

Ecological Mitigation Strategy

including management and monitoring measures

Land at Arundel Road, Angmering

Report for GD Group

October 2019

Our Ref: WSBN12 196



Quality Assurance

Author	Fiona Baker BSc, MSc, MCIEEM
Reviewed	Donna Popplewell BSc, ACIEEM
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About Us

Bakerwell Limited has two offices, led by directors Fiona Baker and Donna Popplewell. The Directors have collectively 16 years' experience in the ecological consultancy industry, hold relevant degrees, are qualified botanists, and are trained in the use of biodiversity metrics to calculate no net loss/gain.

All staff are members, or training to be members, of the professional body for the environmental industry, the Chartered Institute of Ecology and Environmental Management (CIEEM) and hold Natural England European protected species licences for great crested newts, bats and dormice. Bakerwell Limited has SMAS Worksafe Health and Safety Accreditation; all staff hold relevant CSCS cards.

Bakerwell Limited is a consultancy specialising in ecological planning advice and surveys. Bakerwell also work in collaboration with trusted associates to provide Landscape Architecture, Arboriculture and Energy assessments.



*Bakerwell Ltd. Company No: 10511578, VAT No: 258900680
Registered office 5 Longhurst Cottages, Haywards Heath Road, North Chailey, Sussex. BN8 4EZ*

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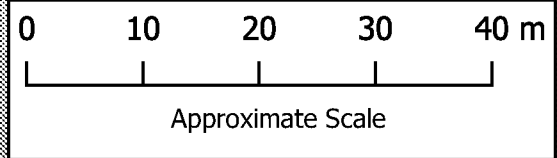
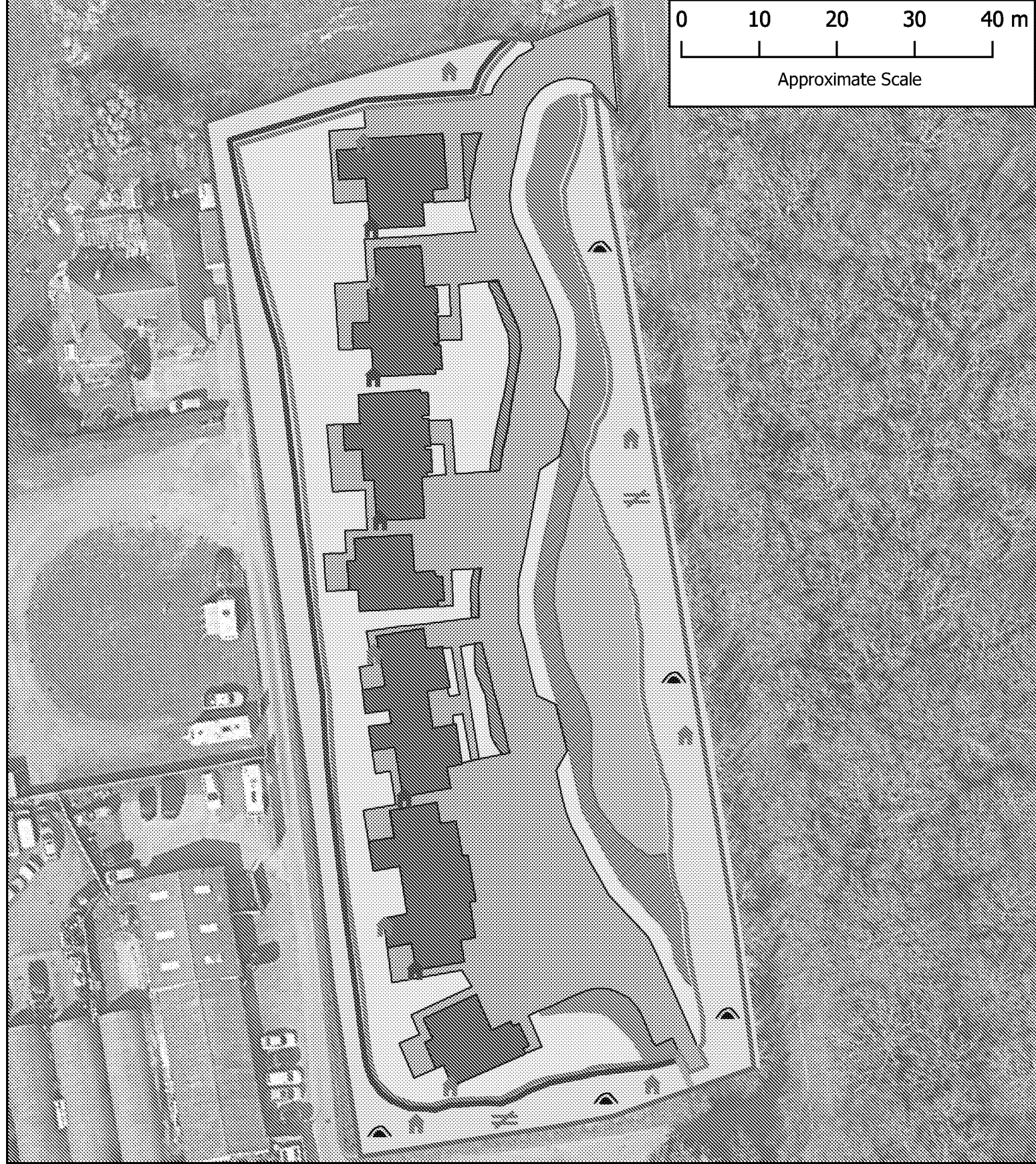
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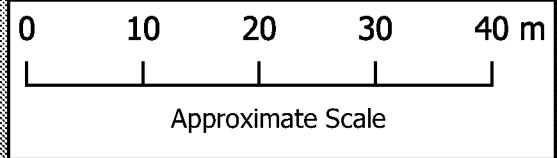
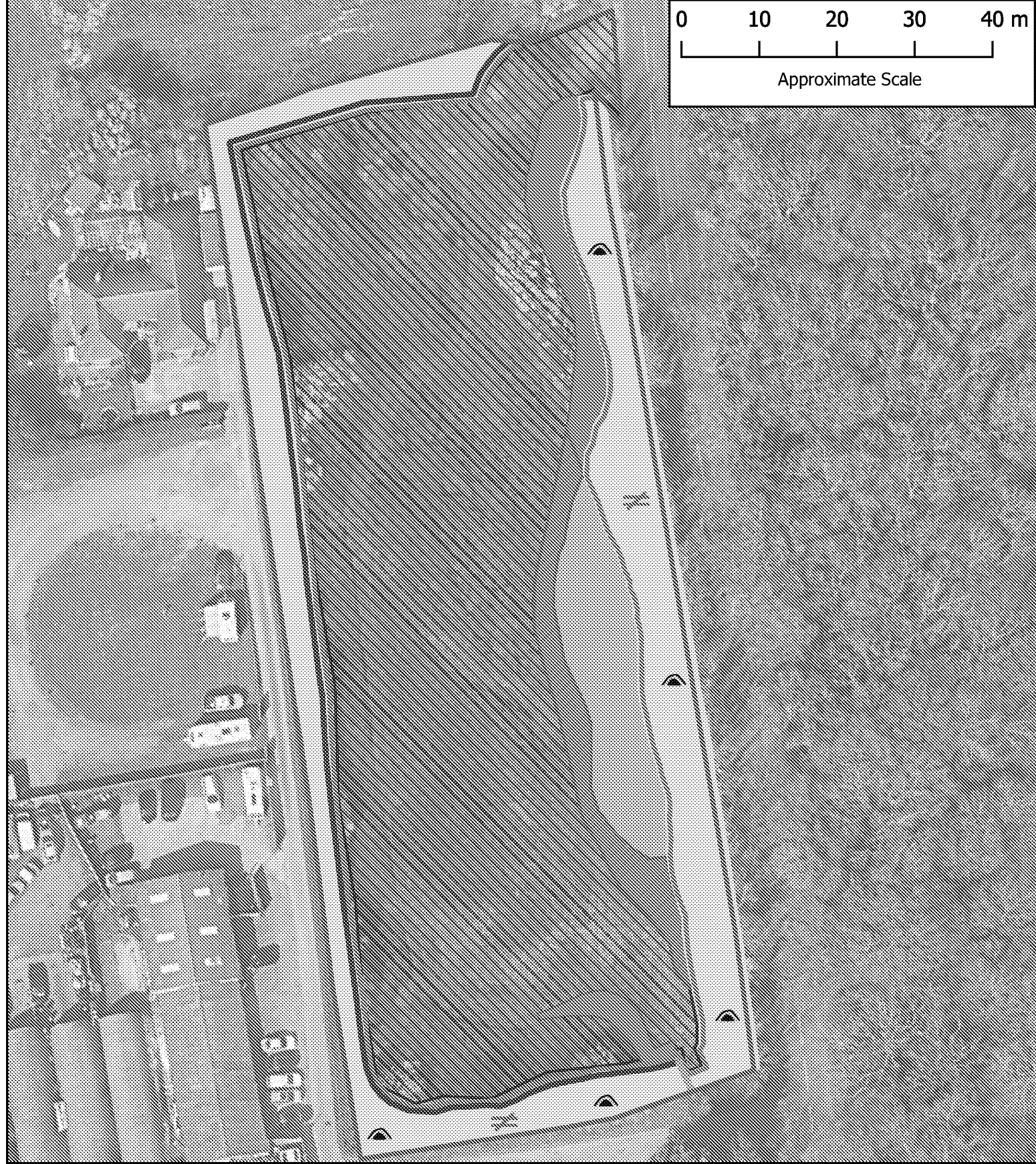
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Site Boundary	Heras Fencing	Amenity Grassland																			
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	Shrub Planting																				
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Key

