LAND AT ARUNDEL

Phase 2 Survey Report



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Phase 2 Survey Report
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EXECUTIVE SUMMARY

Executive summary should include:

- RPS was commissioned by Redrow Homes to undertake Phase 2 surveys for bats (emergence/re-entry), hazel dormouse and great crested newts at land at Arundel, Angmering, Littlehampton, BN16 4ET.
- The application site is located on the northern edge of Angmering village, with arable farmland directly to the south. The site is accessed off Arundel Road. The site is 1.9 hectares, and at the time of the 2021 surveys the site comprised 16 existing buildings, hardstanding, semi-improved grassland, native hedgerow, scrub amenity grassland and one pond.
- In 2018, a Preliminary Ecological Appraisal (PEA) was conducted by CSA Environmental (refer to Appendix A) for the wider site and a following Mitigation and Enhancement Strategy (refer to Appendix B). Phase 2 surveys conducted by CSA Environmental were carried out for reptiles, great crested newt, badger, bats and hazel dormouse within the wider site.
- Dormice were recorded on site in 2018 and 2021. Suitable site habitat which supports dormice will be impacted by the proposed development. Therefore, an EPSML application for hazel dormouse from Natural England will be required prior to the commencement of any works related to the proposed development. Existing hazel dormouse habitat (hedgerows) will be retained and enhance by the infilling of any gaps; the replacement habitat creation to mitigate the loss of any suitable hazel dormouse habitat will be incorporated in the landscape scheme within the 0.4 ha of new planting that will form the 5 m green buffer along retained hedgerows.
- A number of buildings on the site have potential to support roosting bats and updating internal inspection confirm that their status remains the same as per previous surveys (Buildings, B2, B8, B9 and B13). Buildings B3 and B4 are historically confirmed roosts however updating surveys did not discover any current evidence of roosting bats and will therefore not require a protected species licence. Building B1 was subject to emergence/re-entry surveys in 2022 and no roosting bats were confirmed present at the time of survey.
- Buildings B3 and B4 were re-surveyed in 2021 and no bats were found to be emerging or re-entering from the roosts and therefore a Natural England Protected Species Mitigation Licence is not required.
- A pre-works check will be required on all buildings on the site with potential to support roosting bats. These include Buildings B1, B2, B3, B4, B8, B9 and B13.
- No GCN eDNA was reported in the four surveyed ponds within the surrounding habitat.
- Although a protected species licence is not required for sites supporting the common and widespread reptile species, in order to comply with legislation habitat manipulation methods are recommended in order to avoid killing and injury. These methods involve reducing the suitability of the habitat for reptiles and therefore encouraging them to move out of the area to adjacent suitable habitat.
- A 20 meter buffer zone will be implemented around active badger setts to prevent disturbance.
- Clearance of habitat that holds potential to support breeding birds (in particular scrub, hedgerows, and woodland), precautionary measures have been provided in this report.

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Appendix B: CSA Environmental Mitigation and Enhancement Strategy
Appendix C: RPS Site Walkover Report
Appendix D: GCN eDNA Analysis

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1 INTRODUCTION

1.1 Purpose and scope of this report

1.1.1 RPS was commissioned by Redrow Homes to undertake Phase 2 surveys for hazel dormouse *Muscardinus avellanarius,* bats, great crested newts *Triturus cristatus*, and badgers at land at Arundel, Angmering, Littlehampton, BN16 4ET for a Reserved Matters application.

1.1.2 The aims of this report are therefore to:

- Identify the presence of protected species (Phase 2 Protected Species Surveys) and the habitats utilised by any protected species on site;
- Assess population sizes of protected species, if present, on site;
- Provide an assessment of potential direct or indirect impacts of the development on the population status of any protected species present;
- Provide outline details of mitigation required for protected species, as appropriate, in context with wildlife legislation; and
- Provide recommendations for biodiversity enhancements in line with national and local planning policy.
- Following results from the previous bat roost assessment (refer to Appendix A) and results from the updated site walkover (refer to Appendix C), five buildings were identified as having potential for supporting roosting bats (Building B1, Building B2, Building B3 and Building B14) and two buildings confirmed bat roosts (Building B3 and Building B4).

1.2 Site Description

1.2.1 The application site is located on the northern edge of Angmering village, with recreational / amenity grassland to the immediate south. The site is 9.1 hectares and at the time of survey was mixed use, comprising agricultural, industrial, and residential use. This residential building is approved for demolition as part of the outline application. Two oak trees within the western boundary are protected by a Tree Preservation Order (TPO).

1.3 Survey Background

1.3.1 In 2018, a Preliminary Ecological Appraisal (PEA) was conducted by CSA Environmental (refer to Appendix A) of the site. Phase 2 surveys were subsequently conducted by CSA Environmental were carried out for reptiles, great crested newt, badger, bats and hazel dormouse followed by a Mitigation and Enhancement Strategy which was submitted as part of a hybrid application for the wider site (refer to Appendix B).

1.3.2 A subsequent walkover survey of the whole site was carried out by RPS in 2021 (refer to Appendix C) and included a review of all the previous ecology survey work undertaken at the site. It was concluded that updated surveys would be required for bats, great crested newt, badgers and hazel dormouse.

1.3.3 Previous reptile surveys carried out by CSA in 2018 identified a low population of common lizard on site, along the field margins within grassland and scrub. These habitats and their management have not altered since the original surveys; therefore, it was concluded that the status of reptiles at the site was unlikely to have changed since the earlier survey and that no update to the reptile survey was needed.

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1.3.4 Whilst no additional survey was carried out for reptiles, recommendations regarding precautionary measures pertaining to reptile species are still included within this report based on the findings of the earlier reptile surveys.

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2 METHODS

2.1 Great Crested Newt – eDNA Survey

2.1.1 The waterbodies within 250m and 500m of the application site boundary were reviewed as well as the connecting terrestrial habitat between them, to identify suitable waterbodies to survey for presence of great crested newt (GCN) Triturus cristatus.

2.1.2 Nine known waterbodies were within 500m of the site boundary, none of which were within the site boundary. The respective landowners were approached on behalf of RPS and the client through the Land Agent, to request survey access. Access to survey waterbodies P1, P3, P5 and P6 (refer to Figure 2.1) was procured by the Land Agent. Ponds P2, P4 P7 and P8 were not accessible and were not surveyed.

2.1.3 Water samples were collected from the ponds P1, P3, P5 and P6 on the 12th May 2021, which is within the optimal survey period (i.e. considered to be between mid-April and the end of June) and during suitable weather conditions. The water samples were collected by experienced surveyors, including a GCN licensed ecologist.

2.1.4 The eDNA survey technique is set is out in the Analytical and Methodological Development for Improved Surveillance of the Great Crested Newt (Biggs *et al.*, 2014). The method has been developed for standing waterbodies, due to the potential in flowing waterbodies / watercourses for eDNA to be washed downstream from a sample location.

2.2 Hazel Dormouse Survey

2.2.1 A hazel dormouse nest tube survey was undertaken during the active season of 2021, following a methodology based on published best practice guidelines (Bright, Morris & Mitchell Jones 2006; Chanin & Woods 2003).

2.2.2 The initial survey set up was completed on 13th April 2021 by RPS hazel dormouse licensed ecologists and consisted of a total 50 hazel dormouse nest tubes deployed in areas of suitable habitat on site, shown on Figure 2.2.

2.2.3 Nest tubes were tied to suitable vegetation around the site following standard survey guidelines to provide nesting opportunities for any dormice present. The nest tubes consisted of stiff double walled black plastic (5 x 5cm in width and 25 cm long) with a plywood tray placed inside. These were suspended by wire onto the underside of horizontal tree branches.

2.2.4 Nest tubes were checked monthly at times when dormice will be active, between April and September 2021 (allowing the required one month for tubes to 'bed in'). Any signs of occupation or evidence of activity was recorded. All visits were carried out in suitable weather conditions. All survey visits, including tube deployment, were carried by hazel dormouse license holder Jo Balch (licence number 2016-22036-CLS-CLS) in suitable weather conditions (see Table 2.1 below).

Table 2.1 Hazel dormouse survey visit dates weather conditions.

Date	Weather Conditions	Temperature (°C)
30/04/2021	Dry, 50% cloud cover, wind (Beaufort Scale) 2.	22
12/05/2021	Dry, 40% cloud cover, wind (Beaufort Scale) 2.	20-22
09/06/2021	Dry, 10% cloud cover, wind (Beaufort Scale) 3.	18-20

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Date	Weather Conditions	Temperature (°C)
08/07/2021	Dry, 10% cloud cover, wind (Beaufort Scale) 4.	21-23
24/08/2021	Dry, 10% cloud cover, wind (Beaufort Scale) 4.	21-23
02/09/2021	Dry, 95% cloud cover, wind (Beaufort Scale) 2.	17-19

Survey Effort

2.2.5 The hazel dormouse survey guidelines provide recommendations on the minimum survey effort for presence / likely absence surveys. A method is outlined for quantifying survey effort based on the number of nest tubes used and the likelihood of encountering dormice during each month between April and November (when dormice are typically active).

2.2.6 Using this method, the months April through November are each allotted a value referred to as an 'index of probability' score reflecting the relative likelihood of dormice being detected in nest tubes in that month. The 'index of probability' scores for each month are given below in Table 2.2, the survey effort is calculated by totalling the index of probability scores for each month in which nest tubes are installed.

2.2.7 Following the table of probability of finding dormice in the Dormouse Conservation Handbook (Table 5 – Bright, T., Morris, P., Mitchell-Jones, T. 2006), this gives a score of 21, which is above the required minimum survey effort (score of 20) for a valid survey.

Table 2.2 Index of probability calculations for hazel dormouse.

Survey Month	Index of Probability (50 tubes)
April	1
May	4
June	2
July	2
August	5
September	7
Total Score for Site:	**21**

2.3 Badger Survey

Camera Trap Monitoring

2.3.1 A suspected badger sett was located adjacent to the site during the Preliminary Ecological Appraisal (CSA, 2018). The sett was monitored in 2021 for signs of badger activity over three weeks as part of a wider application and was found to be disused.

2.3.2 Further camera trap monitoring was undertaken for 21 days in July and August 2022.

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2.4 Bats

Buildings

2.4.1 Updating systematic external and internal inspections of buildings on-site were completed on the 2nd March 2022. The internal inspection of buildings was completed where safe access was available. Building locations are shown on Figure 3.2.

2.4.2 The internal inspection was undertaken on the 2nd March 2022 by Frances Morris (EPS Class 1 bat licence holder) accompanied by Assistant Ecologist Harriet Miles, to survey internally for bats. All loft spaces with safe access were surveyed internally using a Clulite and head torch. Loft voids, where safe to do so, were searched systematically for evidence of bats (droppings; feeding remains; fur/urine staining and live/dead bats). A summary of the findings for each building are provided below and surveys were undertaken within Good Practice Guidelines (Collins, 2016).

2.4.3 Structural features that may influence the suitability of a building to support roosting bats include the presence of a roof void, the presence of access points into the building (including gaps beneath barge boards, soffits and fascia boards, gaps under lead flashing, gaps within masonry and under loose tiles, gaps between mortise and tenon joints), the complexity and size of any roof voids and daytime light levels in the roof voids (Table 2.3 below).

2.4.4 The surrounding habitat can influence roost potential and notes were made on the setting of the tree/ building, its proximity to significant linear habitat features (such as a watercourse, mature hedgerow, wooded lane or an area of woodland) and other factors including artificial lighting.

2.4.5 Taking account of the architectural and habitat features, the buildings were assigned a level of roost suitability (Table 2.4 below) based the criteria given in the Bat Conservation Trust's Bat Surveys: Good Practice Guidelines (Collins, 2016) and professional judgement. The primary objective of this exercise was to identify the need for further detailed bat survey later in the year, or alternatively to obtain sufficient information that would dismiss the need for further assessment.

Table 2.3 Potential bat roosting features and evidence searched for in trees.

Potential Bat Roosting Features	Signs Indicating Possible Use by Bats
Natural holes	Live, dead or skeletons of bats
Woodpecker holes	Bat droppings in the roof void (particularly below ridge beam and apex
Cracks/splits in major limbs	Feeding remains e.g. insect wings
Loose bark	Tiny scratches around entry point
Hollows/cavities	Urine staining around entry point
Dense epicormic growth	Bat droppings in, around or below entry points
Bird and bat boxes	Audible squeaking at dusk or in warm weather
	Flies around entry point
	Distinctive smell of bats
	Smoothing of surfaces around a cavity

Table 2.4 Categories for bat roosting potential.

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Category	Criteria
Negligible Potential	No evidence, no suitable Potential Roost Features (PRFs)
Low Potential	No evidence of use, one or two features suitable for low numbers of bats, with very limited roosting potential. Limited connectivity to wider landscape with other bat habitats.
Moderate Potential	No evidence of use, several suitable features, but unlikely to support a roost type of high conservation status, connected to wider landscape with good foraging habitat.
High Potential	No evidence of use, but many suitable features for use by larger numbers of bats on a more regular basis and potentially for longer periods. Well connected to good foraging habitat and known roosts nearby.
Confirmed Roost	PRFs with evidence of use present, observation or previous records of bats confirmed to be roosting in the feature/building/tree.

Bat Emergence/re-entry Surveys

2.4.6 Following results from the previous bat roost assessment (refer to Appendix A) and results from the updated site walkover (refer to Appendix C) an updating PRA survey was conducted on 2nd March 2022, in which five buildings, in addition to Building B3 and Building B4 were identified as having potential roost features that could support roosting bats as per previous surveys in 2018; Building B1 had high potential to support roosting bats and Buildings B2, B8, B9 and B13 held moderate potential for supporting roosting bats. Please refer to Appendix A for building locations.

2.4.7 In 2021 emergence re/entry surveys were conducted on Building B3 and Building B4 and in 2022 on Building B1. RPS bat emergence/re-entry surveys were carried out in line with good practice guidelines as outlined by the Bat Conservation Trust (BCT) (see Table 2.3).

2.4.8 Surveys on Buildings B1, B3 and B4 were carried out utilising five bat surveyors, led by RPS Senior Ecologist Frances Morris, and three infra-red cameras paired with static detectors, positioned in locations to ensure features suitable for supporting bats were covered in all locations. Buildings B1, B3 and B4 were surveyed concurrently across three visits. Surveyor locations are shown on Figure 2.3. As Buildings B3 and B4 had previously identified pipistrelle roosts (refer to Appendix A), two emergence and one re-entry survey were carried out and since Building B1 was identified as having high potential for supporting roosting bats, two emergence and one re-entry surveys were carried out.

2.4.9 Dusk emergence surveys commenced 15 minutes prior to sunset and continued until 90 minutes after. The re-entry surveys commenced 90 minutes prior to sunrise and continued until 15 minutes after. Bat activity was recorded using Batlogger M detectors and notes taken to determine flight paths and any emergence/re-entry points. Echolocation calls were subsequently analysed using computer software (BatExplorer) for confirmation of species.

Table 2.5 Bat building survey dates for Building B3 and B4, weather conditions and surveyors.

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Survey	Date	Weather conditions	Sunset/ Sunrise Time	Start Time	End Time
Emergence	14/06/2021	Dry, 50% cloud, 21°C, wind B1	21:17	21:02	22:47
Emergence	08/07/2021	Dry, 70% cloud, 16°C, wind B2	21:15	21:00	22:45
Re-entry	22/07/2021	Dry, <10% cloud, 17°C, wind B1	05:14	03:44	05:44
Emergence	07/07/2022	Dry, <10% cloud, 21°C, Wind B0	21.16	21.01	22.46
Emergence	26/07/2022	Dry, <10% cloud, 22°C, Wind B1	20.57	20.42	22.27
Re-entry	09/08/2022	Dry, <10% cloud, 23°C, Wind B1	05.40	04.10	05.55

2.5 Limitations

Great Crested Newt – eDNA Surveys

2.5.1 Access to ponds within 500m from the site was not available for P2, P4 P7 and P8. However, ponds P1, P3, P5 and P6 were able to be surveyed. Ponds P4 and P8 were previously identified as having poor suitability to support GCN (refer to Appendix A), these ponds would therefore not have been included in the updated survey suite for 2021.

2.5.2 Of the eight ponds in the survey area, only five were deemed suitable habitat to support GCN, of which four were surveyed. Therefore, these limitations are not considered to be a significant constraint on the survey.

Accurate Lifespan of Ecological Data

2.5.3 The majority of ecological data remain valid for only short periods due to the inherently transient nature of the subject. The survey results contained in this report are considered accurate for [two] years, assuming no significant considerable changes to the site conditions.

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3 RESULTS

3.1 Great Crested Newt

3.1.1 No GCN eDNA was recorded in any of the water samples collected from the surveyed waterbodies (P1, P3, P5 or P6). The full results of the eDNA analysis are provided in Appendix D.

3.1.2 The sample integrity check undertaken by the ADAS laboratory confirmed that all water samples passed integrity tests and there were sample quality or contamination factors that might invalidate the results.

3.2 Hazel Dormouse Surveys

Habitat Description

3.2.1 Suitable hazel dormouse habitat is present within the site, within the northern and western boundaries. An area of dense scrub within the centre of the site has suitability for supporting hazel dormouse.

Survey Results

Table 3.1 Survey Results of hazel dormouse nest tube survey.

Visit Number	Date	Survey Results
1	30/04/2021	No evidence found.
2	12/05/2021	Adult hazel dormouse in nest, in nest tube 30.
3	09/06/2021	Adult hazel dormouse in nest, in nest tube 30.
4	08/07/2021	Adult hazel dormouse in nest, in nest tube 12. Empty dormouse nest in tube 30 and 25.
5	24/08/2021	Adult hazel dormouse in nest, in nest tube 12. Empty dormouse nest in tubes 30 and 25.
6	02/09/2021	Empty hazel dormouse nests in tubes 11, 21, 22, 25, and 30.

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3.3 Bats

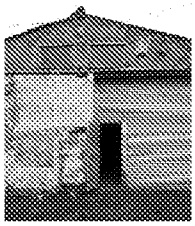
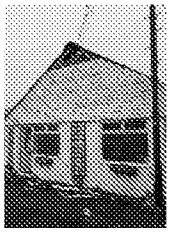
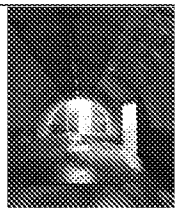
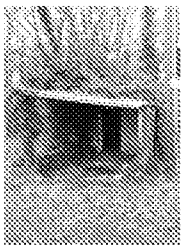
Buildings

3.3.1 Internal inspections on the 2nd March 2022, confirmed that the status of Buildings B2, B3, B4, B8, B9 and B13 were the same as previously surveys (RPS, 2021).

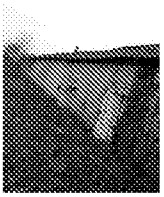
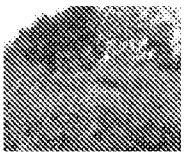
3.3.2 Access was not available to Building B1 at the time of survey.

3.3.3 Buildings B10, B11 and B14 were no longer present and all other buildings were confirmed as having negligible potential for supporting roosting bats.

