjacent to areas of shrub planting.
- Where possible entry and exit points to the wider site will be away from driveways and roads/
- Signage will be included to illustrate the presence and encourage occupants not to block the access holes.

The areas of additional shrub and woodland enhancement as well as areas of grassland will provide additional foraging resources for hedgehog.

2.5 Invertebrates

A total of 8 log piles, with wood from broadleaved trees suitable for saproxylic species such as stag beetle will be created within the areas of boundary woodland and scrub planting and hedgerows on site. The logs should vary in size but be at least 10cm in diameter and will be partially buried to maintain humidity. The pile will incorporate branches and twigs to create structural diversity and be arranged in a cross-cross arrangement to create gaps and cavities for shelter. The pile will be 1-2m long and 0.5m high.

Eight insect hotels comprising four Schwegler clay and reed boxes and four Pinta Apex insect houses (or similar) will be installed within areas of soft landscaping in sunny exposed areas on southern

aspects between 1-2m from ground level. They will only be incorporated in soft landscaping with nectar sources in close proximity.

The area of wildflower planting, attenuation basin, scrub and woodland planting will provide suitable nectar resources for pollinators.



2.7 Amphibians and reptiles

Log piles (as set out above for invertebrates) will provide suitable refugia for reptiles and amphibians on site, with the wildflower areas and scrub providing suitable basking and refugia for reptiles.

Additionally, one basking mound will be created for reptiles on site to provide a warm, sun-exposed area for reptiles to bask. It will be placed within a well-drained area that is not prone to flooding. A shallow pit will be dug out (approximately 30cm deep), saving the turf. The hole will be filled with logs, branches, rubble and rocks and be approximately 4m long, 2m in width and 1m in height. The saved turf and soil will be placed back over the pile, leaving some logs and gaps exposed for access/egress point. The southern aspect will be graded to allow a shallow slope and will include patches with bare ground, sand or gravel to provide a warm surface suitable for basking. The northern aspect will be seeded with a wildflower mix.

The basking mound will be within an open, unshaded area. The vegetation will be maintained as a short, sparse sward through periodic trimming and active removal of encroaching scrub to provide suitable basking conditions.

The wildflower areas will be left unmown to provide suitable foraging resources for both amphibians and reptiles, with the attenuation basins providing suitable aquatic habitat for amphibians on site and foraging resource for reptiles such as grass snake.

3 Management and Monitoring

This section provides an overview of the relevant management and monitoring of ecological enhancements on site.

This management plan will follow a clearly defined 5-year timetable that will be used as a reference point for site management, monitoring and include any future remedial works that may be required.

This 5-year timetable will also be iterative in the medium to long term, adapting in a staged response to the feedback from the monitoring process. Suggestions can be made to alter the enhancement measures and will be updated if necessary.

It is recommended that a Suitably Qualified Ecologist (SQE) undertakes a general site inspection annually where incidental records of species will be collated and submitted to the Local Records Centre. The monitoring for the above ecological receptors will occur annually for the first 3 years and is recommended biannually thereafter. Monitoring will focus on the diversity and abundance of these species.

At or just after completion of the development, a SQE will inspect the ecological enhancements as outlined within the BES.

Five further site surveys will be undertaken annually following practical completion to monitor the effectiveness of the enhancement prescriptions and identify any remedial action.

Indicators of success will include the successful establishment of invertebrates inhabiting ecological features, evidence of bird activity using the nest boxes and foraging on site, bat activity in the form of bats occupying bat boxes and foraging activity, uptake of hedgehogs within hedgehog houses and presence of amphibians and reptiles on site within refugia.

Management actions are summarised in Table 2. The table outlines the necessary responsibilities and key objectives for the near 5 years, with monitoring surveys conducted in the appropriate season, informing any management actions necessary to be undertaken in the next appropriate season.

Table 2 Summary of Management and Monitoring Actions for the First 5-Years

Year after completion and season	Habitat Management Actions
Upon completion of the development	• Post-construction inspection by the SQE to verify enhancements are installed in accordance with the BES; • Confirm successful installation of bird boxes, bat boxes, log piles, invertebrate hotels and hedgehog houses; • During the monitoring programme it will be necessary to check the enhancement measures are intact on site.
Years 1 – 5 (Spring / Summer)	Monitoring Actions:
	• Annual monitoring programme of the site to commence to identify any management requirements. • SQE to check bird, bat boxes, log piles, insect hotels and hedgehog houses are intact and inspect for signs of occupancy between April and October. • Bat activity survey conducted in years 2 and 4 to confirm species present and activity levels on site. • Reporting Procedure.
	Annual monitoring programme report produced:
	• Review of the effectiveness and validity of management programme.
	Remedial Actions:
Years 1 - 5 (Autumn / Winter)	Actions to be undertaken as identified by the annual monitoring programme report. These may include but not be limited to the below: • Re-siting of bird and bat boxes and hedgehog houses in Year 4 onwards if no signs of uptake is observed in Years 1-3. • Use arisings from vegetation management on site to replenish any log piles.
	Reporting Procedure:
	• Submission of all biological records obtained to Sussex Biodiversity Centre by the SQE.
	Remedial Actions:

	• Re-siting of enhancement features in Year 4 onwards if no signs of uptake is observed in Years 1-3. • Bird box, bat box, log pile and hedgehog house maintenance and management actions undertaken.
	• Review of five-year monitoring results against the uptake of habitat features; • Determine whether changes to the frequency of monitoring should occur; and, • Produce a relevant, updated 5-year management plan if required.

Appendix A Figures



Figure A.1 *Indicative Ecological Enhancement Plan*