- Site Boundary
- Hibernacula
- Log Pile
- Temporary Herpetile Fencing
- Heras Fencing
- Herpetile Fencing
- Retained Boundary
- Bee Bank
- Wildflower Meadow
- Long Grass
- Construction Area
- Area of Reptile Displacement

Figure 2: Reptile Mitigation and Enhancement Plan

Site: Arundel Road, Angmering
 Date: October 2019
 Job: WSNB 12 196
 Author/Reviewer: KK/FB

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Key

	Site Boundary		Shrubs
	Bat Box or Brick		Amenity Grassland
	Bird Box		Buildings
	Hibernacula		Paving and Hardstanding
	Log Pile		Bee Bank
	Retained Boundary		Meadow Cut
			Long Grass Meadow Cut

Figure 3: Management and Monitoring Plan

Site: Arundel Road, Angmering

Date: October 2019

Job: WSNB 12 196

Author/Reviewer: KK/FB

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1 Introduction

- 1.1 Bakerwell Limited were commissioned by GD Group to produce an Ecological Mitigation Strategy (EMS) for the Proposed Development for Land at Arundel Road, Angmering, West Sussex, BN16 4ET (hereafter referred to as the site).

- 1.2 Outline planning permission reference A/131/16/OUT was granted on the 21.12.2016 by Arun District Council (CDC). The site was subsequently granted full planning permission on 04.10.18 by Arun District Council, planning reference A/85/18/RES.

- 1.3 This report has been provided to meet condition 11 of A/131/16/OUT which states:

“No development including site access, demolition or associated construction activities, shall take place on the site unless and until a 'Mitigation Statement' that details all of the protection measures for reptiles and other wildlife on the site at Arundel Road has been submitted to and approved by the Local Planning Authority. This should include;

·The mitigation measures proposed in 'Phase 1 Habitat and Ecology Assessment and Phase 2 bat and reptile surveys - dated 14th September 2015',

·The placement of 5 no. nesting opportunities for birds (species such as swallows, swifts & housemartins), ·The placement of 2 no. amphibian/reptile tunnels,

·The provision of a bee bank which should be constructed using sand, a tiny amount of concrete and a small amount of small stones/aggregate/pebbles, the rough dimensions should be 10m (L) x 2m (W) x 1m (H) and it should be south facing to catch maximum sun.

Reason: In accordance with Arun District Local Plan policy GEN29 and the National Planning Policy Framework. It is considered necessary for this to be a pre-commencement condition to prevent damage/harm to the ecology of the site.”

- 1.4 In addition the report takes account of correspondence on the 17.10.17 from the Environment Officer Gareth Ryan in which he lays out requirements including: mitigation for badgers, hedgehogs, breeding birds, retention of hedge on the north and east of site, a portion of site to be wildflower meadow including bee bank, replacement planting for any hedge lost in north east, reptile mitigation strategy and bat a bird boxes.

- 1.5 The site is located to the west of Arundel Road, Angmering central OS grid reference TQ 06723 05365. The site currently consists of recently cut ephemeral/short cut perennial vegetation surrounded by a boundary line of hedgerow with trees. To the west of site lies an industrial park and caravan storage with rural fields beyond. To the east and north are two parcels of broad-leaved woodland. Full site surveys were provided as supporting information in both applications.

- 1.6 The proposed development comprises nine residential dwellings with associated infrastructure, parking and landscaping with access from Arundel Road on the north east corner of site. The site also includes the original house located in the southwest corner.
- 1.7 The EMS provides detailed mitigation and enhancement measures to be included in the proposed development, as well as details of the ongoing maintenance and monitoring of the enhanced and retained habitats.

2 Ecological Background

- 2.1 A Phase 1 Habitat and Ecological Assessment was undertaken by The Ecology Co-op in 2015. This report was submitted to support the outline planning application and was updated in 2018 to support the full application. These reports provided the following information which informs this EMS:

- The site is not located within the zone of influence of any designated site.
- Areas of woodland immediately adjacent to the east of Arundel Road and 124m to the north of site are deciduous woodland Priority Habitat.
- The site was found to have two habitats present, ephemeral/short perennial and hedgerow with trees.
- The central area habitat is dominated by ephemeral/short perennial species typical of disturbed ground, possibly as a result of reduction in grazing/cropping regime. Species include common fleabane *Pulicaria dysentrica*, white clover *Trifolium repens*, creeping cinquefoil *Potentilla reptans*, teasel *Dipsacus foliolosus*, with greater burdock *Arctium lappa* and small patches of common nettle *Urtica dioica* and bramble *Rubus fruticosus* sp. present. The boundary hedgerow was found to be species poor dominated by blackthorn *Prunus spinosa*, with ash *Fraxinus excelsior*, elm *Ulmus minor* and pedunculate oak *Quercus robur* present.
- A mature ash with low bat roosting potential was located in the north east corner of site. No bats were seen to emerge during bat surveys in 2015.
- Soprano pipistrelle *Pipistrelle pygmaeus*, Common pipistrelle *Pipistrelle pipistrellus*, Noctule *Nyctalus noctula* and Natter's bat *Myotis natterii* were recorded commuting and foraging on site.
- A reptile presence/absence survey was undertaken in the summer of 2015, a peak count of seven common lizard were recorded. The site remained in a similar condition in 2018 having been subject to regular management, no update to the survey was required to support the full planning application.
- The boundary habitats and small patches of scrub have potential for breeding birds to be present during March - August.