Table 3.3 Descriptions of buildings with bat roost potential at Land at Arundel

Building ref	Descrition and features	Roost potential	Comments	Photograph
B1	Residential bungalow in use. Hipped roof and wooden soffit box. Loose roof tiles and hgaps under tiles in multiples locations.	High	No access	N/A no access
B2	Breezeblock construction with corrugated asbestos pitched roof. Gap at apex on northern end. Gaos under metal cladding and under subsided areas of roof.	Moderate	Building empty and no longer in use. Pre-works check required.	
B3	Two storey, brick construction with asbestos pitched roof. Gappy plastic weather boarding on eastern side which has been openend up at time of updating PRA.	Historical roost	Pre-works check required.	
B4	Single storey building comprising four round roofed sections. Numerous gaps behind weatherboarding, in moarter and at tops of walls.	Historical roost	Pre-works check required.	
B8	L shaped out building covered in heavey ivy growth. Ash tree growing from building. Gap between metal and bitumen liner.	Moderate	Building no longer in use. Pre-works check required.	

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Building ref	Descrition and features	Roost potential	Comments	Photograph
B9	Single storey, breeze block building with corrugated asbestos pitched roof. Gaps along eaves on all aspects. Hole into roofspace on northern aspect.	Moderate	Building no longer in use. Pre-works check required.	
B13	Single storey barn with partially collapsed roof covered with dense ivy	Moderate	Inacessable – tree felled over building. Pre-works check required.	

Emergence/re-entry Surveys

3.3.4 Bats were not recorded emerging or re-entering from Buildings B1, B3 or B4 during any of the survey visits. General bat activity onsite was very low, with only the occasional recording of foraging common pipistrelle and commuting noctule *Nyctalus noctula* bat.

3.3.5 It is recommended that prior to demolition, a pre-works check is completed on the remaining buildings on site with potential for supporting bats (Buildings B1, B2, B3, B4, B8, B9 and B13) to ensure that bat remain absent as per the updating surveys in 2021/2022 and emergence/re-entry surveys in 2018.

4 EVALUATION AND POTENTIAL IMPACTS

4.1 Great Crested Newt

4.1.1 The eDNA surveys for waterbodies P1, P3, P5 and P6 were all negative for the presence of GCN eDNA. The site contains limited suitable habitat for GCN, mainly in the dense scrub and hedgerow habitat on site. They may on occasion utilise grassland for dispersal if in the area.

4.1.2 Previous surveys (refer to Appendix A) found that five of the eight ponds within the surrounding area contain suitable habitat to support GCN. Four of these ponds (P1, P3, P5 and P6) have confirmed negative eDNA results for GCN (RPS, 2021) indicating GCN are very unlikely to use these ponds. **Therefore, it is concluded that the proposed development will have negligible impact on GCN.** Please see section 2.4 for limitations.

4.2 Hazel Dormouse

4.2.1 Dormice have been found to be present in two hedgerows outside the site boundary but within the ownership boundary. The levels of activity and presence of individual animals suggest that there is a population of dormice across the site, utilising connected hedgerows. Whilst evidence of dormice was found predominantly outside the redline boundary, these were connected to surrounding hedgerows, on site scrub and the woodland off site to the north west with the western hedgerow giving connectivity to the south. Therefore, it is appropriate to assume dormice could be present in all suitable connecting habitat on site and within the wider area off site, and not restricted to hedgerows.

Potential Impacts – Habitat Loss

4.2.2 The proposed development is designed to retain all of the hedgerows on site; however, the scrub habitat will be lost under current proposals.

4.2.3 The area of dense scrub within the site boundary will be removed as part of the proposed development. Due to the presence of dormice in the wider area and the connectivity present between habitats both on and off site, **the loss of any suitable hazel dormouse habitat has the potential to negatively impact dormice within the site.** Therefore, suitable mitigation will be provided, including an application for a European Protected Species Mitigation Licence (EPSML) for hazel dormouse which will be required prior to the commencement of any works related to the proposed development. The mitigation for the loss of the sub-optimal scrub habitat will include the planting of scrub, native shrubs and trees within a 5m green buffer planting along the northern, western and southern site boundaries. Detailed mitigation and enhancement for hazel dormouse will be specified in the European Protected Species Mitigation Licence (EPSML) method statement for the site.

Potential Impacts – Disturbance

4.2.4 Increased human activity occupying proposed new residential dwellings will result in an increase in disturbance to the hazel dormouse population.

4.2.5 Increased lighting, traffic movements and general human activity, particularly during the evening and night periods when dormice would normally be active will be likely to have some effects on the hazel dormouse population. The development is on the edge of Angmering village; however, the site is located mainly within a rural setting, therefore, an increase in residential properties and the potential increase of domestic cats to the area will have a negative impact of the local hazel dormouse population.

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4.3 Bats

Building B3 and B4

4.3.1 Previous bat emergence/re-entry surveys recorded bat roosts in Buildings B3 and B4. A single common pipistrelle *Pipistrellus pipistrellus* was seen emerging from under a ridge tile on Building B3 on the 6th June 2018 and a soprano pipistrelle *Pipistrellus pygmaeus* seen emerging from a gap in brickwork in Building B4 on the 12th June 2018.

4.3.2 These two buildings were re-surveyed this season and no bats were found to be emerging from the roosts and therefore a Natural England Protected Species Mitigation Licence is not required.

4.3.3 It is recommended that a pre-works check is completed by a licenced bat ecologist prior to works to ensure there is no evidence of bats. If evidence of bats is discovered, work will cease and a Natural England Low Impact Class Licence applied for.

Buildings B1, B2, B8, B9 and B13

4.3.4 Building B1, B2, B8, B9 and B13 have high and moderate potential to support roosting bats respectively. Previous surveys conducted in 2018 did not find any roosts present in buildings B1 and B2 (refer to Appendix A) and survey carried out in 2022 on Building B1 did not find any roosts.

4.3.5 Updating internal inspections were completed on the 2nd March 2022 and no evidence of bats were found inside any of the buildings.

4.3.6 Previous internal surveys of the buildings B1, B2, B8, B9 and B13 were completed in 2017 and no evidence of bats was found.

4.3.7 Although the survey data for buildings B2, B8, B9 and B13 is currently out of date, there is a low probability of a bat roost of significant conservation status becoming established between 2018 (date of previous surveys) and present.

4.3.8 A pre works check is recommended prior to demolition and if any evidence of bats is found, works much cease and a suitably licenced ecologist contacted to conduct further emergence/re-entry surveys on the buildings.

4.4 Badgers

4.4.1 The site contains suitable habitat for foraging and commuting badger and 2022 camera trap surveys confirmed badger present. The site boundary is open to allow badgers access onto site from the adjacent surrounding habitat and wider area. The construction phase of proposals has the potential to **negatively impact commuting or foraging badgers, therefore precautionary measures are required to ensure no badgers are harmed during the construction phase of works.**

4.5 Reptiles

4.5.1 A small population of common lizard *Zootoca vivipara* was previously identified on site (CSA, 2018). Habitats on site with potential to support common and widespread reptiles, included the hedgerows and areas of scrub. Without mitigation, the removal of habitat suitable for supporting reptiles is likely to impact common and widespread reptiles. Recommendations are made below in Section 5.

4.5.2 As the habitat conditions, since the previous survey, have not drastically altered, it is reasonable to assume the presence of common reptiles and population size has not changed significantly either. Therefore, recommendations pertaining to reptiles have been provided in Section 5 of this report, to

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ensure the proposed development does not have a significant negative impact on reptile populations.

4.6 Breeding Birds

4.6.1 The hedgerows and mixed scrub on site have the potential to support breeding birds. Therefore, recommendations for timings of works have been included within Section 5 of this report to avoid disturbing nesting birds during any demolition of buildings or clearance of vegetation.

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5 RECOMMENDATIONS AND MITIGAITON REQUIREMENT

5.1.1 Following the results of this report and the previous survey reports, RPS have produced an updated Ecological Mitigation and Enhancement Strategy (RPS, 2021), to provide advised timings, method statements and precautionary measures that are proportionate to the results found from RPS surveys and previous surveys conducted by CSA Environmental (RPS, 2021).

5.2 Reptiles

5.2.1 All common UK reptile species (adder *Vipera berus*, grass snake *Natrix Helvetica*, common lizard and slow worm *Anguis fragilis*) are protected through part of Section 9(1 and 5) of the Wildlife & Countryside Act 1981 (as amended). This prohibits:

- Intentional or reckless injuring or killing;
- Selling, offering or exposing for sale, or having in possession or transporting for the purpose of sale, any live or dead wild animal or any part of, or anything derived from, such an animal; or
- Publishing or causing to be published any advertisement likely to be understood as conveying buying or selling, or intending to buy or sell, any of those things.

5.2.2 Although a protected species licence is not required for sites supporting the common and widespread reptile species, in order to comply with legislation habitat manipulation methods are recommended in order to avoid killing and injury. These methods involve reducing the suitability of the habitat for reptiles and therefore encouraging them to move out of the area to adjacent suitable habitat.

5.2.3 Any cutting of suitable grassland vegetation on site will take place during the reptile hibernation period (November-February inclusive) so that when reptiles emerge in the spring, they will move out of the area to more suitable habitat. Cuttings will not be left on site and removed before the start of the reptile active period in March.

5.2.4 Suitable hibernation habitat (bases of hedgerows and scrub base/below ground) and refugia such as log piles, rubble and tree stumps will not be removed during the winter. During the reptile active period (March – October) any hibernacula will be dismantled by hand with an Ecologist Clerk of Works (ECoW) present to perform hand searches prior to and during the dismantling, with any animals found moved to adjacent suitable habitat.

5.2.5 If the cutting of vegetation is required during the reptile active period, a cut to 30 cm above ground level (no lower) would be required at least 24 hours prior to works to encourage animals to leave the area.

5.2.6 This method may require consideration to nesting birds within the core nesting season (March – August inclusive). Areas to be cut during the bird nesting season and reptile active period will be searched by an ECoW before any cutting commences.

5.2.7 Any reptiles that are caught during the clearance process can be moved into safe, suitable adjacent habitat away from the works area.

5.2.8 The above methods for habitat clearance will also be applicable to common amphibian species.

5.3 Hazel Dormouse

5.3.1 Hazel dormice are fully protected under Schedule 2 of the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and are also protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion in Schedule 5.

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5.3.2 Hazel dormice are also listed on Section 41 of the NERC Act 2006 as a Species of Principal Importance; national objectives & targets include the maintenance of the geographical range and viability of existing Dormice populations to ensure that it remains in favourable conservation status.

5.3.3 Dormice have been recorded adjacent to the site, and suitable habitat which supports dormice will be impacted by the proposed development. Therefore, an EPSML application for hazel dormouse will be required prior to the commencement of any works related to the proposed development.

5.3.4 Requirements for a future licence application are detailed below, including habitat management and recommended measures to avoid disturbance during and post construction.

5.3.5 The EPSML licence will consider future development within the wide site as part of the original hybrid application. The licence will be completed for each phase and updated with Natural England as required.

Mitigation Licence

5.3.6 Three tests must be satisfied before this licence (to permit otherwise prohibited acts) can be issued:

1) Regulation 44(2)(e) states that licences may be granted to "preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.
2) Regulation 44(3)(a) states that a licence may not be granted unless "there is no satisfactory alternative".
3) Regulation 44(3)(b) states that a licence cannot be issued unless the action proposed "will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range".

5.3.7 These tests will need to be addressed in a formal EPSML application to Natural England. Planning permission and the discharge of all relevant wildlife related planning conditions is usually required before Natural England will issue a licence. .

5.3.8 In order to comply with the third test of Regulation 44, the proposed development must ensure the favourable conservation status of the dormice population onsite during the development period and after its completion. The level of mitigation must also be proportional to the ecological impact of the development (Mitchell-Jones, 2004).

5.3.9 This strategy will include the following elements which will form the basis of a detailed method statement to accompany the EPSML application:

- Avoiding killing and injury of dormice during the development;
- Retention and enhancement of habitat suitable to support dormice within the site;
- Provision of habitat suitable to support dormice within the proposed landscaping scheme;
- Ensure no net loss of any habitat lost due to the development;
- Avoid any disturbance, damage, and obstruction of retained habitat within the site to minimise impact to dormice population onsite; and
- During and post construction monitoring to determine success of the mitigation and compensation measures.

5.3.10 The EPSML application will include the proposed works. No works will be undertaken until a licence has been granted by Natural England. Licence applications will be written and submitted on receipt of planning permission. Timings of all licensable activities will be programmed to minimise disturbance impacts. The works will be undertaken at times of year in order to minimise the disturbance to dormice that could be disturbed by the works.

5.3.11 Risks to individual dormice during the construction activity can be mitigated by imposition of a strict policy protecting all retained hedgerows and retained areas of vegetation.

5.3.12 Measures to carry out any habitat clearance would be carried out using a methodology which would avoid potentially active periods /seasons for dormice (detailed in Dormouse Habitat section below).

Hazel Dormouse Habitat

5.3.13 It is advised that the proposed development will avoid damage or removal of the majority of hazel dormouse habitat present onsite and strengthen existing and retained habitat wherever possible.

5.3.14 Where habitat suitable for supporting hazel dormouse such as scrub and hedgerow will be impacted, a European Protected Mitigation Licence will be required.

5.3.15 The lighting design will need to be sympathetic and ensure that light-spill onto existing hedgerows and wooded areas will be minimised, to reduce potential effects from increased lighting.

5.4 Bats

5.4.1 All British bat species are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981, as updated by the Countryside and Rights of Way Act 2000. All British bats are also included on Schedule 2 of The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 as European Protected Species. It is an offence to:

- intentionally or recklessly kill, injure or capture bats;
- deliberately or recklessly disturb bats (whether in a roost or not); and
- damage, destroy or obstruct access to bat roosts.

5.4.2 A roost is defined as 'any structure or place which [a bat] uses for shelter or protection'.

5.4.3 As bats were not identified during the updating surveys a licence is not required, however a pre-works check is required on all buildings with potential for supporting bats to ensure there is still no evidence of roosting bats following the update surveys in 2021/2022.

Further Survey

5.4.4 It is recommended that prior to demolition of buildings B1, B2, B3, B4, B8, B9 and B13 a pre-works check is carried out to inspect for evidence of bats due to their transient nature and previous presence on the site. If evidence of bats is discovered then further emergence.re-entry surveys will be required prior to demolition.

Lighting

5.4.5 It is also recommended that a lighting strategy is incorporated into the proposals, to ensure that the lighting of any retained habitat features suitable for protected species (such as the tree line and hedgerows) is avoided or reduced to lower the impact on species utilising the site. It is anticipated that such information can be conditioned as part of the planning approval.

5.5 Badger

5.5.1 Badgers are protected under the Protection of Badgers Act 1992 which makes it an offence to intentionally kill, injure or take a badger or intentionally or recklessly damage, destroy or obstruct access to a sett or disturb a badger whilst it is occupying it.

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5.5.2 The majority of the site is suitable habitat for foraging and commuting badgers, and an active outlier sett was identified adjacent to the site. The location of the sett is outside of the application boundary but within the ownership boundary.

5.5.3 A 20 meter buffer will be implemented around the sett during the construction phase to protect badgers from disturbance.

5.5.4 Measures are recommended to ensure no injury will come to foraging or commuting badgers around the site. Any holes, trenches or pits dug during construction will be fenced off and all holes will either have a mammal ramp provided (sturdy ramp or wide plank of wood) or be fully covered overnight to avoid individuals becoming trapped inside. In the event that badgers are found to be trapped or injured within the site no attempt should be made to approach the badger and the RSPCA should be contacted immediately.

5.6 Nesting Birds

5.6.1 All active bird nests and their eggs/young are protected whilst actively nesting under the provisions of the WCA 1981, (as amended). Clearance of bramble, scrub and woodland will have the potential to damage active nests. Timing of the works and / or inspections prior to clearance will be required to ensure that the works comply with the provisions of the WCA 1981, (as amended).

5.6.2 Clearance of habitat that holds potential to support breeding birds (in particular scrub, hedgerows, and woodland) will avoid the bird nesting season (March to August inclusive). If this is not possible removal will occur under the supervision of a suitably qualified ecologist (ECoW) who will check for any active nests. If found to be present, a buffer zone, where no development activities will occur, will be cordoned off by the supervising ecologist until the young have fledged.

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6 ENHANCEMENT OPPORTUNITIES

6.1.1 The NPPF requires that the local planning authority should aim to enhance biodiversity when determining planning applications and opportunities to incorporate biodiversity in and around developments should be encouraged. Further recommendations for enhancing the biodiversity of the site are provided for protected species.

6.2 Invertebrates, Amphibians and Reptiles

6.2.1 The installation of three invertebrate boxes will be provided within the proposals.

6.2.2 The creation of five wood log piles will be created from wood fallen or felled on site in appropriate locations within the landscaping scheme as this will provide habitat for a range of species including reptiles, amphibians and saproxylic invertebrates and small mammals.

6.2.3 One hibernaculum will also be created under ecological specification to provide hibernation habitat for amphibians and reptiles.

6.3 Hazel Dormouse

6.3.1 Twenty wooden hazel dormouse nest boxes will be placed at suitable locations within the existing retained hedgerow that borders the woodland to the north of the site and within hedgerow on site, with a 5 m buffer of new habitat. This will ensure that there are features providing additional nesting habitat. The boxes be monitored under the conditions of the EPSML for dormice.

6.3.2 The planting of additional native fruit or nut bearing tree and shrub planting within the proposed development will increase the availability of suitable habitat for dormice as the planting establishes and matures. The planting should be completed in areas connected to existing and retained hedgerow habitat with a screening buffer from any residential properties.

6.3.3 This will offer both increased habitat area but will also maintain and strengthen all existing habitat linkages, ensuring that all parts of the site remain accessible to the species.

6.4 Bats

6.4.1 Ten bat boxes will be positioned on retained mature trees to provide additional roosting habitat for bats. The locations of these can be seen in Figure 2.4 below.

6.4.2 The landscaping proposals for the development will include native planting of fruit or nectar –bearing and night-scented plants, such as night-scented jasmine *Casdtrum noctorburn*, evening primrose *Oenothera* spp., or tuberose *Poluanthes tuberosa*. This additional planting will help attract night-flying insects and therefore providing a regular source of food for foraging bats.

6.5 Birds

6.5.1 The provision of three bird boxes will be located on mature trees withing the site boundary which will provide additional nesting opportunities on site. The locations of these can be seen in Figure 2.4 below.

6.6 Other Species

6.6.1 Any new fences to be installed as part of the proposed development will have a gap at the bottom of 20 cm, or a hole of 15 cm x 15 cm, to allow for habitat connectivity (foraging routes) throughout the garden and into wider habitat for mammals (such as hedgehog) and reptile species.

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6.6.2 Additionally, the incorporation of five hedgehog houses will be placed at the base of retained hedgerows, within the 5 m new habitat buffer, along the northern boundary adjacent to woodland off site to the north.

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7 CONCLUSIONS

7.1.1 RPS was commissioned by Redrow Homes to undertake Phase 2 surveys for hazel dormouse and great crested newts at land at Arundel, Angmering, Littlehampton, BN16 4ET.

7.1.2 The application site is located on the northern edge of Angmering village, with arable farmland directly to the south. The site is accessed off Arundel Road. The site is 1.2 hectares, and at the time of the 2021 surveys the site comprised part of an arable field and an area of dense scrub with a boundary hedgerow adjoining off-site woodland

7.1.3 In 2018, a Preliminary Ecological Appraisal (PEA) was conducted by CSA Environmental (refer to Appendix A) for the wider site and a following Mitigation and Enhancement Strategy (refer to Appendix B). Phase 2 surveys conducted by CSA Environmental were carried out for reptiles, great crested newt, badger, bats and hazel dormouse within the wider site.

7.1.4 Hazel dormice were recorded on site in 2018 and 2021. Suitable site habitat which supports dormice will be impacted by the proposed development. Therefore, an EPSML application for hazel dormouse from Natural England will be required prior to the commencement of any works related to the proposed development. Existing hazel dormouse habitat (hedgerows) will be retained and enhance by the infilling of any gaps; the replacement habitat creation to mitigate the loss of any suitable hazel dormouse habitat will be incorporated in the landscape scheme within the 0.4 ha of new planting that will form the 5 m green buffer along retained hedgerows.

7.1.5 Three emergence re-entry surveys were carried out on Building B1 in 2022 and roosting bats were not identified.

7.1.6 Buildings B2, B8, B9 and B13 were all subject to internal inspection on the 2nd March 2022 and the status is confirmed the same as per previous surveys. A pre-works check is recommended prior to demolition and if presence of bats found, further emergence/re-entry surveys completed.

7.1.7 Buildings B3 and B4 were re-surveyed in 2021 and no bats were found to be emerging or re-entering from the roosts and therefore a Natural England Protected Species Mitigation Licence is not required.

7.1.8 It is recommended that a pre-works check is completed by a licenced bat ecologist prior to works to ensure there is no evidence of bats. If evidence of bats is discovered, work will cease and a Natural England Low Impact Class Licence applied for.

7.1.9 No GCN eDNA was reported in the four surveyed ponds within the surrounding habitat.

7.1.10 Although a protected species licence is not required for sites supporting the common and widespread reptile species, in order to comply with legislation habitat manipulation methods are recommended in order to avoid killing and injury. These methods involve reducing the suitability of the habitat for reptiles and therefore encouraging them to move out of the area to adjacent suitable habitat.

7.1.11 Clearance of habitat that holds potential to support breeding birds (in particular scrub, hedgerows, and woodland), precautionary measures have been provided in this report.

7.1.12 It is also recommended that a sensitive lighting strategy is incorporated into the proposals. This will ensure that the lighting of any retained habitat features suitable for bat foraging and commuting (such as the tree line and hedgerows) is avoided or reduced to lower the impact on bat species utilising the site.

7.1.13 A 20 meter buffer zone will be implemented around active badger setts during the construction phased to prevent disturbance of active setts.

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7.1.14 Measures are recommended to ensure no injury will come to foraging or commuting badgers around the site are also included, mainly the covering and fencing off of any holes, trenches or pits dug during construction.

7.1.15 Clearance of habitat that holds potential to support breeding birds (in particular scrub, hedgerows, and woodland) will avoid the bird nesting season (March to August inclusive).

7.1.16 If this is not possible removal will occur under the supervision of a suitably qualified ecologist (ECoW) who will check for any active nests. If found to be present, a buffer zone, where no development activities will occur, will be cordoned off by the supervising ecologist until the young have fledged.

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FIGURES

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Application boundary

GCN boundary

Standing water

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Rev	Description	By	CB	Date
02	Updated layout	LW	FM	JAN 22
01	--	RN	FM	MAY 21

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Client: Redrow Homes

Project: Land at Arundel

Title: Pond Locations

Status	Drawn By	PM/Checked By
Draft	RN/LW	FM
Project Number	**Scale @ A3**	**Date Created**
ECO01659	1:5,000	28/JAN 2022
Figure Number		**Rev**
2.1		02

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Legend

- Application boundary
- Dormouse tubes
- Dormouse found
- Dormouse nest

Results Summary

Tube 30: Dormice were found in May and June 2021.
Tube 12: Dormouse was found in a dormouse nest in August 2021.

Empty dormouse nests were found in September in tubes 11, 21, 22, 25 and 30.

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02	Updated Layout	LW	FM	JAN 22
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Project: Land at Arundel

Title: Dormice Survey Results

Status	Drawn By	PM/Checked By
Licence Issue	LW	FM
Project Number	**Scale @ A3**	**Date Created**
ECO01659	1:1,400	28/JAN 2022
Figure Number		**Rev**
2.2		01

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Legend

☆ Surveyor position

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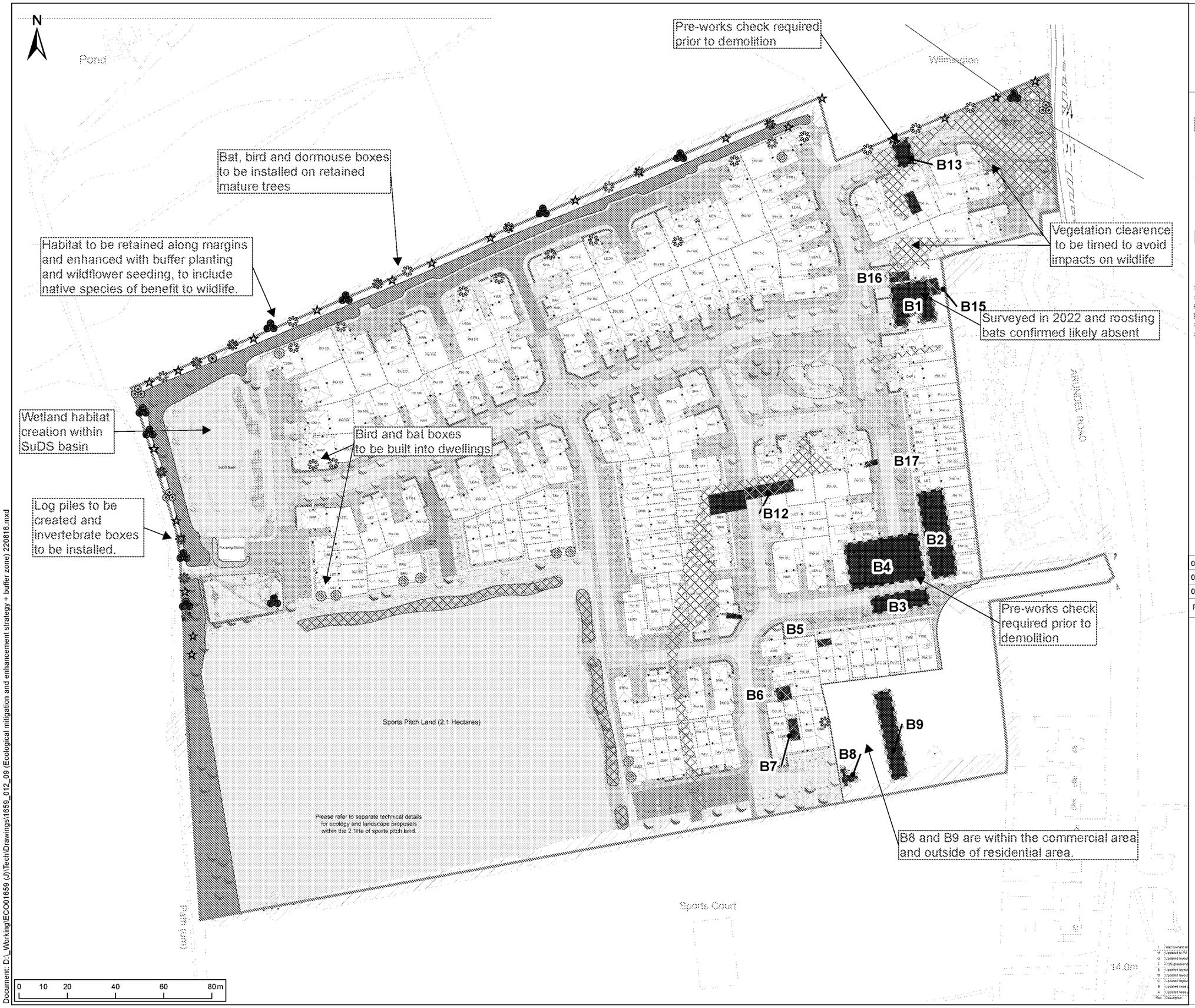
Title: Bat Survey Location

Status	Drawn By	PM/Checked By
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Legend

- Site boundary
- New native species hedgerow planting
- Existing buildings
- Retained vegetation
- New meadow areas
- New buffer mix planting
- Woodland edge mix planting
- Sensitive removal of vegetation
- Proposed SuDS basin
- Historic bat roosts
- High bat roost potential
- Moderate bat roost potential
- Negligible bat roost potential
- Bat box (10)
- Bat tube (10)
- Bird box (20)
- Dormouse box (20)
- Hedgehog house (5)
- Hibernacula (1)
- Invertebrate box (3)
- Log pile (5)

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Rev	Description	By	CB	Date
03-06	Updated layout	LW	FM	MAR 22
02	Updated layout	LW	FM	JAN 22
01	---	LW	FM	NOV 21

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Client: Redrow Homes Limited

Project: Land at Arundel

Title: Ecological Mitigation and Enhancement Plan

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APPENDICES

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Appendix A

CSA Environmental Preliminary Ecological Appraisal

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CSA environmental



Land west of Arundel Road, Angmering

Ecological Impact Assessment

Prepared by
CSA Environmental

on behalf of
Gladman Developments

Report No: CSA/3467/07

July 2019

urban design | ecology | landscape | heritage

www.csaenvironmental.co.uk

This report may contain sensitive ecological information. It is the responsibility of the Local Authority to determine if this should be made publicly available.

Report Reference	Date	Revision	Prepared by	Approved by	Comments
CSA/3467/07	31/07/2019	-	JT	KC	Draft for comment

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Appendix A: Habitats Plan & Photosheet
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Appendix E: Evaluation and Assessment Methods
Appendix F: Bat Survey Report, Photosheet & Plans
Appendix G: Dormouse Survey Report
Appendix H: Badger Survey Report
Appendix I: GCN Survey Report & Plans
Appendix J: Reptile Survey Report

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EXECUTIVE SUMMARY

Mixed development is proposed at Land west of Arundel Road, Angmering, for which outline planning permission will be sought.

CSA Environmental was instructed by Gladman Developments to undertake an Ecological Impact Assessment (EcIA) of the Site to identify important ecological features that could potentially be affected by the proposed development. To inform this assessment, the following surveys have been undertaken:

- Desk study (September 2017)
- Extended Phase 1 Habitat survey (September 2017)
- Building inspection for bats (September 2017)
- Bat activity transects (September 2017 – June 2018)
- Bat remote monitoring (September 2017– June 2018)
- Bat emergence / return to roost surveys (September 2017– June 2018)
- Dormouse surveys (April – September 2018)
- Badger survey (May 2018)
- GCN pond habitat suitability assessment (December 2017)
- GCN surveys (April - May 2018)
- Reptile surveys (April – June 2018)

The following important ecological features are considered to have potential to be subject to adverse effects and/or breaches of legislation as a result of the proposed development, in the absence of mitigation:

- Hedgerows and Trees
- Bats
- Dormice
- Badgers
- Other Mammals
- Nesting birds
- Reptiles
- Amphibians

In the absence of any mitigation measures, the proposed development is anticipated to result in, at most, adverse effects significant at the Local level. However, with the implementation of some straightforward mitigation measures as proposed with this scheme, the development is not anticipated to result in any residual significant adverse effects to important ecological features. The Development Framework Plan will deliver net benefits for wildlife in the form of additional habitats, with the opportunity to provide additional biodiversity enhancement measures alongside the new housing.

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Based on successful implementation of mitigation, compensation and enhancement, as set out within the Ecology Mitigation and Enhancement Strategy (CSA/3467/09), the scheme has the scope to accord with all relevant nature conservation legislation, as well as with the provisions of the Arun District Council Local Plan 2003, Draft Local Plan 2014 and Angmering Neighbourhood Plan 2014.

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1.0 INTRODUCTION

1.1 This report has been prepared by CSA Environmental on behalf of Gladman Developments. It sets out the findings of an Ecological Impact Assessment (EcIA) of proposed development at Land west of Arundel Road, Angmering – EcIA, Angmering (hereafter 'the Site'). Mixed development is proposed at the Site, for which outline planning permission will be sought, with all matters reserved apart from access.

1.2 The scope of this assessment has been determined with due consideration for best-practice guidance provided by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2016) and the Biodiversity: Code of practice for planning and development published by the British Standards Institute (BS 42020:2013).

1.3 The Site occupies an area of c. 9.1ha and is located around central grid reference TQ 065 053, to the north of Angmering. It consists of an arable field with an area of semi-improved grassland, bounded by mature hedgerows and woodland, and developed land to the east (both a residential plot and commercial units) (see Habitats Plan in Appendix A).

1.4 An initial desk study and extended Phase 1 Habitat survey were undertaken for the Site in September 2017, the findings of which are presented herein. In addition, the following further survey work was undertaken in 2017 and 2018:

- Desk study (September 2017)
- Extended Phase 1 Habitat survey (September 2017)
- Building inspection for bats (September 2017)
- Bat activity transects (September 2017 – June 2018)
- Bat remote monitoring (September 2017– June 2018)
- Bat emergence / return to roost surveys (September 2017– June 2018)
- Dormouse surveys (April – September 2018)
- Badger survey (May 2018)
- Reptile surveys (April – June 2018)
- GCN pond habitat suitability assessment (December 2017)
- GCN surveys (April - May 2018)

1.5 This EcIA aims to:

- Establish baseline ecological conditions at the Site.
- Identify any likely significant effects of the proposed development, in the absence of mitigation, including cumulative impacts.
- Set out any ecological measures necessary to effectively avoid or mitigate likely significant effects, and identify residual impacts.
- Identify any compensation measures required to offset residual impacts.

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- Set out potential ecological enhancement measures that may be delivered by the proposed scheme.
- Confirm how proposed mitigation, compensation and enhancement measures will be secured.
- Provide sufficient information to determine whether the project accords with relevant nature conservation policies and legislation, and where appropriate, to allow conditions or obligations to be proposed by the relevant authority.

1.6 An EcIA can be used for the appraisal of projects of any scale. This is a best practice evaluation process, recommended by CIEEM (2018). It is intended that the evaluation of findings presented here-in will aid the Arun District Council in their review of the outline application.

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2.0 LEGISLATION, PLANNING POLICY & STANDING ADVICE

Legislation

2.1 Legislation relating to wildlife and biodiversity of particular relevance to this EcIA includes:

- The Conservation of Habitats and Species Regulations 2017
- The Wildlife and Countryside Act 1981 (as amended)
- The Natural Environment and Rural Communities (NERC) Act 2006
- The Protection of Badgers Act 1992

2.2 This above legislation has been addressed, as appropriate, in the production of this report. Further information on the above legislation is provided in Appendix B.

National Planning Policy

2.3 The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) sets out the government planning policies for England and how they should be applied. Chapter 15: Conserving and Enhancing the Natural Environment, is of particular relevance to this report as it relates to ecology and biodiversity. Further details are provided in Appendix B.

2.4 The Government Circular 06/2005, which is referred to by the NPPF, provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.

Local Planning Policy

2.5 A number of local planning policies relate to ecology, biodiversity and/or nature conservation. These are summarised in Table B.1 of Appendix B. These policies have been addressed, as appropriate, in the production of this report.

Standing Advice

2.6 Natural England Standing Advice regarding protected species aims to support local authorities and forms a material consideration in determining applications in the same way as any individual response received from Natural England following consultation. Standing advice has therefore been given due consideration, alongside other detailed guidance documents, in the scoping of ecological surveys and production of this report.

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3.0 METHODS

Desk Study

3.1 The Multi-Agency Geographic Information for the Countryside (MAGIC) online database was reviewed in September 2017 to identify the following ecological features (based on the likely 'zone of influence' of such features):

- Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites within 10km of the Site
- Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Local Nature Reserves (LNR) within 3km of the Site
- Other relevant data e.g. Ancient Woodland Inventory within 1km of the Site

3.2 Sussex Biological Records Centre (SxBRC) was contacted for details of any non-statutory designated wildlife sites and records of protected/notable habitats and species. This information was requested for an area encompassing the Site and adjacent land within c. 3km of its central grid reference. This search area was selected to include the likely zone of influence of effects upon non-statutory designations and protected or notable habitats and species.

3.3 The Woodland Trust's online Ancient Tree Inventory was reviewed for known ancient or veteran trees within the Site and adjacent land.

3.4 In accordance with Natural England's Great Crested Newt (GCN) Mitigation Guidelines (2001), a desktop search was undertaken to identify ponds within 500m of the Site which may have potential to support breeding GCN Triturus cristatus, using Ordnance Survey (OS) mapping, the MAGIC database and aerial photography.

3.5 All relevant desk study data are presented in Appendix C.

Field Surveys

Extended Phase 1 Habitat Survey

3.6 An extended Phase 1 habitat survey was carried out in fine and dry weather conditions on 06 September 2017 by Clare Caudwell MCIEEM and Jessica Tait GradCIEEM, encompassing the Site and immediately adjacent habitats that could be viewed.

3.7 Phase 1 Habitat survey is a method of classification and mapping wildlife habitats in Great Britain. It was originally intended to provide "*...relatively* rapidly, a record of the semi-natural vegetation and wildlife habitat over large areas of countryside." The Phase 1 Habitat Survey method has been widely 'extended' beyond its original purpose to allow the capture

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of information at an intermediate level between Phase 1 and Phase 2 Habitat surveys. Here, the standard survey method has been 'extended' in this report to include the following:

- More detailed floral species lists for each identified habitat
- Descriptions of habitat structure, the evidence of management and a broad assessment of habitat condition
- Mapping of additional habitat types (e.g. hardstanding)
- Identification of Priority Habitats under Section 41 of the NERC Act (S41 habitats)
- Identification of Habitats Directive Annex I habitat types
- Evidence of, or potential for, European Protected Species (EPS) (including bats, GCN, dormouse and otter)
- Evidence of, or potential for, other protected species (including birds, reptiles, water vole, badger and certain invertebrates)
- Evidence of, or potential for, other notable species (including S41 Species of Principle Importance as well as notable, rare, protected or controlled plants and invertebrates)

3.8 Results of the extended Phase 1 Habitat survey are presented on the Habitats Plan in Appendix A. Appendix D provides a list of floral species recorded in each habitat.

Further Survey Work

3.9 The following detailed field survey work was carried out in 2017 and 2018, with full methods and results provided in the relevant Appendices:

- Bat building inspection, emergence/return to roost surveys and activity surveys (Appendix F)
- Dormouse surveys (Appendix G)
- Badger survey (Appendix H)
- Reptile surveys (Appendix I)
- GCN pond habitat suitability assessments and surveys (Appendix J)

Limitations

3.10 There were no specific limitations to the desktop study or extended Phase 1 habitat survey, which was conducted at an optimum time of year and in good conditions. Limitations to protected species surveys are addressed in the relevant appendices.

Evaluation and Assessment

3.11 Ecological features are identified, evaluated and assessed with due consideration for the CIEEM Guidelines for Ecological Impact Assessment (2018), with detailed methods provided in Appendix E. It is, however, an established principle (CIEEM, 2018) that EcIA is an iterative process. Specialist advice on the avoidance and mitigation of the

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potential negative effects of the proposed development has been input from an early design stage.

3.12 It is also an established principle (CIEEM, 2018) that, wherever possible, potential negative effects should be avoided by 'embedded mitigation' or 'mitigation-by-design', as this gives more certainty over delivery, and demonstrates a well-designed scheme. This also ensures correct application of the 'Mitigation Hierarchy' (as advocated by BS42020:2013, and CIEEM, CIRIA & IEMA 2016).