- The boundary habitats have low potential for dormice *Muscardinus avellanarius* to be present. No surveys were undertaken due to the retention of boundary habitats.
- No evidence of badgers *Meles meles* was found on site, however an active badger sett occurs 260m to the east.
- No suitable breeding ponds for great crested newts (GCN) *Triturus cristatus* were located within 500m of the site, it is therefore considered highly unlikely that this species is present.

3 Ecological Constraints

- 3.1 The site was visited on the 18th August 2019 to re-assess the habitats present, potential for protected species and current condition of the habitats. The aim of this visit was to assess the likely ecological impacts of the development given the current potential.
- 3.2 It was concluded that the ecological condition of the site has not changed significantly since the update survey in 2018 described in reports to support the planning application, please refer to the Phase 1 Habitat and Ecological Assessment and Phase 2 bat and reptile survey (The Ecology Co-op, 2015) and the Updated Preliminary Appraisal (The Ecology Co-op, 2018) for detailed descriptions.
- 3.3 The ash with low bat roosting potential is likely to be lost. Mitigation following best practice guidance is detailed in this report.
- 3.4 The boundary habitats will be retained. A dark skies corridor around the boundary will be included in the design. Lighting mitigation measures for bats are detailed in Section 7 of this report. The lighting strategy is the subject of a separate planning condition and not addressed other than in ecological terms within this report.
- 3.5 There are no buildings on site. Previous surveys did not record any bats emerging from trees on site, and the rest of the trees to be retained in the boundary currently have negligible potential to support bats. However, foraging and commuting bats use the boundary and open area of the site. Boundaries will be retained. Section 7 describes measures to create area of meadow planting to encourage invertebrates and provide flight space.
- 3.6 The habitats on site provide suitable habitat for reptile hibernation (boundaries only), with foraging and limited basking opportunities within the central area. The site condition has not changed in a significant way since the surveys completed in 2015 and 2018. However, scrub growth occupies slightly more of the field area than previously, reducing basking opportunities for reptiles. Mitigation and enhancement measures to ensure no harm to this species are described in Section 7 of this report.

- 3.7 The trees, shrubs and patches of scrub present on site provide nesting and foraging opportunities for birds and dormice. Section 7 includes mitigation and enhancement measures for these species.
- 3.8 The tree and hedge lines represent the habitats of highest ecological value, the majority of these will be retained as detailed in the Arboricultural Method Statement (AMS). To facilitate site access widening to the entry road it is likely a small loss of hedgerow will be required. Compensatory and enhancement measures for vegetation loss are detailed in Section 7.
- 3.9 Whilst no signs of badger or hedgehog were noted the site has potential suitable foraging opportunities within the boundary and scrub, the proposal will include measures to ensure accessibility by these species.

4 Aims and Objectives

- 4.1 The aim of the EMS is to provide detailed specifications of the measures to be taken to avoid and mitigate harm to protected species from the proposed development. It also details measures to enhance the site for biodiversity, and to manage and monitor these features to ensure the longevity of the biodiversity benefits of the site.

Specifically, objectives are to:

- Confirm measures to avoid and mitigate harm to protected species;
- Provide specifications for compensatory measures for protected species;
- Detail methodology for habitat removal;
- Ensure the proposal complies with relevant wildlife legislation and the National Planning Policy Framework (NPPF) relating to the species potentially present;
- Maintain and enhance the retained ecological features of the site;
- Specify enhancement measures to enhance the scheme
- Ensure the ongoing quality of all new biodiversity features;
- Confirm management methodology of ecology features;
- Provide proportional monitoring measures;
- Provide a schedule for management and monitoring tasks.

5 Responsibilities

Management of Site During Construction

- 5.1 The responsibility for the completion of the ecological mitigation and enhancement measures, including the reptile receptor areas shown in Figure 1, will fall to the client who will appoint the necessary contractors to complete the works. Works detailed within this mitigation strategy will be overseen by the appointed Ecologists, Bakerwell Limited, see Table 1.

Table 1: Showing Responsible Persons

Responsible Person	Company	Email	Phone
Client	GD Group	dean@dgconstructionservices.co.uk	01273 466524
Residential Site Manager	GD Group	james@dgconstructionservices.co.uk	01273 466524
Client Ecologist	Bakerwell Limited	info@bakerwell.co.uk	01273 030924
Management Company	GD Group to Confirm to the LPA	dean@dgconstructionservices.co.uk	01273 466524

- 5.2 All site workers must be familiar with the guidance set out in this document if they are to remain compliant with legislation and avoid fines and penalties. A copy of this document will be available in the site office at all times. Each site worker should read through this and return it. When a specific task needs to be done, site workers should re-read the relevant section. Site workers should report any ecological sightings or accidents on site to the Site Manager who will report these to the Ecologist.

Responsible Persons and Lines of Communication

- 5.3 It is expected that all site personnel will act responsibly whilst on the development site. Those who act irresponsibly whilst on the site may find that their company is penalised and could be asked to leave the site. Table 2 lists the contact details for the responsible persons at each stage of construction regarding ecology on site and below is a list of each person's responsibilities.

Site Manager

- 5.4 The Site Manager is a member of staff from GD Group. The site manager is responsible for:
- Ensuring site workers remain in compliance with this document;
 - Notifying the Client Ecologist of any changes to works which may affect the ecology on site;
 - Ensuring that all mitigation measures detailed in this report (Bakerwell Limited 2019) are put in place and remain in good order during construction; and
 - Undertaking regular checks of all ecological and protective site fencing.

- 5.5 The site manager remains responsible for all fencing within the site until all construction activities have been completed. This includes the construction area and the retained reptile receptor area. The term fencing refers to all construction site fencing, tree protection fencing, reptile or wildlife fencing and Hera's fencing. Any repairs to the fencing will be made immediately to ensure the site does not become permeable to wildlife including reptiles, allowing them to re-enter the construction zone. This could cause delays while animals have to be translocated.

The Client Ecologist

- 5.6 The Client Ecologist is Bakerwell Limited. Bakerwell Limited are employed to provide overall guidance on ecology at the site. They are responsible for:
- Undertaking the reptile displacement.
 - Reviewing mitigation and enhancement measures as required

- 5.7 The advice of the ecologist must be followed. Those that do not follow the ecologist's advice may be leaving themselves and their employer at risk of legal and financial penalties.

Management Responsibility

- 5.8 GD Group will appoint a management company if the site is not to be adopted, the management arrangements will be confirmed to the LPA prior to the completion of construction.

6 Ecological Justification of Appropriate EMS

- 6.1 The site is located to the north of the village of Angmering, situated amongst residential and business areas to the north, east and south, and arable land to the east.
- 6.2 The site currently has limited potential to support a diverse range of wildlife, being comprised primarily of ephemeral/perennial species surrounded by a boundary hedge line with trees.
- 6.3 The ecological condition of the site has not changed significantly since the surveys undertaken in 2015 and 2018. Therefore, the precautionary measures laid out in the ecological reports to support the outline and full planning applications are still applicable.
- 6.4 The proposed development has the potential to improve the site for wildlife by enhancing the variety of habitats and plant species on site, and the creation of features of greater value to local species. Thereby offering opportunities to a greater diversity of species.