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4.0 BASELINE ECOLOGICAL CONDITIONS

Nature Conservation Designations

Statutory

4.1 There are no statutory nature conservation designations covering any part of the Site.

4.2 One statutory European wildlife site was identified within 10km of the Site; Arun Valley Special Area of Conservation (SAC), Special Protection Area (SPA) and wetland of international importance (Ramsar) located c. 8.5km north-west of the Site. Given the legislative frameworks underpinning the designation of European sites, this is considered to be important at the International level.

4.3 No national or local statutory nature conservation designations were identified within 3km of the Site.

4.4 These statutory designations are described in Table 1 below.

Non-Statutory

4.5 Five local non-statutory nature conservation designations were identified within 3km of the Site; the closest sites are Polling Copse Local Wildlife Site (LWS) c. 2km west-north-west of the Site, which is a large semi-natural ancient woodland parcel, and Highdown Hill & the Miller's Tomb LWS c. 2km east-south-east, which is an area of chalk grassland that supports several uncommon plants and animals. These non-statutory sites are described in Table 1 below.

4.6 As LWS's are designated according to criteria applied in a county context, these sites are considered to be ecologically important at the County level.

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Table 1. Statutory and non-statutory designations within search radii

Site Name & Designation	Distance & Direction from Survey Area	Brief Description of Designated Site
European Designations within 10km		
Arun Valley Special Area of Conservation (SAC), Special Protection Area (SPA) and wetland of international importance (Ramsar)	c. 8.5km north-west	The site consists of low-lying grazing marsh with an area of peat derived from a relict raised bog. Variation in soils and water supply lead to a wide range of ecological conditions and hence a rich flora and fauna. The ditches and margins between grazing marsh fields have an outstanding aquatic flora and invertebrate fauna. The Arun Valley supports important numbers of wintering waterbirds, which feed in the wetter, low-lying fields and along ditches. SAC reasons for designation Annex II species that are a primary reason for selection of this site: 4056 Ramshorn snail Anisus vorticulus The Arun valley is one of the three main population centres for this species in the UK. This proposed site includes two of its core sites in the wash lands of the Arun floodplain (Pulborough Brooks and Amberley Wild Brooks SSSIs). SPA reasons for designation Over winter the site supports Bewick's Swan Cygnus columbianus bewickii, 115 individuals representing at least 1.6% of the wintering population in Great Britain (5 year peak mean for 1992/93 to 1996/7). The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Ramsar reasons for designation Ramsar criterion 2: The site holds seven wetland invertebrate species listed in the British Red Data Book as threatened. One of these, Pseudamnicola confusa, is considered to be endangered. The site also supports four nationally rare and four nationally scarce plant species. Ramsar criterion 3: In addition to the Red Data Book invertebrate and plant species, the ditches intersecting the site have a particularly diverse and rich flora. All five British duckweed Lemna species, all five water-cress Rorippa species, and all three British water milfoils Myriophyllum species, all but one of the seven British water dropworts Oenanthe species, and two-thirds of the British pondweeds Potamogeton species can be found on site. Ramsar criterion 5: Assemblages of international importance: Species with peak counts in winter: 13774 waterfowl (5 year peak mean 1998/99-2002/2003).

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National Designations within 3km		
N/A	-	-
Local Designations within 3km		
N/A	-	-
Non-statutory Designations within 3km		
Poling Copse Local Wildlife Site (LWS)	c. 2.0km west-north-west	A large (51ha) block of ancient, semi-natural woodland. Ancient sections consist mostly of Hazel coppice Corylus avellana with Ash Fraxinus excelsior and Oak Quercus robur standards; more recent woodland is dominated by Sycamore Acer pseudoplantanus with some Hazel, Oak and Ash.
Highdown Hill & the Miller's Tomb LWS	c. 2.0km east-south-east	A 22.9ha chalk grassland site, mostly unimproved with some species-rich areas. Although heavily used for informal recreation, the site supports several uncommon plants and animals. A mosaic of short turf, taller herbs and scrub makes the site a valuable habitat for invertebrates, including Carthusian snail Monacha cartusiana (Red Data Book species), Long-winged Cone-head Conocephalus discolor, Common Lizard Zootoca vivipara, Glow-worm Lampyris noctiluca, the scarce Chalkhill Blue Polyommatus coridon and 17 commoner butterfly species; and a range of birds, including occasional Nightingales Luscinia megarhynchos.
Warningcamp Hill and New Down LWS	c. 2.5km north-west	Designated for its herb-rich chalk grassland, including some extensive patches of Burnet Rose Rosa pimpinellifolia, an uncommon plant in West Sussex. The site also supports a remnant of ancient semi-natural woodland and areas of mixed scrub.
Titnore & Goring Woods Complex LWS	c. 2.5km east	Largest woodland complex in Worthing Borough (78.6ha), much of it ancient in origin, although its structure and species composition vary considerably due to management. The site is important as a large area of semi-natural habitat close to a heavily built-up area.
Clapham Wood LWS	c. 2.9km north-east	An extensive (155.8ha), ancient semi-natural woodland on the undulating dip slope of the South Downs. Its rich ground flora includes a number of notable species: Wood Anemone Anemone nemorosa (ancient woodland indicator species), Bluebells Hyacinthoides non-scripta and Early-purple Orchid Orchis mascula. Tuberous Comfrey Symphytum tuberosum, a very rare plant in West Sussex occurs along a track. Clapham Wood also has a moderately diverse range of breeding birds, including Goldcrest Regulus regulus, Chiffchaff Phylloscopus collybita, Blackcap Sylvia atricapilla, Treecreeper Certhia familiaris, Marsh Tit Poecile palustris, Nuthatch Sitta europaea, Cuckoo Cuculus canorus, Great Spotted Woodpecker Dendrocopos major and Green Woodpecker Picus viridis.

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Ancient Woodland

4.7 There is no designated Ancient Woodland covering any part of the Site or immediately adjacent land. No trees on or adjacent to Site are listed on the Ancient Tree Inventory. Habitats and Flora

Notable Flora Records

4.8 The SxBRC provided records of 27 notable plant species, one lichen and one moss species from within the search area. Those of potential relevance to the Site include the arable weeds corncockle Agrostemma githago, corn marigold Glebionis segetum and cornfield knotgrass Polygonium rurivagum, wild strawberry Fragaria vesca and calcareous-favouring species crosswort Cruciata laevipes.

Habitats

4.9 The following habitats were recorded on-site and classified in line with current Phase 1 habitat species guidance (JNCC, 1990), as illustrated in Appendix A. Photographs of the Site can be found in Appendix A, with photographs of buildings included within the bat report in Appendix F. An indicative botanical species lists for each habitat is provided in Appendix D.

Arable

4.10 Much of the Site comprises a large arable field, which was straw stubble at the time of survey. The field margins are c. 1m wide and comprise grass and arable weeds such as fumitory Fumaria spp. and sun spurge Euphorbia helioscopia.

Semi-improved grassland

4.11 The northern third of the main field comprises semi-improved grassland, which is mostly grass-rich with frequent Timothy Phleum pratense and cock's-foot Dactylis glomerata in the relatively short sward. Herb species included common species such as selfheal Prunella vulgaris, St. John's wort Hypericum sp. and locally abundant silverweed Potentilla anserine, common fleabane Pulicaria dysenterica, and rush Juncus sp. along the eastern woodland edge, indicating wetter conditions in this area.

4.12 There is semi-improved grassland along the banks either side of the access road, with species including tufted vetch Vicia cracca, agrimony Agrimonia eupatoria, wild strawberry Fragaria vesca, hedge bedstraw Galium album, greater stitchwort Stellaria holostea, and crosswort Cruciane lla stylosa which is characteristic of calcareous soils.

Buildings and hardstanding

4.13 As shown on the Habitats Plan (CSA/3467/102), there are a number of buildings on-site comprising a residential dwelling and associated out-buildings (B1, B15, B16), a camp site (B17), a small industrial estate (B2 to 12) and three derelict buildings (B8, 13 and 14). These are surrounded by

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hard-standing with a surfaced access road stretching to Arundel Road in the east.

4.14 The residential bungalow is a single storey building of brick construction with clay roof tiles, and a number of features were noted which are suitable for roosting bats, such as lifted tiles which could provide access between tiles and internal roof lining.

4.15 A small partially collapsed barn (B13) is present within the 'Severn Acre Plot' in the north-eastern part of the site overgrown by ivy and scrub, which could also be used by bats as a night roost / feed perch. A second derelict building (B8) is present along the southern boundary, which is overgrown with ivy, bramble scrub and a young ash tree.

4.16 The commercial buildings are of varying construction, many with corrugated asbestos roofing; some had features which are suitable for bats (e.g. lifted facia boards / crevices in brickwork), and many were suitable for roosting birds, particularly for opportunistic species such as swallows Hirundo rustica and pigeons Columba spp.

Amenity grassland

4.17 There is a small area of amenity grassland at the Site comprising a private garden and adjacent area of grass used as a caravan/camp site. It is short mown and predominantly perennial rye grass Lolium perenne with a few herbs such as white clover Trifolium repens.

Colonising ground and tall ruderal

4.18 As identified on the Habitats Plan, colonising vegetation is present within the industrial estate and surrounding the northernmost derelict building (B13) where areas of bare ground have been left unmanaged. These areas are characterised by pioneering species such as bristly ox-tongue Helminthotheca echioides, bittercress Cardamine sp., ribwort and buckshorn plantain Plantago major/coronopus, black medick Medicago lupulina, scarlet pimpernel Anagallis arvensis and field mallow Malva sylvestris. The north-eastern plot contains more developed vegetation including common nettle Urtica dioca, ox-eye daisy Leucanthemum vulgare, ragwort Senecio jacobaea, greater willowherb Epilobium hirsutum and hemp agrimony Eupatorium cannabinum.

Hedgerows and trees

4.19 There are nine hedgerows across the Site, as identified on the Habitats Plan. Six of these are characterised as species rich by having five or more native woody species within them. The arable field is bounded by mature species-rich hedges to the east and west (H4 & H6), a deciduous woodland edge to the north and mature tree belt on top of a bank to the south (H5). There are also tall native hedgerows along the eastern Site boundary (H2, H3, H7, H8, and H9) and a pruned hedgerow south of

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the bungalow (H1). The Site is bounded to the north by a woodland edge, with mature trees overhanging the Site by c. 6m.

4.20 There is a mature apple tree Malus spp. and some conifers in the residential garden, in addition to a number of mature trees within the hedgerows which bound the Site.

Scrub

4.21 There is dense scrub dominated by bramble Rubus fruticosus agg. along the boundary between the arable field and commercial plot, and in the north-eastern corner of the Site, and scattered scrub along hedgerows in the south-western and north-eastern corners of the Site.

Pond

4.22 There is a small ornamental pond in the residential garden, which is plastic-lined and has a stone margin. Plant species include water lily Nymphaea spp. and waterweed Elodea spp. Goldfish were noted during the GCN surveys.

Importance

4.23 Hedgerows are an S41 habitat, with high intrinsic ecological value, so are considered to be important at the Local level.

4.24 Both wild strawberry and crosswort were recorded on Site and are listed as near threatened on the IUCN Red List, so are of local importance. However, they were only present within a very limited patch of habitat along the side of the access road. Overall, grassland habitat is not considered to be more important than Site level.

4.25 The remaining habitats onsite are not considered to be more important than Site level, so are not considered further in this report.

Fauna

<u>Bats</u>

4.26 SxBRC provided 13 bat records from within the search area, including the following species: common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus and brown long-eared bats Plecotus auritus. The closest record is c. 245m south-east of the site and is of a garage which provides a feeding roost where an unspecified pipistrelle species was present in 2014.

4.27 The arable field, which dominates the site, is of generally low suitability for foraging bats. However, trees and hedgerows along the boundaries support foraging and dispersal opportunities, as do those in the residential garden. The garden pond further enhances foraging suitability by encouraging insects. Treeline / hedgerow borders also provide connectivity to habitats and resources in the wider landscape,

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including the adjoining parcels of mature deciduous woodland to the north and east of the site.

Roosting Bats

4.28 Under the current development proposals, no trees considered to hold potential roosting opportunities for bats will be lost. Although the trees along the southern boundary are of a sufficient size, they are in good condition do not exhibit any features suitable to support roosting bats.

4.29 A number of the onsite buildings were noted to have features suitable to support roosting bats during the Phase 1 survey (e.g. features such as lifted tiles and gaps beneath cladding). A number of trees adjacent to northern and western Site boundaries were also noted to have features suitable for roosting bats.

4.30 Of the 17 buildings identified on-site, one building was assessed as having moderate potential to support roosting bats (B1), four as having low potential (B2, B3, B4 and B13), and two low to negligible potential (B8, B9), with the remainder having negligible potential. Internal inspections of B1, B8, B9 and B13 did not reveal any evidence of past or current use by roosting bats.

4.31 Bat emergence / return to roost surveys completed in 2018 revealed that roosting bat(s) are present within B3 and B4, with a single common pipistrelle observed emerging from B3, and a soprano pipistrelle from B4.

4.32 Given the low level of roosting activity recorded, by individual / low numbers of common and soprano pipistrelle bats (two of the most common and widespread of the UK bats species), the roost(s) identified are considered to be of low conservation significance. However, given the legal protection and S41 status of bats, overall the Site is considered to be important at up to the Local level for roosting bats.

Foraging / Commuting Bat Activity

4.33 During the bat emergence / return to roost, transect surveys and static monitoring undertaken across the Site, at least eight species of bat were recorded. Bat activity was predominantly recorded along the Site boundaries, particularly along the northern Site boundary, which is a woodland edge with a stream and ponds to the north, and western hedgerow; species diversity was also greater at these locations. Activity was dominated by common pipistrelle and soprano pipistrelle calls (peak of 20.78 passes / hours at MP1 for soprano pipistrelle, and 22.08 passes / hours for common pipistrelle at MP3 during static monitoring), with a large number of Myotis species calls along the woodland edge (index of 19.64 passes / hour at MP1). During the remote monitoring surveys 96 barbastelle Barbastellus barbastellus calls (indices less than one pass / hour for barbastelle at MP1, 2 and 3.), 49 noctule Nyctalus noctula calls and 13 brown long-eared calls (all at less than one pass /

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hour at static monitoring points) were recorded. Serotine Eptesicus serotinus and Nathusius' pipistrelle were also recorded during the activity transects. Full results are provided in Appendix F.

4.34 Using the method provided by Wray et al. (2010) to evaluate the importance foraging and commuting habitats for bats (see Table 2), county value is assigned for common and some rarer species (common pipistrelle, soprano pipistrelle, Myotis species, noctule, Nathusius pipistrelle, and serotine), local for brown long-eared, and regional for barbastelle, due to its rarity.

4.35 Given the low level of activity recorded in relation to some of these species (i.e. less than one pass per hour for Myotis species, barbastelle, noctule, Nathusius pipistrelle and brown long-eared; serotine single pass only recorded during transect) across the majority of the Site, and the large proportion of arable land, buildings and hardstanding at the Site which are likely to be of some limited value to bats, it is considered that a more accurate assessment of the importance of the Site for foraging and commuting bats is Local level importance for most bat species, and County importance for barbastelle, due to its rarity. Marginal woodland and hedgerow habitats to the north and west being of greatest importance for foraging, for all species including Myotis and barbastelle in particular.

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Table 2: Valuation of bat foraging and commuting habitat at the Site (following Wray et al (2010) evaluation criteria)

Species	Rarity	No. of bats	Roosts/potential roosts nearby	Commuting habitat	Foraging habitat	Total score	Calculated Importance	Adjusted Importance
Common pipistrelle	Common (2)	Small number (10)	Moderate number (4) – 1 roost present on-site, 4 roost records within 1km from SxBRC, and 2 records of pipistrelle species roosts, including a maternity roost	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	24	County	Local
Soprano pipistrelle	Common (2)	Small number (10)	Small number (3) – 1 roost present on-site, 2 roost records for pipistrelle species within 1km radius from SxBRC, including a maternity roost	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	23	County	Local
Myotis species	Rarer (5)	Small number (10)	Small number (3) – no roost records within 1km radius from SxBRC, and moderate amount of activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	26	County	Local
Noctule	Rarer (5)	Individual (5)	Small number (3) – no roost records within 1km radius from SxBRC, and low amount of activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	21	County	Local
Nathusius pipistrelle	Rarer (5)	Individual (5)	Small number (3) – 2 roost records for pipistrelle species within 1km radius from SxBRC, including a maternity roost, and low activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	21	County	Local

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Brown long-eared	Common (2)	Individual (5)	Small number (3) – 3 roost records within 1km radius from SxBRC, and low amount of activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	18	Local	Local
Barbastelle	Rarest (20)	Individual (5)	Small number (3) – no roost records within 1km radius from SxBRC, and low amount of activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	36	Regional	County
Serotine	Rarer (5)	Individual (5)	Small number (3) – no roost records within 1km radius from SxBRC, and low amount of activity recorded during surveys	Well-grown and well-connected hedgerows, small field sizes (4)	Larger, or connected woodland blocks, mixed agriculture, and small villages/hamlets (4)	21	County	Local

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Dormouse

4.36 SxBRC provided two records of dormouse Muscardinus avellanarius within the search area. The most recent record was from 2015, from the Oval Racecourse c. 950m east of the Site, with little habitat connectivity to the Site. The second record was of feeding signs in Butler's Copse, a patch of Ancient Woodland c. 950m north of the Site across the A27, which may act as a barrier to dispersal for dormice.

4.37 Eight species-rich and one species-poor hedgerows are present on-Site and dormice are known to live permanently within hedgerows, which can provide a continuous food resource throughout the active season, with unmanaged, diverse hedgerows most optimal. The hedgerows on-site showed some evidence of management and were found to be comprised mainly of hawthorn Crataegus monogyna, blackthorn Prunus spinosa, elm Ulmus sp. and bramble Rubus fruticosa agg., with occasional hazel Corylus avellana, ash Fraxinus excelsior, dog rose Rosa canina sp. and oak sp. Quercus sp.. While some of these hedgerows are not considered to offer high quality opportunities for dormice, they do act to connect more optimal habitats in the wider surrounds.

4.38 Dense patches of scrub are present at the Site along the eastern boundaries of the arable field and within the north eastern corner of the Site. Dense scrub provides suitable habitat for dormice to persist as the vegetation provides a food resource for a large part of the dormouse active season and is frequently used for hibernation. These scrub patches are connected to the boundary hedgerows and there is potential for dormice to be present within and to be utilising this scrub habitat.

4.39 The dormouse survey recorded dormice in the eastern and western hedgerows (H2 and H6) with a peak count of two individuals, and six likely dormouse nests along the woodland edge, eastern and western hedgerows (H3, H6 and H9). As a European Protected Species the population will be of at least Local importance given their local distribution and conservation status.

Badger

4.40 SxBRC do not provide records of badger Meles meles as this is considered sensitive information. Arable and grassland habitats onsite offer limited suitability for foraging, and the hedgerows and scrub along the boundaries provide cover for setts.

4.41 Signs of badger activity and a badger sett were observed on Site. Full details have not been included here for confidentiality reasons, to protect badgers. Further information has been included within a separate badger report (CSA/3467/06).

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4.42 Badgers are common and widespread and of no local or national conservation concern, but their setts are strictly protected under the Protection of Badgers Act 1992.

4.43 The habitat used by badgers is to be retained and buffered by new planting as part of the proposed development, therefore impacts upon badgers have been scoped out of the assessment, but mitigation measures to ensure adherence to legislation have been included.