- 6.5 The mitigation hierarchy is a tool used to limit the negative impacts of development projects on biodiversity and should be considered during the design of any development. The hierarchy follows sequential steps, these are; to avoid adverse effects on biodiversity when and where possible. Where adverse effects cannot be avoided through design, mitigation measures will be implemented to minimise the negative impact. In exceptional cases, where avoidance and mitigation are not possible, compensation measures will be considered. Alongside the efforts to avoid, mitigate or compensate for the negative impacts of the development, opportunities to enhance the ecological value of the site will be considered.

Bats

- 6.6 There is potential for bats to be foraging and commuting across the site. Lighting considerations will be taken into account during the construction and post construction phases of development to ensure light spill over likely commuting and foraging areas is avoided or within limits acceptable to bat activity.

Birds

- 6.7 The hedges, scrub and trees on site provide habitat potential for nesting birds. An appropriate, precautionary methodology is described below to ensure the possibility of harm to birds during construction activities is minimized.

Badgers and hedgehogs

- 6.8 There is potential for both badgers and hedgehogs to use the site. An appropriate, precautionary methodology is described in Section 8 to ensure badgers and hedgehogs are not harmed during construction activities.

Habitats

- 6.9 The trees and hedges have intrinsic ecological value, the AMS describes the works to be undertaken to protect the trees and hedges to be retained in detail.

7 Mitigation and Enhancement Strategy

Multi-Species Enhancements

- 7.1 Enhancements for specific species and habitats are given below. Enhancements which are beneficial for a greater number of species are given here. Timing for the implementation of measures detailed below will be given section by section, this broadly falls into three timeframes:

- Pre-construction site preparation
- Construction
- Occupation

- 7.2 The boundary hedge habitat and ephemeral species along the field margins will be retained around the entire site. Green space outside of residential gardens to the east of site will be planted with wildflower and grass meadow species to increase floral, and consequently faunal, diversity to the site. This will feature a bee bank running sinuously through the scheme, the sinuous nature ensures that sun falls on the bank in different sections throughout the day. To the east of this an area of wildflower meadow will spread north to south connecting with habitat to the north and retained boundary habitat on site see Figure 1.
- 7.3 As the site occurs near to the South Downs plant species suitable for chalky substrates will be used for the wildlife area, with a pollinator specific mix to be used on the bee bank. The following Emorsgate seeds mixes are recommended, full species lists are provided in Appendix 1. Alternatively, wildflower turf with equivalent plant species mix will be used for rapid establishment:
- EM6 – Meadow Mixture for Chalk and Limestone Soils
 - ESF2 – Wild Pollen and Nectar Mixture
- 7.4 Construction of the bee bank and wildflower planting will be undertaken during landscaping work as part of the initial construction phase to allow early use by species on site.

Trees and Hedgerows

- 7.5 All trees and hedgerows to be retained as part of the proposal will be protected by Tree Protection Fencing (TPF) to standard BS5837. In summary of the AMS, tree protection fencing will protect the root protection areas (RPA), any works within or adjacent to these areas, service trenches etc, will be supervised by an arboriculturalist. Should works be carried out adjacent to trees, the advice of an arboriculturalist will be followed. TPF will be erected prior to any site work and will remain in place until the completion of all construction and landscaping. Materials will not be stored within or against the TPF at any time.
- 7.6 To mitigate for the loss of the ash tree and a small section of hedge to allow site access, planting will strengthen the north and east boundaries to diversify the species present. This will provide feeding opportunities for wildlife, bird nesting and bat commuting flight lines. Examples of native and wildlife-beneficial shrub species suitable for planting are shown in Table 2.

Table 2. Native tree species recommended for hedge planting

Common Name	Latin Name
Hawthorn	<i>Crataegus monogyna</i>
Blackthorn	<i>Prunus spinos</i>
Field Maple	<i>Acer campestre</i>

Common Name	Latin Name
Wild Privet	<i>Ligustrum vulgare</i>
Wild Cherry	<i>Prunus avium</i>
Bird Cherry	<i>Prunus padus</i>
Alder	<i>Alnus glutinosa</i>
Guelder Rose	<i>Viburnum opulus</i>
Spindle	<i>Euonymus europaeus</i>
Juneberry	<i>Amelanchier lamarcki</i>

- 7.7 Trees will be planted between November and February during the construction phase for maximum chance of health and survival. Any that fail to flourish during the first five years will be replaced. These will be surrounded by a deep mulch and watered as necessary, see Section 8.

Reptiles

- 7.8 The Ecology Co-op conducted a seven-day presence/absence reptile survey and population assessment in 2015. The survey methodology followed standard guidelines for reptile presence/absence surveys. Where a very low population is found across this period it is not considered appropriate to extend the survey effort in order to reach an assessment of population.
- 7.9 The maximum count of adults found on a single survey (the peak count) can be used to estimate population size. The Froglife (1999) survey methodology is based on 10 refugia per ha, therefore where more are used to ensure coverage of good quality habitat, the following adjustment is made to account for the increase in survey effort. $10 \times (\text{ha}) / (\text{refugia}) \times (\text{peak number of reptiles}) = \text{the peak number per ha}$ (this must be carried out for each species present). The result is then compared with Table 3 HGBI (1998) to give a population size.
- 7.10 The site is 0.7ha, 10 refugia were used therefore the calculation is as follows: $10 \times 0.7 / 10 \times 7 = 4.9$ common lizard per hectare. The reptile population when compared to Table 3 is therefore considered to be low.
- 7.11 Despite the lapse in time since the original survey the site vegetation was found to be in the same condition in update surveys in 2018, for this reason the survey data was considered valid at the time of full planning application. The recent visit to the site found that scrub has spread slightly but is still low indicating a relatively recent reduction in site management. For this reason, the survey results are still considered to be valid.

Table 3: Reptile Population Classes (HGBI, 1998)

Species	Adult Peak Count Per Hectare		
	Low Population	Medium Population	High Population
Adder	<2	2-4	>4
Grass Snake	<2	2-4	>4
Slow worm	<50	50-100	>100
Common Lizard	<20	20-80	>80

- 7.12 Suitable habitat for reptiles is present across the site and a low population of common lizard have been recorded on site within the central vegetation. Reptiles are protected from killing/injury in UK Law by the WCA 1981, therefore the following proportional mitigation strategy will be carried out.

Reptile Mitigation Strategy

Summary

- 7.13 The mitigation for the low common lizard population found on site includes the following:
- Creation of the reptile receptor area and installation of enhancement features as part of required mitigation;
 - Cut of vegetation to 20cm;
 - Fingertip search for reptiles by the ecologist
 - Displacement of reptiles to an enhanced retained receptor area;
 - Erection of temporary reptile exclusion fencing to prevent access to the construction footprint during works;
 - Translocation of any reptiles during site clearance by the supervising ecologist.

Reptile Receptor Creation

- 7.14 To mitigate for the loss of habitat supporting reptiles, a section of boundary habitat adjacent to the hedgerow will be retained and enhanced along all boundaries of the site. The areas to the north, west and south of site will act as the initial reptile receptor area. Following the planting of the wildflower and bee bank this area will also be made accessible to reptiles.
- 7.15 Reptile basking and hibernation features, comprising a log pile and two hibernacula will be installed into the initial receptor area prior to the displacement of reptiles from the construction footprint. Two further hibernacula and a log pile will be installed in the wildflower area, see Figure 2.

- 7.16 The log piles and hibernacula will be created from wood fallen or felled on site and supplemented by native hardwood species in appropriate locations adjacent to the southern and eastern hedge line. A specification is provided within Appendix 2. This will provide habitat for a range of species including reptiles, amphibians and saproxylic invertebrates and small mammals.

Displacement of Reptiles into the Prepared Receptor

- 7.17 Due to the low numbers of common lizard found during the reptile survey (peak count of seven), and the objective being to maintain the conservation status of the population (which requires continued links to further lizard in the vicinity) it is considered disproportionate to carry out a full translocation program. Instead the habitat will be manipulated to displace common lizard into the receptor area before this is fenced.
- 7.18 The displacement of reptiles will be undertaken during suitable conditions March – October Inclusive, where consistent day time temperatures of 9 – 18 degrees centigrade persist. The displacement will cease if daytime temperatures fall below 8 degrees, ground (earth) temperatures are below zero and a hard ground frost or persistent heavy rain is predicted. Should temperatures dip below 8 degrees centigrade for three days or more, the displacement will be delayed into the next suitable season.
- 7.19 The ecologist will first carry out a fingertip hand search of suitable habitat and will supervise careful removal of scrub from the construction footprint moving any reptiles found to the receptor area. Where required to allow the fingertip search, the ruderal vegetation and scrub will be cut to 20cm using hand tools and the supervision of an ecologist. Immediately following the search vegetation to be removed by cutting to ground level and be left for at least 24 hours.
- 7.20 A “destructive search” under ecological supervision will then be completed of the construction footprint. Under ecological supervision the remaining vegetation in the construction footprint will be stripped in sections using a small excavator with a toothed bucket. The top few centimetres of the ground will be stripped by the digger and each section will be lifted in the bucket and held to allow the ecologist to check the stripped vegetation for herptiles, before being placed to one side onto clear ground so that the next section can be stripped. Should herptiles be found during checks they will be relocated to the initial receptor area of retained habitat on site, see Figure 2.

Herptile Fencing Installation

- 7.21 Temporary Herptile exclusion fencing will be used to ensure that reptiles do not enter the development footprint during the construction period. The herptile exclusion fencing will be erected as shown in Figure 2.
- 7.22 Approximately 108m of temporary herptile exclusion fencing will be erected to form the temporary receptor area. This will ensure common lizard are prevented from moving into adjacent habitats into the construction zone and being harmed by construction activities.

- 7.23 The fencing membrane material will be 100cm in width to allow the correct height of fence to be installed. The membrane will be smooth and will not break down or become brittle under exposure to the elements, particularly UV light and frost, for a minimum of one year. This specification is shown in Appendix 3.
- 7.24 The membrane will include 70cm above ground level, of which 20cm of the top lip of the membrane will be curled over. Below ground will be the remaining 30cm with a 10cm section curled away from the fence and construction zone. The membrane will be as taut as possible, avoiding creases or folds and secured to posts using pads and washers, nails or staples. Joins between membrane sheets will be curl joined (including top curl and underlap) and firmly secured to a fence post with no gaps. Soil will be packed tightly to the fence and down onto the bottom lip with no gaps leading under the fence. Membrane, top curl and underlap will face off site with fence posts facing the site.
- 7.25 To install the fencing a fingertip search of the route of the fence line will be completed by an ecologist to ensure no reptiles are located within the installation area. Following this the scrub and ruderal vegetation will be cleared by hand tools. Any reptiles found will be moved out of harm's way to the initial receptor area, Figure 2. The top layer of soil will then be carefully stripped using a small excavator with a toothed bucket. The fence can then be installed. Backfill should be placed turf downward to suppress grass regrowth and well compacted to eliminate lumps or gaps.
- 7.26 During the construction period, the fence will be checked monthly for damage or gaps by the site manager and any repairs will be conducted immediately to ensure the integrity and functionality of the fence is not compromised. Security fencing (e.g. Heras fencing) installed between the construction zone and the exclusion fencing will help to protect the fencing from construction activities.
- 7.27 Following the completion of the wildflower and bee bank, the section of temporary fencing shown in Figure 2 will be removed to allow reptiles access to this additional enhanced habitat. The remainder of the fencing will remain in place in good order until the completion of all construction and landscape works.
- 7.28 Should reptiles be seen on the development site at any time during construction all works should cease in the area found and ecological guidance should be sought without delay. No vehicles or materials will be stored in the wildflower area at any time once the landscape works are complete in this area.

Bats

- 7.29 Bats and their roosts are protected under the EU Habitats Directive (transposed into UK law as the Conservation of Species and Habitats Regulations 2010), and the Wildlife and Countryside Act 1981 (as amended). This protects bats from killing, injury, capture and disturbance of their roosts from damage, destruction and obstruction.

- 7.30 Bats are likely absent from roosting on site; none were found during previous surveys. However, there has been a delay since surveys and low potential remains. Therefore, precautionary methodology will follow best practice guidance as laid out in guidance (BCT, 2016) for the felling of the ash identified with low potential for roosting bats. The tree will be searched for bats by an ecologist prior to soft felling under ecological supervision.
- 7.31 Due to the use of the site by foraging and commuting bats, and the requirement for dark skies along the site boundaries the lighting scheme will ensure there is no light spillage onto boundary trees.
- 7.32 The residential unit lighting strategy will include recessed rather than pendant lighting in the installed to direct lighting internally to avoid light spill from windows. External lighting on properties will be limited to the eastern side of the properties (the side of access from the road) and will be installed by the developer in the porches of properties to dissuade home owners from installing unsuitable lights. These security lights in the porches will be motion censored and timed to be on for as short a time as possible.
- 7.33 The street light will use of baffles/downward facing lights and low wattage lights with limited lighting within the UV spectrum to make this possible. A 0.4 lux (vertical plane) - 0.2 lux (horizontal) is recommended as it is within the range of light that light averse bat species hunt within.
- 7.34 The Bat Conservation Trust (BCT) and Institution of Lighting Professionals (ILP) have produced guidance regarding lighting and bats, this can be accessed <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>.
- 7.35 Enhancement for bats will consist of five bat bricks to be incorporated into the brickwork of the residential buildings or garages during construction, see Figure 1 for indicative positioning. The boxes will be Birdbrickhouses.co.uk Bat Brick or similar. These will be installed at a height of at least 3m, with an unobstructed access point and on a southerly aspect where possible, facing away from the prevailing winds. Research into bat mitigation by The University of Exeter and the Chartered Institute of Ecology and Environmental Management (2018) has shown bats are unlikely to use bat boxes where less than five are installed. This is because bats roost transiently, requiring several to be available at a time to facilitate roost selection based on weather conditions and the other factors.
- 7.36 Further enhancements benefiting bats are the additional hedge planting, log piles and wildflower planting. These enhancements will provide improved roosting, foraging, commuting and feeding opportunities for bat species.