Riparian Mammals

4.44 SxBRC provided 17 records of water vole Arvicola amphibius within the search area. All records are c. 900m south of the Site within Angmering itself, most associated with Black Ditch stream which runs through the woodland to the north of the Site, and the most recent is from 2016. While potentially suitable habitat for water voles may be provided by the stream within the woodland immediately north of the site (which is connected to Black Ditch), this habitat is outside of the Site boundary and not likely to be impacted by proposals. Water vole will therefore not be considered further.

Other Mammals

4.45 SxBRC provided 12 records of hedgehog Erinaceus europaeus from within the search area, the closest c. 30m east of the Site within the woodland patch, recorded in 2015. Hedgehogs were observed in the south-east of the site during the bat emergence / return to roost surveys, on two occasions in 2018. Hedgehogs are a S41 priority species. On-site opportunities for hedgehogs are provided by the hedgerow bases along the site borders and shrubs within the residential garden. However, the habitats present at the Site are common and widespread in the local context, and are considered unlikely to support an important population of this species, so will not be considered further.

Birds

4.46 SxBRC provided 2726 records of birds from within the search area, 306 of which were notable species. Those notable species which could be present onsite include birds of prey such as red kite Milvus milvus, generalists (e.g. herring gull Larus argentatus), species associated with woodland and trees (e.g. lesser spotted woodpecker Dendrocopos minor), with hedgerows (e.g. dunnock Prunella modularis), with grassland (e.g. skylark Alauda arvensis) and with buildings (e.g. swallow).

4.47 Trees, hedgerows and shrubs provide foraging habitat for small woodland and garden birds, while more open field habitat may provide hunting/scavenging opportunities for larger birds of prey and those which ground nest / feed over open land. All nesting birds are protected under the Wildlife and Countryside Act 1981.

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4.48 A number of bird species were seen during the site visit, including swallow and feral pigeon Columba livia domestica nesting in the metal storage units north of B10, goldfinch Carduelis carduelis, blue tit Cyanistes caeruleus and blackbird Turdus merula within the hedgerows, and wren Troglodytes troglodytes was found nesting in a dormouse tube along H5. Ground nesting birds such as skylark could utilise the parcel of semi-improved grassland at the north of the Site, although farming practices may limit its suitability.

4.49 The habitats present at the Site are common and widespread in the local context, and are considered unlikely to support an important assemblage of bird species. The bird assemblage of the Site is therefore considered to be of no more than Local value.

Reptiles

4.50 SxBRC provided seven records of grass snake Natrix natrix dating from 1990-2002, the closest being 550m north-east of the Site in 2002. SxBRC also provided one record of adder Vipera berus from 1991 in grid square TQ0605.

4.51 The arable field margins, area of colonising ground and scrub in the north-east corner of the Site and parcel of semi-improved grassland provide opportunities for reptiles. A single common lizard was recorded on site during the seven survey visits, indicating a low population of this species is present on the site. It should be noted that common lizards are often under-represented during surveys due to their highly mobile nature. Full details of the surveys are provided in Appendix J.

4.52 Common lizards (and all other UK reptile species) are protected under the Wildlife and Countryside Act (1981 and are a S41 species); the reptile population on site is therefore considered of Local importance.

Amphibians

4.53 SxBRC provided 11 records of amphibians within the search area, including common frog Rana temporaria, common toad Bufo bufo, palmate newt Lissotriton helveticus and smooth newt Lissotriton vulgaris, dating from 1987-2016. No records of GCN Triturus cristatus were found within the search area.

4.54 The closest record is of 200 common toad in the large pond where the ditch in the adjacent northern woodland terminates, c. 145m north-west of the Site, recorded in 1992.

4.55 Onsite aquatic habitat for amphibians is limited to the small garden pond. However, the hedgerows and scrub provide suitable terrestrial habitat for amphibians.

4.56 Of the eight mapped ponds within a 500m radius of the Site, one was found to no longer exist (pond 7), five were assessed to have average

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suitability to support GCN (ponds 1, 2, 3, 5 and 6) one below average suitability (pond 4), and one poor suitability (pond 8). Results are summarised in Table 3 below, and full results are presented in Appendix G.

Table 3. Summary of the pond habitat suitability assessment for GCN within 500m of land to the west of Arundel Road, Angmering in December 2017 and GCN surveys in spring 2018

Pond number	Distance to Site	HSI Score	Suitability	GCN present/likely absent
1	On-Site	0.65	Average	Likely absent
2	95m east	0.66	Average	Likely absent
3	250m south-west	0.65	Average	Access denied
4	130m north	0.57	Poor	-
5	85m north-west	0.61	Average	Likely absent
6	260m west	0.61	Average	Likely absent
7	435m north-west	Filled in	-	-
8	480m north-west	0.34	Poor	-

4.57 Full presence / likely absence surveys were completed for ponds 1, 2, 5 and 6. GCN were not recorded during the pond surveys, nor were any recorded under refugia during the reptile survey. It is concluded that GCN are likely absent from the Site and adjacent areas.

4.58 Common toads are a S41 priority species. As a large breeding population of toad have previously been recorded within Pond 5, it is likely that they are present within suitable terrestrial and aquatic habitat on-Site (largely restricted to the site margins). The on-Site pond is very small, so unlikely to support significant numbers of toads, and the terrestrial habitat on-Site is of lower quality to that provided within the woodland to the north. The on-Site toad population is anticipated to be of Site importance.

Invertebrates

4.59 SxBRC provided 26 records of notable invertebrates from within the search area, including: four species of butterfly (purple emperor Apatura iris, swallowtail Papilio Machaon, grizzled skipper Pyrgus malvae, and white admiral Limenitis Camilla – the closest of the butterfly records, in the woodland to the east of site in 2008); 11 species of moth (the closest record being ten sprawler moths Asteroscopus sphinx in the woodland to the east of site in 2007) and one true fly in 2015 (Volucella zonaria, which is considered rare in Sussex). SxBRC also provided six records of stag beetle Lucanus cervus (Habitats Directive Annex 2) from between 2002 and 2015, the closest c. 400m east-south-east of the site in 2015. A comma butterfly Polygonia c-album was also seen during the site visit.

4.60 The semi-improved grassland, garden and colonising ground / tall ruderal vegetation provide open flower-rich habitat for pollinators, the

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small pond provides a limited amount of aquatic habitat, and the hedgerows provide flower, fruit and deadwood resources. Overall, there range of habitats and resources across the Site could support a reasonable assemblage of common invertebrates, but it is unlikely that any rare species would be present. Overall, the invertebrate assemblage of the Site is likely to be of Site value, so is not considered further in this report.

Future Baseline

4.61 The Site is presently under active arable management, including the periodic cutting of field margins and hedgerows. Notwithstanding the potential rotation of crop-type, these management interventions maintain the on-site conditions in a relatively stable state. There is no known intention to cease this management, other than to accommodate the proposed development should planning permission be granted. As such, the future baseline status of important ecological features is not anticipated to vary significantly from that at present.

Summary of Ecological Features

4.62 Table 4 below summarises all important or legally protected ecological features identified within their respective zones of influence, along with their geographic context of importance and/or protection status:

Table 4. Summary of important ecological features and their geographic context

Ecological Feature	Geographic Context of Importance and/or Protection Status
Hedgerows and trees	Local
Bats	Local to County
Badger	Protected
Dormouse	Local
Birds	Local
Reptiles	Local
Amphibians	Local

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5.0 ASSESSMENT OF EFFECTS

5.1 Outline planning permission is sought for mixed development at the Site. The following impact assessment is based on the Development Framework Plan (DFP) (CSA/3467/136) prepared by CSA Environmental on behalf of Gladman Developments.

5.2 The construction phase of the proposed development will comprise the following:

- Cessation of arable cultivation
- Demolition of existing buildings
- Removal of hedgerows H1, H4, H7 and H9, and partial loss of H3 and H5 for vehicular and pedestrian access and to facilitate construction
- Clearance of semi-improved grassland, amenity grassland, scrub, tall ruderal/ colonising ground vegetation, and a pond
- Construction of up to 160 residential dwellings and an employment/commercial centre
- Construction of associated gardens, parking, access infrastructure, and two senior (110m x 70m) football pitches
- The establishment of formal and informal Public Open Space (POS) including new tree, thicket and meadow planting, as well as recreational routes
- The establishment of a woodland belt (c. 0.5ha) along the southern edge of the residential parcel, separating it from the proposed employment/commercial centre and sports hub to the south
- Construction of a Sustainable Urban Drainage System (SUDS) including a large attenuation basin set within the POS to the north-west of the developed area
- Strengthening of boundary vegetation with a significant amount (c. 0.4ha) of new native thicket planting and planting of nearly 500 new trees

5.3 The operational phase of the proposed development will comprise the following:

- Occupation of new residential dwellings and use of commercial/employment centre
- Increase in human activity, including use of vehicles and presence of domestic pets
- Increased artificial lighting and anthropogenic noise
- Management of habitats within POS

Assumptions

5.4 The following assumptions have been made during the assessment of potential effects of the proposed development on Important Ecological

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Features. Although taken as part of the pre-mitigation scenario, these measures are referenced in the proceeding sections where integral to the mitigation strategy.

5.5 In accordance with BS42020:2013 (biodiversity code of practice for planning and development), it is assumed that a Construction Environmental Management Plan (CEMP) will be secured by planning condition and prepared at the detailed design stage for each phase of development. In addition to the construction phase impact avoidance and mitigation measures identified in the following sections, these will detail standard environmental control measures, including though not limited to the following:

- Implementation of strict protection measures for the root protection areas of retained trees and hedgerows, in accordance with BS5837:2012
- Standard best practice construction phase pollution prevention and control measures
- Sensitive working methods and timing to avoid direct impacts to nesting birds
- All working measures needed to comply with the terms of EPS derogation licencing specific to the development phase or works activity
- Updated ecological surveys, where necessary, to identify shifts in the baseline ecological condition (such as to support EPS derogation licence applications) in order that revised impact avoidance and mitigation measures can be adopted as required

5.6 In accordance with BS42020:2013, it is assumed that a Landscape and Ecology Management Plan (LEMP) will be secured by planning condition and submitted alongside detailed development proposals at the Reserved Matters stage. These will set out measures for the establishment and management of newly created and retained habitats.

Assessment of Likely Significant Effects

5.7 Likely effects on ecological features as a result of the proposed development have been assessed in the absence of mitigation, but take account of mitigation by design measures incorporated into the DFP. Additional measures to avoid, mitigate and compensate potential impacts are discussed within the following section of the report, and are detailed within the accompanying Ecological Mitigation and Enhancement Strategy (CSA/3467/09).

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Hedgerows and trees

Predicted effects

5.8 The proposed development will result in the loss of hedgerows H1, H4, H7 and H9, partial loss of H3 and H5, and c. 10 trees present within the residential garden, north-east and south-east corners of the Site, a total of c. 0.4ha of habitat. However, new planting proposals include a significant number of new trees and thicket planting to buffer retained hedgerows (c. 0.4ha), and a new woodland belt along the south of the residential parcels (c. 0.5ha), which will generate an overall increase in available habitat across the site.

Mitigation

5.9 The majority of onsite hedgerows will be retained as part of the proposed development, as shown on the EMES plan (CSA/3467/111); this is in line with policies ENV SP1 and DM4.

Residual Effects

5.10 The significant amount of new buffer planting is anticipated to have beneficial effect in terms of increasing hedgerow resources on-site, but these are not anticipated to be significant given the hedgerow loss. Overall, the proposed development is anticipated to have no significant effect on hedgerow and tree resources.

Bats

Predicted effects

5.11 Under the current development proposals, no trees considered to hold potential roosting opportunities for bats will be lost.

5.12 Current roosting by a single common pipistrelle was confirmed within B3, emerging from under a ridge tile on 06 June 2018. A roost was also identified within B4 with a soprano pipistrelle bat flying low from the north of the building on the 15 May and 06 June 2018, and seen emerging from a hole in the brickwork in section d on 12 June 2018. Buildings with confirmed and potential bat roosts have been identified within the bat emergence and return to roost survey plan (CSA/3467/122).

5.13 During the construction phase, foraging and commuting habitat will be lost in the east, north-east and south of the Site as hedgerows, scrub, trees, grassland and the pond are removed. This will reduce habitat connectivity from Steyne Wood to the north, through the Site to the woodland across Arundel Road to the east, and along the southern boundary. However, the POS will include a significant amount of buffer planting along the edge of Steyne Wood and the majority of the site boundaries, in addition to the new woodland belt, both of which will strengthen commuting routes. In addition, new meadow planting and a SUDs basin will provide a variety of foraging habitats.

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5.14 During the operational phase, ambient light levels could be increased due to artificial street lighting, although it should be noted that significant floodlighting is currently in place within the industrial park.

5.15 In the absence of mitigation, the proposed development could have an adverse impact on bats, through roost loss / disruption of foraging habitat. However, this effect is predicted to be limited to the Site level, given the small number of minor confirmed roosts and focus of bat activity within retained habitats to the north and west.

Mitigation Measures

5.16 Mitigation shall be required for the loss of bat roosting opportunities within B3 and B4. Details of measures to avoid direct impacts to bats during demolition and to provide alternative roosting opportunities by way of compensation are detailed within Appendix D of the EMES. The proposed scheme includes installation of one pair of bat boxes (Schwegler 2FN, 2FN-FDP, or similar) on a retained mature tree per roost to be lost as mitigation, with addition boxes on trees and integrated into new dwellings (Habibat bat tube, or similar) by way of enhancement.

5.17 Demolition of B3 and B4, will need to take place under European Protected Species (EPS) licence, using methods to minimise the risk of killing or injury of roosting bats (set out within Appendix D of the EMES (CSA/3467/03)). Given the low conservation significance of the roost(s) identified, EPS licencing may be progressed by the traditional Natural England approach or via Low Impact Class Licencing (BLICL), dependent upon the survey results.

5.18 In line with policies ENV SP1 and DM5, to maintain habitat suitability for bats a sensitive lighting strategy will be developed to minimise light spill onto retained and new vegetation through choice of products, positioning, and use of cowls, hoods and timers. New buffer planting along the woodland edge should also help to prevent light spill from affecting the woodland interior.

Residual Effects

5.19 Subject to mitigation measures being successfully implemented, the proposed development is anticipated to have no significant effect on roosting or foraging bats.

<u>Badger</u>

Predicted Impacts

5.20 All badger sett tunnel entrances are located 20-30m from the construction footprint, with most tunnels dug away from the direction of the site, and will be buffered from development by the POS and new thicket planting. New meadow and amenity grassland areas will also provide foraging opportunities.

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5.21 Badgers could experience an increased level of disturbance in the operational phase due to walkers and dogs using the site. However, the significant amount of new buffer planting should provide some screening of the sett and discourage access.

5.22 Overall, no significant impacts to badger are anticipated and badgers are not considered further in this assessment. However, mitigation measures to minimise the risk of contravening legislation are set out below.

Mitigation Measures

5.23 As badgers are protected under the Protection of Badgers Act (1992), a pre-construction badger check will be completed to confirm the presence or likely absence of badger activity from the construction footprint, or close enough that they would be affected by the development. If any setts are found in this area, they will be closed under EPS licence.

5.24 Precautionary working methods during construction will be employed during construction to prevent badgers from becoming trapped in excavations, and minimise their risk of injury, to be compliant with legislation.

Dormouse

Predicted Effects

5.25 A significant proportion of the on-Site hedgerows will be retained and buffered by the planting of c. 0.4ha thicket planting, to be supplemented by c. 490 new trees and a new woodland belt to the south of the residential parcels (c. 0.5ha).

5.26 There will be loss of c. 0.4ha of scrub and hedgerows to allow creation of the primary site access, additional pedestrian access points, and facilitate the construction. This will result in a permanent loss of suitable nesting and foraging habitat (more than compensated for by new planting), and temporary reduction in habitat connectivity until new planting matures.

5.27 There is the potential for direct impacts to this species during the construction phase, as vegetation clearance activities may result in an offence whereby dormice are injured, killed or disturbed and/or their breeding or resting places are damaged or destroyed. During the operational phase, dormice may be at greater risk of predation due to domestic cats, and traffic collision.

5.28 Overall, in the absence of mitigation, the proposed development could have the potential for adverse impact on dormice significant at the Local level.

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Mitigation Measures

5.29 Although some habitat will be lost to facilitate site access and construction, a significant amount of new buffer planting (c. 0.4ha) and a new woodland belt (c. 0.5ha) is to be included in the scheme, which will result in an overall increase in available dormouse habitat on site. The new planting will include native species of benefit to dormice, such as hazel Corylus avellana and blackthorn Prunus spinosa. Strategic placement of thorny species should also deter domestic cats. Habitat removal has been avoided where feasible, to ensure breaks in the boundary vegetation are minimised and habitat connectivity is maintained. Although the new site access will create a break in the eastern boundary and remove the majority of the southern boundary, connectivity will be maintained across the site and to the wider landscape via the western hedgerow, woodland edge to the north, and new woodland belt to be created.

5.30 Retained habitat will be protected against accidental damage during construction works by use of heras-style fencing or tree protection fencing as appropriate.

5.31 Significant areas of retained habitat will be able to accommodate a nest box scheme to provide sheltering locations whilst the new planting matures, and eventually increase availability of suitable nesting habitat. As for bats, a sensitive lighting strategy will be developed to minimise light spill onto retained and new vegetation. Appropriate management of the new buffer planting and hedgerows will ensure this new habitat maintains suitability for this species and other fauna.

5.32 Mitigation and development will need to be subject to an EPS licence from Natural England, which will be applied for once full planning permission has been granted, and all relevant conditions have been discharged. Habitat clearance will be subject to seasonal constraints and will adopt the recommended standard two-stage clearance methodology as recommended within the Mitigation and Compensation Methods Section of the Dormouse Conservation Handbook[1] to minimise the risk of harming dormice. Details of this can be found within the method statement in Appendix E of the EMES (CSA/3467/09).

5.33 The full survey results will be used to inform a Mitigation Strategy to accompany a detailed / reserved matters planning submission and any subsequent EPS licence application.

Residual Effects

5.34 It is considered that the scheme offers sufficient scope to ensure that impacts are avoided and that habitat compensation and enhancement measures can be delivered. Subject to a suitable Mitigation Strategy being agreed, and delivery under EPS licence, it is

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considered that the proposed development has the capacity to ensure no significant effect on dormice.

Birds

Predicted Effects

5.35 The proposed development will result in an initial loss of nesting bird habitat through vegetation clearance and demolition of buildings, and risks killing or injuring any birds nesting during habitat clearance. New planting proposed will include a significant number of new trees, thicket planting and meadow planting. Until this new planting matures, the proposed development is anticipated to have a temporary adverse effect on nesting birds, but due to the habitat availability in the surrounding landscape this effect will not be significant.

5.36 During the operational phase, nesting birds will experience increased levels of disturbance due to walkers and dogs, with ground nesting / foraging species particularly affected. As the habitat currently present on Site is sub-optimal for ground nesting birds, it is unlikely this will result in a significant adverse effect.

5.37 In the absence of mitigation, the proposed development is anticipated to have the potential for an adverse impact on birds significant at the Site level.

Mitigation Measures

5.38 New planting within the POS (including woodland, tree, thicket and meadow planting, and SuDS basin creation) will provide a significant habitat resource for foraging and nesting birds; and shall provide mitigation for that removed to facilitate development. Access routes and planting in the POS will be sensitively designed with an aim to minimise disturbance of nesting birds from walkers and dogs, in line with policies ENV SP1 and DM5.