Breeding Birds

- 7.37 All active bird nests are protected under the WCA 1981 from damage and destruction. Furthermore, birds that are listed on Schedule 1 of the Act are protected from disturbance at all times.
- 7.38 The areas of scrub, the hedgerows and trees present on site provide suitable nesting habitat. The majority of hedges and treelines will be retained. The ash tree, possibly a short section of hedge, and scrub areas have been identified within the application for removal and pruning works. Where possible these works will avoid the bird nesting season, March to August inclusive. Should it not be possible to avoid this period, works will be completed under the supervision of a suitably qualified ecologist during the pre-construction site preparation phase as detailed below.
- 7.39 The ecologist will carry out a check for bird's nests no less than 24 hours before works are due to start. Any active nests will be marked out with an exclusion zone appropriate to the species. No works will take place in this area until the ecologist has confirmed that the young have fledged.
- 7.40 Where trees or scrub are dense the ecologist will carry out a period of observation. Should birds be observed carrying out nesting behaviour, returning regularly to a specific location within the scrub, carrying nesting material or food, pair behaviour etc, the ecologist will mark out an exclusion zone as above. If no such behaviour is observed a precautionary methodology will be carried to remove scrub in small stages under ecological supervision, between localised searches for nests by the ecologist.
- 7.41 Five bird nesting boxes will be supplied to mitigate for the removal of scrub and hedge these will be erected during pre-construction. Five schwegler 3SV bird nest boxes will be erected on mature trees around the development site. As enhancement, a further Five bird nesting boxes suitable for swift/house martins and house sparrows such as one schwegler 11A swift box, two schwegler 11 House martin nest and three sparrow terraces birdbrickhouse.co.uk will be incorporated into the walls of buildings.
- 7.42 The nest boxes will be placed at least 3m high, avoiding direct southern and northern aspects to minimise overheating/cooling. Care should also be taken to avoid artificial light spill on nest boxes, see Figure 1 for indicative positioning.
- 7.43 The site will be further enhanced for birds through the provision of log piles and wildflower planting. These enhancements will provide improved foraging and feeding opportunities for the species.

Dormouse

- 7.44 The potential for dormice was identified within the hedgerows of the site, the potential is considered to be low due to the poor species diversity of the hedge. The boundary hedge and trees are to be retained. However, it is possible that a small section of hedge may be lost to ensure road visibility from the site access. As a precaution the following methodology will be followed should this hedge loss occur:

- A section or multiple sections of a total of less than 10m will be searched by hand by and dormouse licensed ecologist prior to any removal. Should nests or chewed nuts or any other evidence of dormice be found all works will cease until a Natural England (NE) European Protected Species Mitigation Licence (EPSML) has been obtained.
- If the proposal changes and a larger section of loss is required a dormouse survey following standard guidance (one survey per month April – November to achieve a survey effort of >20) will be undertaken to inform the need for a NE EPSML.

Hedgehog

- 7.45 Hedgehogs are partially protected under the Wildlife and Countryside Act 1981. There is potential for hedgehogs to forage on site, as well as the potential for hedgehogs to nest in the scrub vegetation. Therefore, any areas where hedgehogs could be sheltering within the construction footprint under a precautionary methodology will be dismantled/cut by hand with an ecologist present during the pre-construction site preparation phase. Any animals found at this point will be translocated by the ecologist to suitable habitat in the retained boundary habitat, see Figure 1.
- 7.46 Fences (both new and retained) will have a 13cmx13cm gap cut at the base to allow hedgehogs to move across the site. Including any fences between residential gardens. Provision will be made of two hedgehog houses underneath the retained hedge.

Badgers

- 7.47 Badgers and their setts are protected in the UK under the Protection of Badgers Act 1992. There are no badger setts on site, however, there is potential for badgers and hedgehogs to forage on site. Excavations during the construction phase of the development will be covered overnight, alternatively planks of wood will be placed within trenches to provide ramps so as to enable any animals which may fall in to escape.
- 7.48 The site will be enhanced for hedgehogs and badgers through the provision of the strengthened hedgerows, wildflower planting and the log piles. These enhancements will provide improved shelter, foraging and feeding opportunities for both species.

8 Management Plan

- 8.1 Management of the retained and introduced biodiversity features will be carried out during construction and post construction phases to ensure that ecological features remain a functioning benefit of the planning proposal. The management will be ongoing in perpetuity. Figure 3 shows the management and monitoring areas on site, Appendix 4 provides a schedule for timing of these works.

Amenity Grassland

- 8.2 Amenity grassland planting as per the Landscape plan will line the immediate area 500mm – 1000mm alongside properties and the access road including an area 1m wide adjacent to the road and bee bank. This will be managed using a bi-monthly cut to 50mm in height.

Wildflower Meadow and Bee Bank Preparation and Planting

- 8.3 The wildlife area and bee bank will be seeded with a wildflower grassland meadow mix and pollinator mix as detailed in Section 7.3 and Appendix 1. Early spring is the ideal time to sow seed, but suppliers guidance on planting times and ground preparation will be followed. Any areas of loss or failure in the first two years will be replaced.
- 8.4 To prepare the wildflower meadow area topsoil will need to be removed (wildflowers need poor soil substrate to avoid becoming dominated by ruderal species) and the ground graded in preparation for receiving the seed mix.
- 8.5 To prepare the area for the bee bank an area no less than 10m in length will be prepared as follows to achieve a bank of no less than 2m in width and 1m in height. (variation from this width and height to create steeper and shallow bank areas is to be encouraged). Figure 1 shows the position of the bee bank.
- Top soil and vegetation to be removed
 - Subsoil to be set aside for reuse
 - Lay sand along base of bank
 - Lay chalk and flint aggregate, recommend due to location
 - Cover western side (residential facing side) with subsoil and grade for seeding
 - Cover eastern bank with sand and compact
 - Seed or turf using mix specified in Section 7.3
- 8.6 The seeded areas will require initial regular watering to ensure successful establishment. During the first growing season a quarterly cut should be carried out to manage dominant species such as nettle, dock and thistles.

Retained Areas, Wildflower Meadow and Bee Bank Management

- 8.7 Retained areas and the wildflower meadow, once established, will be cut twice per year between October and February to avoid the plant flowering season and to increase floral biodiversity and seedstock re-entering the soil. These areas should not be cut lower than 150mm to avoid injuring or killing reptiles and to increase the suitability for a range of species including herpetofauna, invertebrates and small mammals.
- 8.8 Management of the western and top of the bee bank once established will follow that of the wildflower meadow. Management of the eastern bank may require occasional “scrapes” to ensure continued bare areas for nesting bees.

Log Piles and Hibernacula

- 8.9 An annual check of the status and condition of the log piles and hibernacula will be carried out with additional logs being added as required. Grass cutting will avoid the area within 1m of the log pile to provide continuous cover for wildlife.

Hedges and Treelines

- 8.10 Retained hedges and treelines will be only be pruned outside of the bird nesting season (March – August inclusive) to avoid damage and destruction of birds’ nests.
- 8.11 Any new native hedge planting will follow an initial management plan to ensure healthy establishment. This will include weed control and firming of soil to encourage rapid establishment of newly planted hedges. Herbicides, pesticides and fertiliser use should be avoided where possible; an alternative is to carry out ‘halo’ cutting of weeds around each trees base. The use of Miccorhizal fungi placed beneath the trees when planted aids the natural establishment process, negating the need for fertilizers.
- 8.12 Following planting, the top and sides of the new hedgerow plants shall be pruned ‘faced up’ as required during the first two years to create a dense compact hedge. In year 3 once the hedge plants are established (dense enough to be suitable for nesting birds) cutting will take place outside of the bird nesting season March – August.
- 8.13 Hedge cutting will be carried out on a three-year rotation following DEFRA guidelines (DEFRA, unpublished). A different 1/3 of the hedge area will be cut each year. This will allow 2/3 to flower and fruit each year providing foraging opportunities for mammals and birds. A more regular cut may be required in areas adjacent to footpaths/roads to allow these to remain open.