5.39 As all wild birds and their nests are protected under the Wildlife and Countryside Act (1981, as amended), all clearance of nesting bird habitat will be undertaken outside of nesting bird season (March to September) or immediately following a check by a suitably qualified ecologist to confirm the absence of any active nests.

Residual Effects

5.40 Overall, the proposed development is anticipated to have no significant effect on the bird population onsite.

Reptiles

Predicted Effects

5.41 A very low population of common lizard is present on site (only one individual recorded). Although the proposed development will result in

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a loss of some suitable habitat from the centre of the site, the majority of the boundary vegetation will be retained, and proposals include widened field boundaries with new thicket and meadow planting.

5.42 Habitat to be retained includes a significant proportion of the boundary hedgerows (c. 0.3ha), and grassland along the northern boundary (c. 0.1ha), so it is anticipated that sufficient opportunities for reptiles will still exist.

5.43 The habitat which will be removed mostly comprises semi-improved grassland (c. 2ha) which is tall, relatively uniform and of sub-optimal suitability for reptiles. In addition, a small amount of tall ruderal / colonising ground vegetation (c. 0.3 ha) and scrub and hedgerow (c. 0.4ha) will be removed. Should reptiles be present within suitable habitat to be cleared, they are at risk of killing / injury during construction works.

5.44 Reptiles could experience an increased level of disturbance in the operational phase due to walkers and dogs using the site, and predation from domestic cats.

5.45 In the absence of mitigation, the proposed development is anticipated to have potential for an adverse impact on reptiles significant at the Site level.

Mitigation Measures

5.46 The POS shall include new habitats of value to reptiles. The functionality of this habitat for reptile species will be maintained through appropriate management, with implementation of a low-intensity cutting regime to create a dense and tussocky sward. Meadow and thicket habitat will be enhanced for reptiles and other wildlife through creation of log piles and hibernacula to increase refuge and hibernation opportunities. In line with policies ENV SP1 and DM5, access routes and planting in the POS will be sensitively designed with an aim to minimise disturbance to reptiles from walkers and dogs.

5.47 To minimise the risk of killing or harming individuals, vegetation clearance will be undertaken using a two-stage approach under an ecological watching brief, which is aligned with clearance of dormouse habitat. Full details can be found within section 5 of the EMES.

Residual Effects

5.48 Subject to the implementation of suitable mitigation measures as appropriate, the proposed development is anticipated to have no significant effect on reptile species.

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Amphibians

Predicted Effects

5.49 GCN are likely absent from the Site. Other amphibian species, including common toad, an S41 species, could be present on Site within suitable terrestrial habitat.

5.50 The proposed development will result in a loss of some habitat suitable for use by amphibians during their terrestrial life phase, and a small garden pond. There is a risk of direct impacts (killing / injury) of amphibians during habitat clearance works.

5.51 The new POS will include widened field boundaries which include new meadow and thicket planting, likely to be value to amphibian species, in the longer term.

5.52 The new SuDS attenuation basin will provide some wetland habitat (c. 0.25ha), including wet meadow grassland and marginal planting. The attenuation basin will include a permanently wet core, which will provide aquatic habitat. New aquatic habitat provision will be beneficial to amphibian species which could use the Site.

5.53 In the absence of mitigation, the proposed development is anticipated to have no significant adverse impact on amphibians. However, mitigation measures have been included below in line with best practice.

Mitigation Measures

5.54 Habitats within the POS will be managed to maximise their suitability for amphibians and other fauna, in line with legislation and policy requirements (e.g. policies ENV SP1 and DM5). This will include a low intensity cutting regime for the meadow planting, to maintain a dense and tussocky sward.

Summary of Effects

5.55 Table 5 below summarises the assessment of effects, including any mitigation and subsequent residual effects.

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Table 5. Summary of effects

Important Ecological Feature	Potential Likely Significant Effect and/or Legal Implication (before mitigation)	Avoidance & Mitigation Measures	Mechanism by which Mitigation is Secured	Residual Effects (after mitigation)
Hedgerows and trees	- Loss of hedgerows H1, H4, H7 and H9, and partial loss of H3 and H5 - Loss of small number of trees - New woodland, tree and buffer planting	- Retention of majority of hedgerows	Ecological Mitigation and Enhancement Strategy (EMES)	No significant effect
Bats	- Loss of minor common pipistrelle roost and minor soprano pipistrelle roost - Temporary loss of foraging habitat (until new planting matures) - Creation of SUDs basin - Increase in ambient lighting	- Mitigation to be delivered under EPS licence including provision of replacement roost locations - Sensitive lighting strategy; delivery of POS to buffer woodland to north	EMES & EPS licence	No significant effect
Badger	- Temporary loss of habitat (until new planting matures) - Risk of falling into open excavations - Increased risk of traffic collisions, disturbance	- Pre-construction badger check - Mitigation as required if should set closure be necessary - Precautionary working methods	EMES	No significant effect
Dormouse	- Temporary loss of nesting/foraging habitat (until new planting matures, which will compensate) - Temporary loss of dispersal routes (until new planting matures) - Greater risk of predation from domestic cats, and traffic collision - Increase in ambient light - Strengthening of dispersal routes along N and W boundaries, and S (once new planting matures) - Significant increase in area of habitat (once new planting matures)	- Mitigation to be delivered under EPS licence, to include provision of nest boxes - New native planting including thorny species to deter predators	EMES & EPS licence	No significant effect
Birds	- Temporary loss of habitat (until new planting matures) - Increased disturbance	- Timing of clearance works - Sensitive design of POS access routes and planting to limit disturbance	EMES	No significant effect

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Important Ecological Feature	Potential Likely Significant Effect and/or Legal Implication (before mitigation)	Avoidance & Mitigation Measures	Mechanism by which Mitigation is Secured	Residual Effects (after mitigation)
Reptiles	- Minor net loss of terrestrial habitat - Risk of killing/injury during construction works - Increased disturbance	- Sensitive design of POS access routes and planting to limit disturbance - Low intensity cutting regime of grassland to ensure suitable habitat long-term	EMES	No significant effect
Amphibians	- Minor net loss of terrestrial habitat - Loss of aquatic habitat (if SuDS attenuation basin can't have permanently wet core) - Risk of killing/injury during construction works - Increased disturbance	- Sensitive design of POS access routes and planting to limit disturbance - Low intensity cutting regime of grassland to ensure suitable habitat long-term	EMES	No significant effect

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Cumulative Effects

5.56 Other nearby plans and projects that could potentially give rise to a significant cumulative effect on the ecological features identified in Table 5 above have been assessed as much as possible using publicly available information. The plans and projects and their confirmed / likely effects on ecological features are summarised in Table 6 and detailed below.

Strategic Housing Allocation in Angmering

5.57 Within the Arun Local Plan 2011 – 2031, the draft Policy H SP1 Strategic Housing Allocation sets out a strategic allocation for 800 homes in north Angmering and 250 homes in south and east Angmering.

5.58 Within the Angmering Neighbourhood Plan 2014 – 2029, policy HD2: Parish Housing Allocation sets out a strategic allocation for at least 66 dwellings on land at Bramley Green South (Mayflower Way), at least 16 dwellings on the Field in Mayflower Way, at least 20 dwellings on the Chandlers site in the centre of the village.

5.59 The majority of landowners within this strategic land allocation have submitted planning applications, and are currently under construction:

- A/82/12: Land to east of Roundstone Lane. Residential development comprising 138 dwellings.
- A/144/15/PL: Land at West End Nursery. Residential development comprising 246 residential dwellings.
- A/154/14/OUT: Pound Place, Roundstone Lane. Residential development comprising 18 dwellings.

Other Developments in Angmering

5.60 Other developments proposed in Angmering included in the assessment are as follows:

- A/45/19/PL: BMW House, Chandlers Garage Ltd (Undecided). Residential development comprising 19 dwellings.
- A/46/19/PL: Land North of Mayflower Way (Undecided). Residential development comprising 24 dwellings.
- A/9/19/PL: Pound Place Roundstone Lane (Undecided). A 62 bedroom care home.
- A/132/17/OUT: Quiet Waters, Roundstone Lane (Undecided). Residential development comprising 30 dwellings.

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- A/131/16/OUT: Land between New Place Bungalow & Arundel Road (Conditioned with S106) Residential development comprising 9 dwellings.

- A/113/15/PL: Premier Inn Spinney and Burberry House Roundstone Lane / Roundstone Road East Preston (Approved Conditionally). Commercial development comprising construction of hotel annexe. A/178/17/OUT: Crete Nursery Dappers Lane (Undecided). Residential development comprising retention of 1 dwelling & the erection of 7 dwellings.

- A/168/18/RES & A/142/16/OUT: Merry England Nursery Dappers Lane (Conditioned with S106). Residential development comprising 18 dwellings.

5.61 The majority of nearby developments, both proposed and under construction, include adequate avoidance, mitigation and compensation measures to result in no significant adverse effects to IEFs. Most of the developments retain much of their boundary vegetation, with the exception of access breaks. Many of the developments, particularly the larger schemes, include significant new native planting and habitat creation which will benefit a range of wildlife.

5.62 No significant impacts nor potential for cumulative impacts were noted with regards to planning applications A/45/19/PL, A/9/19/PL , A/46/19/PL, A/82/12, A/132/17/OUT, A/178/17/OUT, A/142/16/OUT.

5.63 With regard to development at Land between New Place Bungalow & Arundel Road, potential adverse impacts in relation to dormice are predicted. Whilst no dormouse surveys were completed to inform this planning application, nor was any specific mitigation provided, dormice have now been recorded along H2, H3 and H9 which border this site. Outline proposals for the site include retention of boundary vegetation and strengthening along the roadside with native broadleaved planting. However, development at both sites will increase risk of disturbance by noise and artificial lighting, and predation of dormice by domestic cats. Overall, it is anticipated that there will be a cumulative adverse impact significant at the Site level.

5.64 Development at Land at West End Nursery and Premier Inn Spinney and Burberry House is anticipated to overall have a beneficial impact on a number of IEFs through ecological enhancement measures. Development at Pound Place is anticipated to have an adverse effect on nesting birds through habitat removal.

5.65 Cumulatively, the nearby developments in combination with the proposed development are anticipated to have a temporary adverse impact on nesting birds significant at the local level, as there will be a reduction in available nesting and foraging habitat through vegetation

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clearance. This effect will be relatively short term (c. 5 years) and only last until new planting matures.

Table 6. Summary of cumulative effects

Ecological Feature	Description of Potential Residual Effects Inclusive of Mitigation (if applicable)				Geographic Scale of Cumulative Effect with Proposed Development
	A/144/15/PL	A/154/14/OUT	A/131/16/OUT	A/113/15/PL	
Hedgerows and trees	Positive impact significant at Site level	Adverse impact significant at Site level	No significant impact	No significant impact	No significant impact
Bats	Positive impact significant at Site level	Adverse impact significant at Site level	No significant impact	Positive impact significant at Site level	No significant impact
Badger	No significant impact	No significant impact	No significant impact	No significant impact	No significant impact
Dormouse	No significant impact	No significant impact	Adverse impact significant at Site level	No significant impact	Adverse impact significant at Site level
Birds	No significant impact	Adverse impact significant at Site level	No significant impact	No significant impact	Temporary adverse impact significant at local level until new planting matures
Reptiles	Positive impact significant at Site level	No significant impact	No significant impact	No significant impact	No significant impact
Amphibians	Positive impact significant at Site level	No significant impact	No significant impact	No significant impact	No significant impact

Compensation

5.66 To compensate for the temporary loss of bird nesting habitat until new planting matures, 10 nest boxes will be installed on retained mature trees and integrated into new buildings. A mix of nest boxes will be selected which are suitable for the species of conservation concern present locally, including swallow terraces to compensate for lost opportunities within the buildings.

Enhancement

5.67 The Development Framework Plan includes landscape planting enhancements which will make positive contributions to on-site biodiversity. New habitat creation will provide opportunities for species

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confirmed to be present on-site at baseline, such as nesting birds. In addition to these enhancements which are embedded into development proposals, a range of additional ecological enhancement measures will be delivered as part of the proposed development, as identified below. Further details can be found in the EMES, and will be set out in full in a Landscape and Ecology Management Plan (LEMP) at the detailed design stage, however as an indicative guide:

- Inclusion of plant species of known wildlife value within the landscaping scheme, including night-scented varieties to benefit bats, and species of known benefit to dormice such as honeysuckle Lonicera periclymenum and hazel.

- Provision of new bat roosting opportunities: At least 15 bat boxes will be erected on mature trees or new builds. These will be a purpose-built, durable and long-lasting variety such as available from Schwegler or Habibat. Where possible, these will be incorporated into the fabric of new builds.

- Provision of new dormouse nesting opportunities: At least 20 new heavy-duty dormouse boxes will be erected on retained trees along the Site boundaries.

- Provision of new bird nesting opportunities: At least 10 bird nesting boxes will be provided in new/retained planting to benefit generalist bird species.

- Creation of log piles: Timber generated from tree clearance works at the Site will be used to make at least 5 log piles for wildlife benefit. These will be sited within boundary vegetation where they will be least disturbed. New material can be added as required following any future management works.

- Appropriate management of the POS: Both retained habitat and new planting within the ecology corridor will be managed to maximise their suitability for wildlife, to include a low-intensity cutting regime for the meadow and extended cutting intervals for hedgerows.

Monitoring

5.68 Ongoing monitoring of newly established and enhanced habitats as part of the POS will be completed. This commitment will be made, and further detail provided, within the LEMP to be prepared at the detailed design stage.

5.69 Monitoring of the bat boxes is proposed to occur in the summer of year 1 post-development, although no formal monitoring requirement is

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anticipated for the EPS licence given the low conservation status of the roost(s) to be lost.

5.70 Monitoring of the dormouse boxes is proposed to occur in years 1 and 3 post-development, to be confirmed in the EPS licence, with monitoring checks undertaken in May, August and September each year (often the peak months). The results will be used to inform future management if necessary and will be reported to Natural England, the local records centre and any local interest groups. It is hoped that liaison with the local dormouse group can ensure that monitoring of the boxes is undertaken in the longer-term.

5.71 Any records of protected species will be submitted to the Sussex Biodiversity Records Centre annually, and records of bat roosts will be provided to Sussex Bat Group who will also be encouraged to continue monitoring in the longer term. These commitments will be made, and further detail provided, within the LEMP to be prepared at the detailed design stage.

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6.0 CONCLUSIONS

6.1 In the absence of any mitigation measures, the proposed development would be anticipated to have, at most, adverse effects significant at the Local level. However, with the implementation of some straightforward mitigation and precautionary measures as proposed with this scheme, the development is not anticipated to result in any significant adverse residual effects to important ecological features.

6.2 Based on successful implementation of avoidance, mitigation and enhancement measures to be informed by further survey work as set out herein, the development proposals have the scope to accord with relevant nature conservation legislation, as well as with the provisions of the Arun District Council Local Plan 2003, Draft Local Plan 2014 and Angmering Neighbourhood Plan 2014.

6.3 The Development Framework Plan will deliver net benefits for wildlife in the form of additional habitats, with the opportunity to provide additional biodiversity enhancement measures alongside the new housing. The measures set out herein can be secured through appropriate conditions imposed upon any planning consent, and the development may therefore be delivered without harm to nature conservation interests.

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Appendix A

Habitats Plan & Photosheet

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Plate 1. Site entrance from Arundel Road



Plate 2. Caravans park with amenity grassland and hardstanding in north-east of Site



Plate 3. Pond in garden of bungalow



Plate 4. Tall ruderal and colonising ground in north-east of Site



Plate 5. Arable stubble and mature boundary vegetation



Plate 6. Arable stubble and mature boundary vegetation and scrub

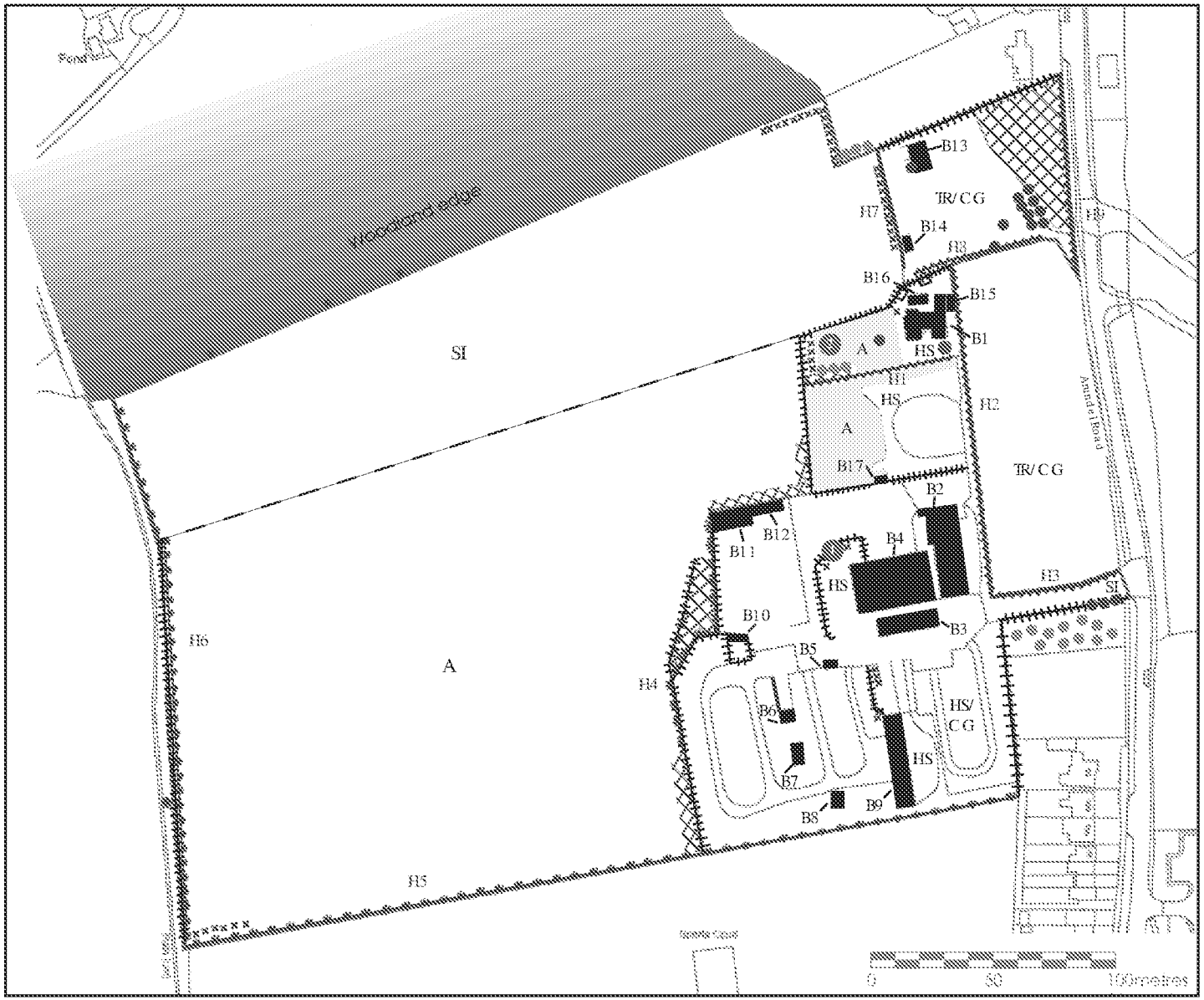


Photo 7. Arable on left, semi-improved grassland and woodland edge to right



Photo 8. Mature oak tree along western boundary

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- Site Boundary
- Species-rich hedge with trees (H4-6)
- Species-rich hedge (H1-3 & 8-9)
- Species-poor hedge (H7)
- Fence
- A — Arable
- SI — Semi-improved grassland
- A — Amenity grassland
- Dense scrub
- Scattered scrub
- CG — Colonising ground
- HS — Hard standing
- TR — Tall ruderal
- Buildings (B1-13)
- Wall
- Individual trees - deciduous
- Individual trees - coniferous
- Pond
- Trees with features suitable for roosting bats
- 1 - Brash pile; 2 - Garden: amenity grassland with ornamental planting, mature trees & shrubs, chestnut post & rail fencing

N

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Project:	Land West of Arundel Road, Angmering	Date: January 2017	Drawing No.: CSA/3467/102
Drawing Title:	Habitats Plan	Scale @ A4: See scale bar	Rev: A
Client:	Gladman Developments Ltd.	Drawn: KW/JT	Checked: JT

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Appendix B

Legislation and Planning Policy

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The Conservation of Habitats and Species Regulations 2017 (as amended) enacts the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, and Council Directive 79/409/EEC on the Conservation of Wild Birds, into UK law. The Regulations allow for the designation of Statutory Nature Conservation-sites (SACs and SPAs) and European Protected Species ('EPS' including all UK bat species, great crested newt, hazel dormouse and otter) which are assigned a greater level of protection than under national legislation.

The Wildlife and Countryside Act 1981 (as amended) forms the primary piece of UK legislation relating to the protection of habitats and species (including nesting birds, reptiles and water vole). Additionally, badgers are protected under the Protection of Badgers Act, 1992.

Section 40(1) of the Natural Environment and Rural Communities (NERC) Act 2006 states that each public authority "must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity". This legislation makes it clear that planning authorities should consider impacts to biodiversity when determining planning applications, with particular regard to the Section 41 list of 56 habitats and 943 species of principal importance, irrespective of whether they are covered by other legislation. The S41 list was taken forward for action under the UK BAP (first published in 1994). The UK BAP has now been superseded by the Biodiversity 2020 Strategy1, which continues to prioritise the S41 list, setting national targets for the period to 2020, and the UK Post-2010 Biodiversity Framework2, which shows how these contribute to targets at the European level. Whilst BAPs are therefore no longer formally recognised, many of the tools and resources originally developed for the BAP remain in use, such as the background information which still forms the basis of work at national level.

The National Planning Policy Framework (2019) (NPPF) sets out the government planning policies for England and how they should be applied. With regards to ecology and biodiversity, Chapter 15: Conserving and Enhancing the Natural Environment, paragraph 170, states that the planning system and planning policies should minimise impacts on and provide net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

Paragraph 175 sets out the principles that local planning authorities should apply when determining planning applications:

- If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts).

[1] Defra (2011) *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*. Defra, London
[2] JNCC and Defra (2012) UK Post-2010 Biodiversity Framework (on behalf of the Four Countries' Biodiversity Group). July 2012.

- Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest.

- Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists.

- Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

The Government Circular 06/2005, which is referred to within the NPPF, defines statutory nature conservation sites and protected species as a material consideration in the planning process.

Local planning policies of relevance to ecology, biodiversity and/or nature conservation have been set out in Table B.1 below.

Table B.1. Summary of regional and local planning policy relating to ecology

Policy	Summary
Arun District Local Plan 2011-2031 (Adopted July 2018)	
Policy ENV SP1: Natural Environment	Arun District Council will encourage and promote the preservation, restoration and enhancement of biodiversity and the natural environment through the development process and particularly through policies for the protection of both designated and non-designated sites. Where possible it shall also promote the creation of new areas for habitats and species. In relation to designated sites, development will be permitted where it protects sites listed in Tables 17.1-17.7 that are recognised for the species and habitats contained within them.
Policy ENV DM1: Designated Sites of biodiversity or geological importance	a) Proposed development likely to have an adverse effect on land with the designated features of any Site of Biodiversity or Geological Importance as listed in Tables 17.1-17.7 or any subsequently designated sites (either individually or in combination with other developments), will not normally be permitted. Consideration will be given to the exact designated features present on the site, their scarcity/rarity and recognition of the protection offered by their existing status. Development on wildlife sites with the highest value will only be permitted exceptionally where the following can be demonstrated: i. There is no alternative solution (which shall be adequately demonstrated by the developer). ii. There are reasons of public health or public safety or

Policy	Summary
	iii. There are benefits of primary importance to the environment or iv. There are imperative reasons of overriding public interest. Notwithstanding the above however, the presumption in favour of sustainable development does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined. b) In determining any planning application affecting Sites of Biodiversity or Geological Importance the Council will ensure that the intrinsic natural features of particular interest are safeguarded or enhanced having regard to; i. The European, National or Local status and designation of the site; ii. ii. The nature and quality of the site's features, including its rarity value; iii. iii. The extent of any adverse impacts on the notified features of interest; iv. iv. The need for compensatory measures in order to re-create remaining features of habitats on or off the site. c) Where appropriate the Council will ensure the effective management of designated sites through the imposition of planning conditions or Section 106 agreements as appropriate.
Policy ENV DM4: Protection of trees	Development will be permitted where it can be demonstrated that trees protected by a Tree Preservation Order(s), (TPO) identified as Ancient Woodland, in a Conservation Area or contributing to local amenity, will not be damaged or destroyed now and as they reach maturity, unless development: a. Would result in the removal of one or more trees in the interests of good arboricultural practice. This shall be demonstrated by the developer following the advice of a suitably qualified person which shall be guided by BS 5837 (2012). Details of any advice received having regard to BS 5837 (2012) shall be submitted, in writing, as part of a planning application; or b. Would enhance the survival and growth prospects of other protected trees; c. The benefits of the proposed development in a particular location outweigh the loss of trees or woodland, especially ancient woodland. Where planning permission is granted in any of the above instances, conditions shall be used to ensure that, for any trees which are removed as part of a development, at least an equivalent number of a similar species and age (where practical) are planted on the proposed development site. Sufficient space for replacement trees to mature without causing future nuisance or damage shall be provided. The planting of new trees shall form an integral part of the design of any development scheme. Proper provision must be made for the protection and management of trees or areas of woodland on-site when

Policy	Summary
	undertaking development. A management plan shall be provided as part of a planning application in accordance with BS 5837 (2012) in order to ensure that trees are adequately protected during development and appropriately maintained in the future. Conditions for the continued protection of trees on sites shall be included in any planning permission given. Where there are existing trees on or adjacent to a development site, developers shall be required to provide: d. Land and tree surveys e. A tree constraints plan f. An arboricultural impact assessment to include a tree protection plan and arboricultural method statement These will ensure that development is planned to take a comprehensive view of tree issues at an early stage in the design process and that development works do not have a negative impact on existing trees.
Policy ENV DM5: Development and biodiversity	Development schemes shall, in the first instance, seek to achieve a net gain in biodiversity and protect existing habitats on site. They shall also however incorporate elements of biodiversity including green walls, roofs, bat and bird boxes as well as landscape features minimising adverse impacts on existing habitats (whether designated or not). Development schemes shall also be appropriately designed to facilitate the emergence of new habitats through the creation of links between habitat areas and open spaces. Together, these provide a network of green spaces which serve to reconnect isolated sites and facilitate species movement. Where there is evidence of a protected species on a proposed development site, planning applications shall include a detailed survey of the subject species, with details of measures to be incorporated into the development scheme to avoid loss of the species. This involves consideration of any impacts that will affect the species directly or indirectly, whether within the application site or in an area outside of the site, which may be indirectly affected by the proposals. All surveys shall be carried out at an appropriate time of year and shall be undertaken by a qualified and, where appropriate, suitably licensed person. All developments shall have regard to Natural England's standing advice for protected species.

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Appendix C

Desk Study Information

Site Check Report Report generated on Thu Oct 26 2017
You selected the location: Centroid Grid Ref: TQ065053
The following features have been found in your search area:

SSSI Impact Risk Zones - to assess planning applications for likely impacts on SSSIs/SACs/SP As & Ramsar sites (England)

1. DOES PLANNING PROPOSAL F ALL INT O ONE OR MORE OF THE CATEGORIES BELOW?	2. IF YES, CHECK THE CORRESPONDING DESCRIPTION(S) BELOW. LPA SHOULD CONSULT NATURAL ENGLAND ON LIKELY RISKS FROM THE FOLLOWING:
All Planning Applications	
Infrastructure	Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals.
Wind & Solar Energy	
Minerals, Oil & Gas	Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.
Rural Non Residential	
Residential	
Rural Residential	
Air Pollution	Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, pig & poultry units, slurry lagoons > 200m² & manure stores > 250t).
Combustion	General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.
Waste	Landfill. Incl: inert landfill, non-hazardous landfill, hazardous landfill.
Composting	Any composting proposal with more than 75000 tonnes maximum annual operational throughput. Incl: open windrow composting, in-vessel composting, anaerobic digestion, other waste management.
Discharges	
Water Supply	Large infrastructure such as warehousing / industry where total net additional gross internal floorspace following development is 1,000m² or more.
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Infrastructure	Pipelines, pylons and overhead cables. Any transport proposal including road, rail and by water (excluding routine maintenance). Airports, helipads and other aviation proposals.
Wind & Solar Energy	Wind turbines.
Minerals, Oil & Gas	Planning applications for quarries, including: new proposals, Review of Minerals Permissions (ROMP), extensions, variations to conditions etc. Oil & gas exploration/extraction.
Rural Non Residential	Large non residential developments outside existing settlements/urban areas where footprint exceeds 1ha.
Residential	Residential development of 50 units or more.
Rural Residential	Any residential development of 10 or more houses outside existing settlements/urban areas.
Air Pollution	Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, pig & poultry units, slurry lagoons > 200m² & manure stores > 250t).
Combustion	General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.
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Discharges	Any discharge of water or liquid waste of more than 5m³/day to ground (ie to seep away) or to surface water, such as a beck or stream (NB This does not include discharges to mains sewer which are unlikely to pose a risk at this location).
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Rural Non Residential	Large non residential developments outside existing settlements/urban areas where footprint exceeds 1ha.
Residential	
Rural Residential	Any residential development of 100 or more houses outside existing settlements/urban areas.
Air Pollution	Any industrial/agricultural development that could cause AIR POLLUTION (incl: industrial processes, pig & poultry units, slurry lagoons > 200m² & manure stores > 250t).
Combustion	General combustion processes >20MW energy input. Incl: energy from waste incineration, other incineration, landfill gas generation plant, pyrolysis/gasification, anaerobic digestion, sewage treatment works, other incineration/ combustion.
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Local Nature Reserves (England)
No Features found

National Nature Reserves (England)
No Features found

Sites of Special Scientific Interest (England)
No Features found

Site Check Report Report generated on Thu Oct 26 2017
You selected the location: Centroid Grid Ref: TQ065053
The following features have been found in your search area:

Ramsar Sites (England)

Name	ARUN VALLEY
Reference	UK11004
Hectares	530.42

Special Areas of Conservation (England)

Name	ARUN VALLEY
Reference	UK0030366
Hectares	487.48
Hyperlink	http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?eucode=UK0030366

Special Protection Areas (England)

Name	ARUN VALLEY
Reference	UK9020281
Hectares	530.42

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3467_3km site search



Legend

- Local Nature Reserves (England)
- National Nature Reserves (England)
- Sites of Special Scientific Interest (England)
- SSSI Impact Risk Zones - to assess planning applications for likely impacts on SSSIs/SACs/SPAs & Ramsar sites (England)

Projection = OSGB36
xmin = 494000
ymin = 99150
xmax = 519100
ymax = 111700

0 1 2
km

Map produced by MAGIC on 26 October, 2017.

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3467_10km site check map



Legend

- Ramsar Sites (England)
- Special Areas of Conservation (England)
- Special Protection Areas (England)

Projection = OSGB36
xmin = 459600
ymin = 82600
xmax = 557400
ymax = 128800

0 3.5 7
km

Map produced by MAGIC on 26 October, 2017.

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Appendix D

Habitats and Flora Species List

Table D1. Indicative botanical species list for habitats present in land to the west of Arundel Road, Angmering collected during the Phase 1 habitat survey September 2017

Latin name	Common name	Garden (introduced shrub planting and amenity grassland)	Semi-improved grassland	Hard standing with colonising ground	Arable Field margins	Hedgerows
Herb species						
Achillea millefolium	Yarrow					✓
Agrimonia spp.	Agrimony					✓
Anagallis arvensis	Scarlett pimpernel			✓		
Arctium spp.	Burdock sp.			✓		
Argentina anserina	Silverweed		✓ (east margins)	✓		
Aster spp.	Aster sp.			✓		
Bellis perennis	Daisy			✓		
Calystegia sepium	Hedge bindweed				✓	✓
Capsella bursa-pastoris	Shepherds purse			✓		
Cardamine hirsuta	Bittercress			✓		
Centaurea nigra	Common knapweed					✓
Centranthus ruber	Red valerian			✓		
Cerastium fontanum	Common mouse-ear		✓			
Chenopodium spp.	Goosefoot				✓	
Cirsium arvense	Creeping thistle		✓	✓		
Cirsium spp.	Thistles			✓	✓	
Cirsium vulgare	Spear thistle		✓	✓		
Clematis spp.	Clematis					✓
Convolvulus arvensis	Field bindweed		✓			
Cruciata laevipes	Crosswort					✓
Dahlia spp.	Dahlia	✓				
Dipsacus spp.	Teasel	✓	✓	✓	✓	
Epilobium spp.	Willow herb			✓		
Erigeron spp.	Fleabane	✓	✓	✓	✓	✓
Eupatorium cannabinum	Hemp agrimony			✓		
Euphorbia helioscopia	Sun spurge				✓	
Euphorbia spp.	Spurge sp.			✓		
Fragaria vesca	Wild strawberry					✓
Fumaria officinalis	Fumitory				✓	
Galium spp.	Bedstraw					✓
Geranium molle	Dovesfoot				✓	
Geranium spp.	Cranesbill		✓			
Glechoma hederacea	Ground ivy			✓		
Helianthus spp.	Sunflower	✓				
Heracleum spp.	Hogweed	✓				
Hibiscus syriacus	Rose of Sharon	✓				
Hypericum perforatum	St John's wort	✓	✓			✓
Jacobaea vulgaris	Ragwort		✓	✓		
Lamium purpureum	Red dead nettle			✓		
Leucanthemum vulgare	Oxeye daisy			✓		
Malva neglecta	Field mallow			✓		

Matricaria chamomilla	Scented mayweed			✓		
Medicago lupulina	Black medick			✓		
Myosotis spp.	Forget-me-not			✓		
Ononis repens	Rest harrow		✓			
Picris echioides	Bristly ox tongue		✓	✓		
Plantago coronopus	Buckhorn plantain			✓		
Plantago lanceolata	Ribwort plantain			✓		
Plantago major	Greater plantain			✓		
Potentilla reptans	Creeping cinquefoil			✓		
Prunella vulgaris	Selfheal	✓		✓		
Pteridium spp.	Bracken					✓
Ranunculus spp.	Buttercup	✓	✓			
Rumex spp.	Dock	✓	✓	✓	✓	
Solanaceae spp.	Nightshade sp.			✓		
Sonchus spp.	Sow thistles			✓		
Stachys sylvatica	Hedge woundwort		✓ (margins)			
Stellaria holostea	Greater stitchwort					✓
Taraxacum spp.	Dandelion			✓		
Trifolium repens	White clover		✓	✓		
Trifolium spp.	Clover		✓	✓	✓	
Tripleurospermum inodorum	Scentless mayweed			✓		
Urtica spp.	Nettles		✓	✓	✓	
-	Various ornamental shrubs	✓				
Vicia cracca	Tufted vetch		✓			
Grasses, rushes and sedges						
Bromus hordeaceus	Soft-brome		✓			
Dactylis glomerata	Cock's-foot		✓		✓	✓
Festuca rubra	Red fescue	✓				
Holcus lanatus	Yorkshire fog		✓	✓		
Lolium perenne	Perennial rye grass	✓	✓	✓		
Phleum pratense	Timothy		✓			
Poa annua	Annual meadow-grass	✓		✓		
Arrhenatherum elatius	False oat grass					✓
Brachypodium sylvaticum	False brome					✓
Juncus inflexus	Hard rush					✓
Woody species						
Acer campestre	Field maple					✓
Acer pseudoplatanus	Sycamore					✓
Aesculus hippocastanum	Horse chestnut					✓
Alnus glutinosa	Common Alder					✓
Buddleja spp.	Buddleia	✓				
Buddleja spp.	Buddleia					✓
Clematis vitalba	Traveller's joy					✓
Cornus spp.	Dogwood	✓				
Corylus avellana	Hazel					✓

Cotoneaster spp.	Cotoneaster					✓
Crataegus monogyna	Hawthorn					✓
Cupressus × leylandii	Leylandii					✓
Euonymus europaeus	Spindle					✓
Fagus sylvatica	Beech					✓
Fraxinus excelsior	Ash			✓		✓
Hedera spp.	Ivy					✓
Ligustrum vulgare	Wild privet					✓
Malus spp.	Apple tree	✓				
Populus spp.	Poplar spp.					✓
Populus tremula	Aspen					✓
Prunus avium	Cherry					✓
Prunus spinosa	Blackthorn					✓
Prunus spp.	Prunus (domesticated)	✓				✓
Quercus spp.	Oak sp.					✓
Rosa arvensis	Field rose					✓
Rosa canina spp.	Dog rose					✓
Rubus fruticosus agg.	Bramble					✓
Salix spp.	Willow					✓
Sambucus nigra	Elder					✓
Tilia platyphyllos	Large-leaved lime					✓
Ulmus spp.	Elm					✓

Table D2. Indicative botanical species list for hedgerows present in land to the west of Arundel Road, Angmering collected during the Phase 1 habitat survey September 2017

Hedgerow Number		H1	H2	H3	H4	H5	H6	H7	H8	H9
Common name	Latin name	Managed garden hedge	Mature c.4m tall	Mature c.4m tall	Mature c.5m tall	Tall tree belt	Wide & scrubby, outgrown with mature trees	Dense c.5m tall	Dense, mature, c.5m tall	Dense, outgrown, c.4m tall
Woody species										
Acer campestre	Field maple				✓	✓				
Acer pseudoplatanus	Sycamore									
Aesculus hippocastanum	Horse chestnut									
Alnus glutinosa	Common Alder					✓				
Buddleja spp.	Buddleia									✓
Clematis vitalba	Traveller's joy						✓			
Corylus avellana	Hazel								✓	
Crataegus monogyna	Hawthorn		✓	✓	✓		✓		✓	
Cupressus × leylandii	Leylandii		✓ (dominant to north)							
Euonymus europaeus	Spindle			✓						
Fagus sylvatica	Beech	✓	✓							
Fraxinus excelsior	Ash		✓	✓		✓ (dominant)				
Hedera spp.	Ivy	✓		✓	✓	✓			✓	

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Ligustrum vulgare	Wild privet			✓						
Populus sp.	Poplar spp.					✓				
Populus tremula	Aspen					✓				
Prunus avium	Cherry					✓				
Prunus spinosa	Blackthorn		✓	✓			✓ (dominant)	✓	✓	✓
Prunus spp.	Prunus (domesticated)				✓					
Quercus sp.	Oak sp.					✓	✓			
Rosa arvensis	Field rose			✓						
Rosa canina spp.	Dog rose		✓		✓		✓			
Rubus fruticosus agg.	Bramble	✓	✓							
Salix spp.	Willow (saplings)				✓		✓			✓
Sambucus nigra	Elder	✓				✓			✓	✓
Tilia platyphyllos	Large-leaved lime					✓				
Ulmus spp.	Elm			✓	✓		✓		✓	✓
Cotoneaster sp.	Cotoneaster	✓								
Herb species										
Achillea millefolium	Yarrow			✓						
Agrimonia sp.	Agrimony			✓						
Calystegia sepium	Hedge bindweed									✓
Centaurea nigra	Common knapweed			✓						
Clematis sp.	Clematis			✓						

Cruciata laevipes	Crosswort			✓						
Erigeron sp.	Fleabane			✓						
Fragaria vesca	Wild strawberry			✓						
Galium sp.	Bedstraw			✓						
Hypericum perforatum	St John's wort			✓						
Pteridium sp.	Bracken			✓						
Stellaria holostea	Greater stitchwort			✓						
Grasses, rushes and sedges										
Arrhenatherum elatius	False oat grass			✓						
Brachypodium sylvaticum	False brome			✓						
Dactylis glomerata	Cock's-foot			✓						
Juncus inflexus	Hard rush									

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Appendix E

Evaluation & Assessment Methods

Ecological features are evaluated and assessed with due consideration for the Chartered Institute of Ecology and Environmental Management (CIEEM) 2018 Guidelines for Ecological Impact Assessment (EcIA). For clarity, the evaluation and assessment process adopted within this EcIA is set out below.