9 Health and Safety

- 9.1 Working on the site carries a number of risks. The landowner will be responsible for drawing up a health and safety risk assessment which will be updated every year. The site will be managed to comply with all Health and Safety Executive approved codes of practice and health and safety legislation. The managing agent will be responsible for ensuring that the annual risk assessment takes into account the effectiveness of all control measures.
- 9.2 The landowner will be responsible for ensuring that accidents and incidents which occur on the site are reported to the relevant enforcing authority as required by the Reporting of Injuries, Disease and Dangerous Occurrences Regulations 1995.

10 Monitoring

- 10.1 The client ecologist will check that all ecological features have been installed once construction has reached that stage (anticipated to be in the year after start of works), a compliance report will then be provided to the LPA. Ongoing responsibility for monitoring the ecological features described in Section 8 will fall to the applicant or applicant's management company, who will continue to monitor these features throughout the lifetime of the proposal. This will include monitoring the condition of the enhancements, such as log piles/hibernacula, bat boxes and bird boxes, to ensure that they continue to function. Any damaged features must be replaced as necessary. Where bat boxes require removal/repair or replacement, a bat licenced ecologist should first check to ensure no roost is present. As bat roosts are protected in legislation.
- 10.2 The log piles will be monitored to ensure they remain stable and in a sunny position. Shading vegetation will be cut back, and the pile supplemented with new, native species logs if necessary. Old logs will not be removed, these will instead be left to decompose naturally to encourage the local stag beetles to breed here.
- 10.3 The applicant or applicant's management company should revisit the EMS annually to ensure that the management is following the methodology laid out in Section 8. Where there are concerns that the management is incorrect or not meeting the aims and objectives set out in the EMS, an ecologist should be consulted, and review of the management carried out to inform any changes.
- 10.4 Any changes to the management regime should be recorded and full justification given in a revised EMS to be provided to the LPA for their approval.

11 Conclusion

- 11.1 This Ecological Mitigation Strategy details the measures to be taken to safeguard protected species at Arundel Road, Angmering. Providing the mitigation detailed in Section 7 is implemented the approved development will remain compliant with relevant biodiversity legislation. In the context of Chapter 15 of the NPPF the enhancements and management in Section 7 and 8 of this report will ensure the approved development will remain compliant with this policy, ensuring the longevity and potential increase in the biodiversity present.

12 References

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The Ecology Co-op (2015) Phase 1 Habitat and Ecology Assessment and Phase 2 bat and reptile surveys.

The Ecology Co-op (2018) Updated Preliminary Ecological Appraisal.

13 Appendices

Appendices

Appendix 1: Emorsgate Wildflower Mixes

Appendix 2: Hibernacula and Log Pile Diagram

Appendix 3: Reptile Fence Specification

Appendix 4: Schedule

Appendix 1. Emorsgate Wildflower Mixes

Mixture EM6 contains wildflowers suitable for chalky soils and specifically beneficial to pollinators for the wildflower area.

EM6 – Meadow Mixture for Chalk and Limestone Soils

www.wildseed.co.uk/mixtures/view/7

Composition

This rich mixture is suitable for sowing onto thin lime-rich soils of low fertility and with a significant chalk or limestone content. Sowing EM6 directly onto exposed chalk or limestone can produce some of the most interesting results; establishment will be slower than on well developed soils, but less management will be needed.

Wild Flowers

%	Latin name	Common name
0.5	<i>Achillea millefolium</i>	Yarrow
0.8	<i>Anthyllis vulneraria</i>	Kidney Vetch
1.5	<i>Centaurea nigra</i>	Common Knapweed
1.5	<i>Centaurea scabiosa</i>	Greater Knapweed
0.4	<i>Clinopodium vulgare</i>	Wild Basil
1	<i>Daucus carota</i>	Wild Carrot
2	<i>Galium verum</i>	Lady's Bedstraw
1	<i>Knautia arvensis</i>	Field Scabious
0.4	<i>Leontodon hispidus</i>	Rough Hawkbit
1	<i>Leucanthemum vulgare</i>	Oxeye Daisy
0.6	<i>Lotus corniculatus</i>	Birdsfoot Trefoil
1	<i>Onobrychis viciifolia</i>	Sainfoin
0.2	<i>Origanum vulgare</i>	Wild Marjoram
1	<i>Plantago media</i>	Hoary Plantain
2	<i>Poterium sanguisorba</i> - (<i>Sanguisorba minor</i>)	Salad Burnet
0.5	<i>Primula veris</i>	Cowslip
2	<i>Prunella vulgaris</i>	Selfheal
1	<i>Ranunculus acris</i>	Meadow Buttercup
1	<i>Ranunculus bulbosus</i>	Bulbous Buttercup
0.5	<i>Reseda lutea</i>	Wild Mignonette
0.1	<i>Scabiosa columbaria</i>	Small Scabious

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Grasses

%	Latin name	Common name
2	<i>Briza media</i>	Quaking Grass (w)
32	<i>Cynosurus cristatus</i>	Crested Dogtail
24	<i>Festuca ovina</i>	Sheep's Fescue
12.8	<i>Festuca rubra</i>	Red Fescue (w)
4.8	<i>Koeleria macrantha</i>	Crested Hair-grass (w)
4	<i>Phleum bertolonii</i>	Smaller Cat's-tail (w)
0.4	<i>Trisetum flavescens</i>	Yellow Oat-grass (w)

ESF2 is a mix specifically designed for bees, this mix will be sown on the bee bank.

ESF2 – Wild Pollen and Nectar Flowers

www.wildseed.co.uk/mixtures/view/51

Composition

Pollen and nectar is provided by a wide range of wild flowers. ESF2 contains species that have been shown to be particularly important to bumblebees like red clover and birdsfoot trefoil as well as open flowered plants like wild carrot and oxeye daisy which are important for other beneficial insect groups such as hoverflies. ESF2, if sown with a grass mix, can develop into flower-rich stable grassland. With the longer lived genuine wild red clover and other plants it offers a long lived sustainable alternative to the short-lived pollen and nectar mixtures based on agricultural forage varieties.

Wild Flowers

%	Latin name	Common name
6	<i>Achillea millefolium</i>	Yarrow
15	<i>Centaurea nigra</i>	Common Knapweed
5	<i>Daucus carota</i>	Wild Carrot
3	<i>Knautia arvensis</i>	Field Scabious
8	<i>Leucanthemum vulgare</i>	Oxeye Daisy
10	<i>Lotus corniculatus</i>	Birdsfoot Trefoil
4	<i>Malva moschata</i>	Musk Mallow
2	<i>Primula veris</i>	Cowslip
15	<i>Prunella vulgaris</i>	Selfheal
16	<i>Ranunculus acris</i>	Meadow Buttercup
10	<i>Silene dioica</i>	Red Campion
1	<i>Trifolium pratense</i>	Wild Red Clover
5	<i>Vicia cracca</i>	Tufted Vetch

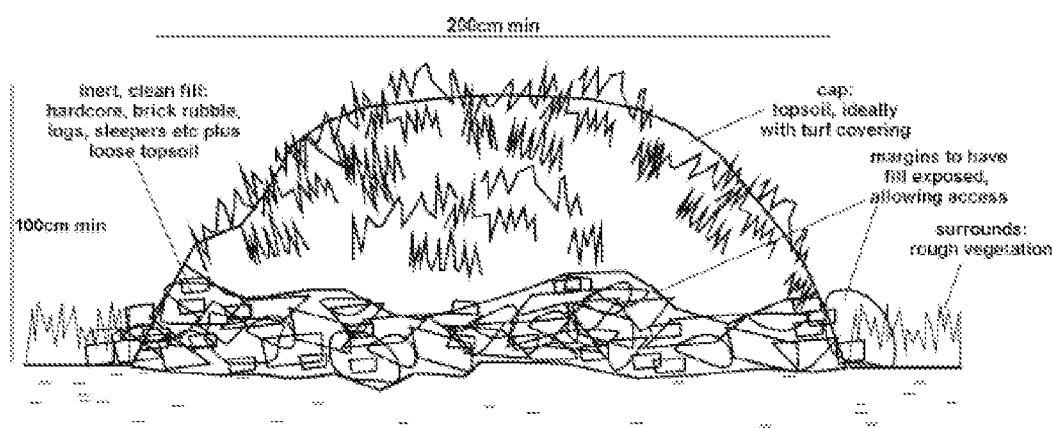
Appendix 2. Hibernacula & Log Pile Diagram

Hibernacula

Suggested Hibernacula Design (After English Nature, 2001)

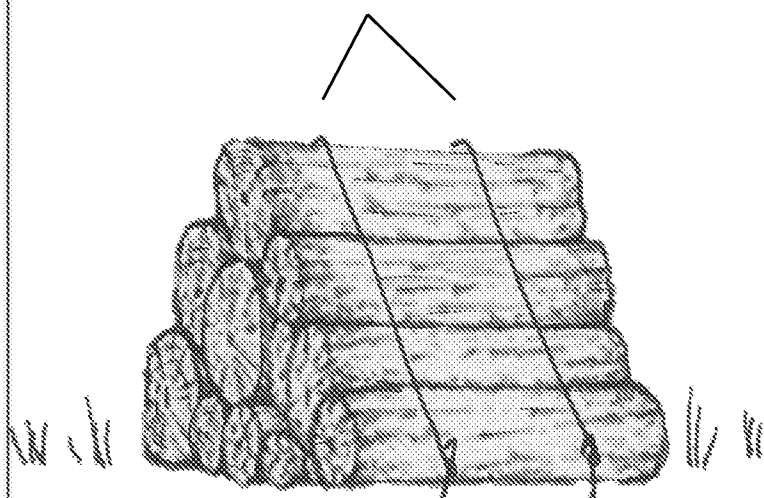
The design mimics artificial and natural conditions in which herptiles have been found over wintering. Dimensions should not be below 2m length x 1m width and 1m height.

Hibernacula should be placed on free draining surfaces, with the the fill located in an excavated depression in the ground above the flood line.



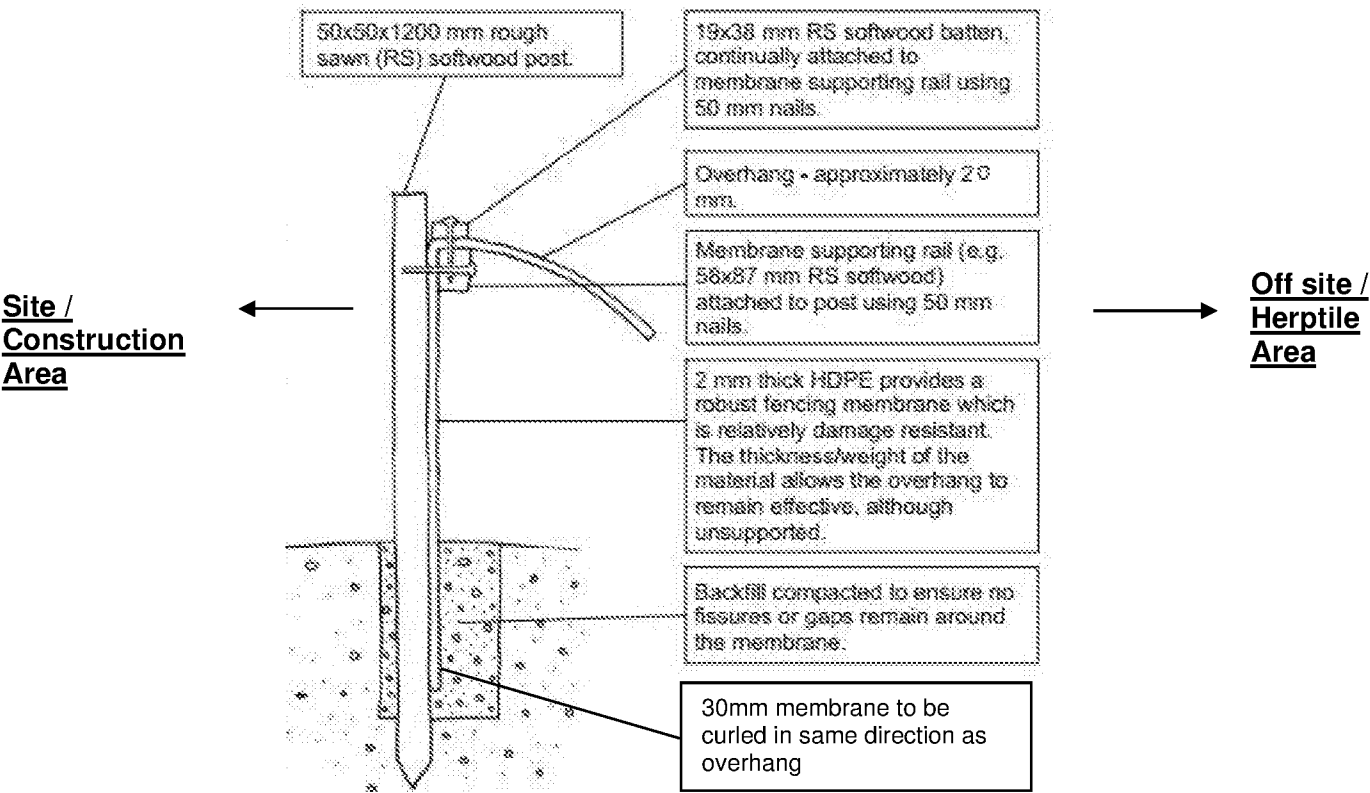
Log Pile

Logs tied down with wire, kept taut and pinned to the ground with pegs.



Log piles to be stacked in existing grassland habitat, in unshaded position, preferably south facing. Log piles to be formed from native arisings following tree felling, or locally sourced native hardwood.

Appendix 3. Reptile Fence Specification



Appendix 4. Schedule

Appendix 4: Mitigation and Management Schedule

Habitat/Species	Timeframe	Task	Oct-19	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reptiles	Pre-construction	Displacement															
Ash Tree Felling	Pre-construction	Soft Fell															
Hedge/Shrub	Pre-construction	Clearance															
Log Piles/Hibernacula	Pre-construction	Building															
Meadow/Bee Bank	Construction	Planting															
Trees/hedges/scrub	Construction	Planting															
Badger/hedgehog	Construction	Install gaps to fencing															
Amenity Grass	Post-construction	Cutting															
Meadow cutting	Post-construction	Cutting															
Log Piles/Hibernacula	Post-construction	Check and rebuild as required															
Hedge/Tree	Post-construction	Management Cutting															
All areas	Post-construction	Annual Monitoring, in 1st year by ecologist															

Key

Optimal Time

Requires Ecological Supervision