Establishing Potentially Important Ecological Features

Ecological features are assessed where they are considered to be important, and where they may be impacted by a proposed development. A feature may be considered important for a variety of reasons, such as quality, extent, rarity and/or statutory protection. Table E.1 below sets out a non-exhaustive list of ecological features that are typically considered, along with key examples:

Table E.1. Potentially important ecological features (adapted from CIEEM 2018)

Potentially Important Ecological Features	Typical examples
Statutory designated sites under international conventions or European Legislation	Wetlands of International Importance (Ramsar sites), Special Areas of Conservation (SAC), Special Protection Areas (SPA)
Statutory designated sites under national legislation	Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR, Local Nature Reserves (LNR)
Non-statutory, locally designated wildlife sites	Local Wildlife Sites (LWS), County Wildlife Sites (CWSs), Sites of Importance for Nature Conservation (SINCs)
National biodiversity lists	Habitats or Species of Principal Importance for the Conservation of Biodiversity (Section 41, NERC Act 2006), Ancient Woodland Inventory
Local biodiversity lists	Local Biodiversity Action Plan (BAP) priority species or habitats
Red Listed / Rare Species	Species of conservation concern, Red Data Book (RDB) species, Birds of Conservation Concern, nationally rare and nationally scarce species
Legally Protected Species	E.g. species listed under Sch.5 of the W&C Act 1981, or Sch.2 of the Hag. Regs. 2017
Legally Controlled Species	E.g. species listed under Sch.9 of the W&C Act 1981

It should also be noted that the social, community, economic or multi-functional importance attributed to ecological features are not assessed as they fall outwith the scope of this assessment.

Establishing Likely Zone of Influence

The 'zone of influence' for a project is the area over which ecological features may be subject to significant effects as a result of the project and associated activities. The project's zone of influence varies across different ecological features, which have different vulnerabilities and sensitivities. For the purposes of this assessment, the following zones were considered:

- International statutory nature conservation designations up to 10km from the Site
- National and local statutory nature conservation designations up to 3km from the Site
- Non-statutory locally designated wildlife sites up to 1km from the Site

These arbitrary distances are considered sufficient for identifying the nature conservation designations which could be subject to significant effects. However, it is acknowledged that in certain circumstances effects beyond these distances are possible and should be considered as far as is reasonably practicable to do so.

For other ecological features, such as habitats and species, the appropriate zone of influence is described and justified as appropriate within the report, depending on their respective sensitivity to an environmental change.

The results of professionally accredited or published scientific studies have been used and referenced, where available, to establish the spatial and temporal limits of the biophysical changes likely to be caused by specific activities, and to justify decisions about the zone of influence.

Geographic Context and Significance Criteria

The importance of ecological features, as well as the significance of any likely impacts and their effects, are considered here within a defined geographic context:

- International
- National
- Regional
- County
- Local

The size, conservation status and the quality of features are all relevant in determining their importance and assigning this to the geographic scale. Where the importance of a feature is considered to fall below the Local scale, they are scoped out of detailed assessment.

Impacts and their effects are taken to be significant where they support or undermine biodiversity conservation objectives, with the scale of significance defined according to the above geographic context. Where

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an impact or effect is unlikely to be perceptible at a Local scale, this is taken to be not significant.

Characterising Ecological Impacts and their Effects

Where likely significant ecological impacts and effects are identified in connection with the proposed project, these are considered and described with reference to the following characteristics (where this is helpful in accurately portraying the ecological effect and determining the scale of significance):

- Positive or negative (i.e. does the anticipated change accord with nature conservation policies and objectives?)
- Extent (i.e. the spatial area over which the impact or effect may occur)
- Magnitude (i.e. the quantified size, amount, intensity or volume)
- Duration (i.e. the timeframe over which the impact or effect may occur, in both human and ecological terms)
- Frequency and timing (i.e. the number of times an activity occurs, where this is likely to influence the effect)
- Reversibility (i.e. is spontaneous recovery possible or may the effect be counteracted by mitigation?)

Appendix F

Bat survey report
Building inspection photosheet
Bat activity transect survey routes plan (CSA/3467/109)
Bat habitat utilisation plan (CSA/3467/110)
Bat building survey plan (CSA/3467/122)

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Introduction

Survey design, data analysis and interpretation set out herein has been undertaken with due consideration for the Bat Conservation Trust (BCT) guidelines 3rd Edition (BCT, 2016).

Legislation

All species of British bats are legally protected under part 3 (Section 41) of the Conservation of Habitats and Species Regulations 2017. These Regulations make it an offence to:

- Deliberately capture, injure, or kill a bat;
- Deliberately disturb bats, impairing their ability to survive, breed, reproduce or rear/nurture their young;
- Damage or destroy a breeding site or resting place used by bats; or
- Be in possession of, transport, sell, exchange or offer to sell/exchange a bat (dead or alive) or any part of a bat.

All bats and their roosts in England, Scotland and Wales were originally protected under the Wildlife & Countryside Act 1981. Subsequent amendments to the legislation for England and Wales has removed bats from most of the provisions of the Act, however it remains an offence to:

- Intentionally or recklessly disturb a bat while it is occupying a structure or place which it uses for shelter or protection; or
- Intentionally or recklessly obstruct access to any structure or place that a bat uses for shelter or protection.

Disturbance of bats is covered by both the 2010 Regulations and the 1981 Act, with the magnitude of disturbance critical. Disturbance that impairs survival or successful reproduction would be covered by the Regulations with no legal defence existing. Less significant acts of disturbance may only be covered by the Wildlife & Countryside Act 1981, which includes some legal defences that may be applied in certain circumstances.

It is important to note that bat roosts are protected throughout the year, regardless of whether or not bats are present at the time. Under the Conservation of Habitats and Species Regulations the offence of damaging or destroying a breeding site or resting place of bats is not subject to any legal defence, i.e. an offence will have been committed even if the damage or destruction occurs accidentally.

Licensing

Where development is proposed that would result in an offence under the Habitats and Species Regulations a European Protected Species (EPS) licence needs to be granted by Natural England to permit an act that would otherwise be unlawful. This provides for a specific derogation from the legislation, to prevent a legal infringement occurring. To obtain an EPS

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licence for development it must be demonstrated that the purpose of the act to be licensed is for:

> *"preserving public health or public safety or other imperative reasons of overriding public interest including those of social or economic nature and beneficial consequences of primary importance for the environment"* (Regulation 53(2)(e)).

In addition Natural England will not grant an EPS licence unless they are satisfied that:

> *"There is no satisfactory alternative" (Regulation 53(9)(a))*; and
> *"The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range"* (Regulation 53(9)(b)).

Methods

Preliminary Roost Assessment

The aim of the preliminary roost assessment is completed to determine the suitability of the building for roosting bats. Where significant potential for, or evidence of, roosting bats is identified, further bat roost surveys are generally necessary to determine the presence or likely absence of a roost, and to characterise any roost present. The method described below has been followed with due consideration of the current guidelines (BCT, 2016).

A detailed inspection of the exterior of structures at the Site was undertaken to (i) identify any Potential Roost Features (PRFs) and potential bat ingress / egress points, and (ii) locate any evidence of bats such as live or dead specimens, droppings, urine splashes, fur-oil staining, feeding remains (e.g. moth wings) and/or squeaking noises. Internal inspections were also undertaken for buildings B1, B2, B7, B8, B9 and B13, which were scoped in due to suitable features noted during the external inspections. Equipment used included ladders, high-powered torches and close-focusing binoculars, as appropriate. The external inspection of the on-site structures and internal inspection of B1 was carried out by Clare Caudwell ACIEEM (2015-15070-CLS-CLS) and Jessica Tait GradCIEEM on 06 September 2017. The external and internal inspection of B2, B8 and B13 was carried out by Tilly Fitzwebster (2017-31876-CLS-CLS) and Jessica Tait on 13 March 2018.

Evaluation

Following the assessments, each structure was assigned one of the following categories in respect of its potential to support roosting bats (adapted from Collins, 2016):

- Negligible: no obvious PRFs
- Low: a structure with one or more PRFs that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions

and/or suitable surrounding habitat to be used on a regular basis by large numbers of bats.

- Moderate – a structure with one or more PRFs that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat; but unlikely to support a roost of high conservation status.
- High – a structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

Dusk Emergence Survey

During the survey, surveyors were positioned strategically to maximise their visual coverage of the building. Emergence surveys began c. 15 minutes before British Summer Time (BST) sunset and continued for approximately 1.5 hours after sunset with due consideration for the BCT good practice guidelines. The survey work was led by Jessica Tait GradCIEEM, an experienced bat surveyor. The survey was undertaken in suitable weather conditions (see Table 1 below).

Table F.1 Weather conditions during emergence survey, 20 September 2017

Survey Date	Buildings Surveyed	Sunset/ Sunrise	Start Time	End Time	Temperature (°C)		Precip-itation	Cloud Cover (Oktas)		Wind (Beaufort Scale)	
					Min	Max		Min	Max	Min	Max
20/09/17	1	19:04	19:04	20:34	15	15	Dry	46	46	23	23
01/05/18	8, 9	20:22	20:03	21:45	12	11	Dry	8	4	2	1
09/05/18	8, 9	20:35	20:30	22:00	14	12	Dry	8	8	2	2
14/05/18	13, 15, 16	20:43	20:45	22:13	18	15	Dry	4	2	1	1
15/05/18	2, 3, 4	05:13	03:45	05:13	13	12	Dry	0	0	5	4
06/06/18	2, 3, 4	21:11	20:41	22:41	22	17	Dry	2	3	0	1
07/06/18	1, 13	04:50	03:25	04:50	19	15	Dry	8	8	2	1
12/06/18	3, 4	21:16	21:01	22:46	16	19	Dry	0	6	0	0

During the survey, the surveyors, each equipped with a hand-held Wildlife Acoustics EM3 bat detector or Elekon BatLogger M, watched for any bats emerging from/entering parts of the buildings/trees and using key flight lines. A note was made of all bat passes, along with the time, species and any information regarding behaviour, including direction of flight, and activity e.g. foraging/commuting. As it was hard to access / view the narrow alley between buildings B3 and B4, a Wildlife Acoustics SM2 bat detector was affixed to an infrared camera rig to record footage of any bats and their calls and thereby assist with identifying the species of any bats filmed emerging from/returning to roost in this area.

Following the survey all bat calls were downloaded from the EM3 detectors and BatLoggers and analysed using AnalookW v.4.1z and BatExplorer

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Software, respectively, to enable species identification, where possible, and quantitative analysis of the data.

Remote Monitoring

Remote monitoring was undertaken to provide additional data to inform the assessment of bat activity across the Site. The extended time period covered by this type of survey allows for a more accurate assessment of bat species diversity and activity levels to be made.

Two Wildlife Acoustics Songmeter (SM2/SM2+) static detectors were deployed on three occasions during early and late September 2017, and May 2018 to provide six data-sets. The locations of each Monitoring Point (MP) are shown in Figure F.1 below. MP4 was installed at the entrance to B13, a dilapidated out-building. Whilst this building was not considered to be provide good opportunities for use as a day roost, bat activity at the barn entrance was monitored to provide any indication of use as a night roost / feeding perch. In June 2018, a static detector was again deployed inside B13 for 4 nights.

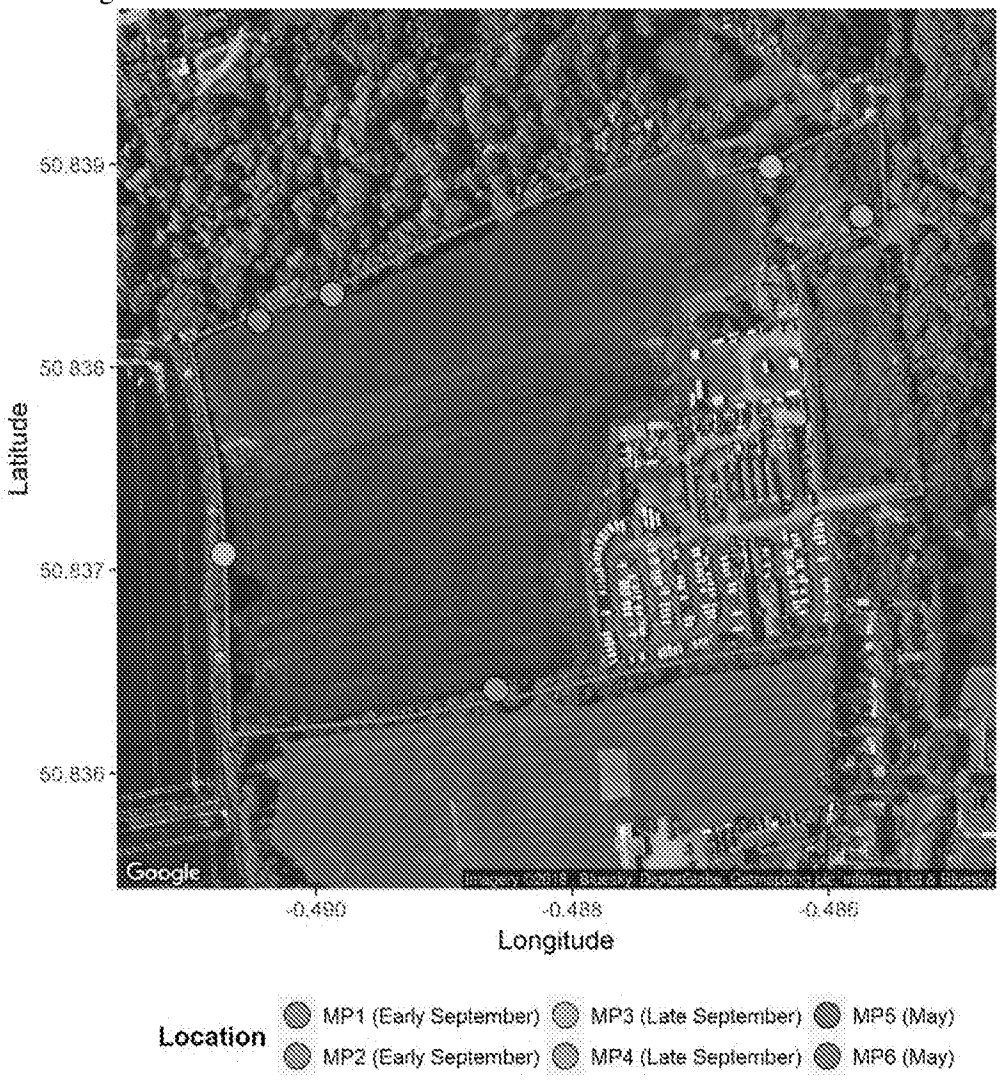


Figure F.1 Map to show the locations of each Monitoring Point (MP) surveyed during static monitoring surveys in September

The detectors were installed on-site and setup to record bat activity automatically for the period from half an hour before sunset until half an hour after sunrise each night. Each monitoring period spanned at least five consecutive nights.

Weather conditions were obtained for each night surveyed using historic weather data from the World Weather Online website, with weather observations taken from the nearest weather station in Shoreham Airport. The five nights showing the most optimal weather conditions (in terms of temperature, precipitation and wind speed) were taken forward for analysis.

Recorded bat calls were analysed using the specialist software AnaLookW to identify the species present. Each recorded file is considered to represent a single bat 'pass'. Quantitative analysis of bat activity levels is then undertaken by calculating the mean number of bat passes per hour.

Static data analysis and graphics were also produced in the statistical computing and graphics software R and this report has been written and generated using the authoring format R Markdown through R-Studio.

Bat Activity Transect Survey

Transect surveys were undertaken at the Site in September 2017, May and June 2018 to assess the level and distribution of bat activity across on-site habitats. Two transect routes were walked on each occasion which covered different areas of the Site at random. Several circuits of the survey area could be made during each survey, each of which was altered at random to visit different habitat types or features. Effort was made to ensure that all parts of the Site were visited and thus represented during subsequent analysis, in order to give the truest possible reflection of bat activity. Each transect was walked at a moderate and consistent speed with bat activity and observations of bat behaviour recorded during the survey. Each transect survey commenced at sunset (British Summer Time), continuing for the following two hours and was undertaken during suitable weather conditions as summarised in Table F.1.

Bat calls were recorded using Elekon Batlogger M detectors, with recordings later analysed using BatExplorer software to identify each bat call to species or genus level. Batlogger M detectors automatically record each time an ultrasound signal is detected with a one second delay between recordings. Each of these automatically recorded sound files, which contain a variable number of call pulses, is designated as a 'bat contact' and then manually assigned a species identification, where possible. At the point of contact, each sound file is assigned a GPS location.

Bat data analysis and graphics have been produced in the statistical computing and graphics software R and this report has been written and generated using the authoring format R Markdown through R-Studio.

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The transect survey design, data analysis and interpretation takes account of the Bat Conservation Trust (BCT) guidelines 3rd Edition (Collins, 2016).

Limitations

Due to access constraints, it was not possible to complete an internal inspection of B8. Some parts of B2, B4 and B9 also could not be accessed, either because the loft access had been closed up (B2, B9) or due to volume of storage (B4), however a partial internal inspection was possible. Any information on the building interiors which could be collected during the external inspection has been recorded.

Batlogger M detectors automatically assign a GPS location to each bat contact, allowing distribution maps to be plotted (see Results section of this report). The accuracy of the GPS locations provided for each contact is variable and may depend on the number of satellites available and the strength of the signal received. This in turn is affected by environmental conditions such as cloud or tree canopy cover. The accuracy of GPS coordinates may vary between 5-15m during a transect survey and, as a result, this must be taken into account when viewing the distribution maps within this report.

It should be noted that the findings described herein for static monitoring surveys are based on the bat activity recorded at the location immediate to each static detector, and therefore only describe localised activity at the Site. Detectors were moved around the Site between monitoring periods to sample different areas and reduce the effect of this limitation, however caution should be used when applying results to the wider area.

A fifth static detector was deployed for the second monitoring period along the southern Site boundary to increase coverage. Unfortunately due to microphone issues, it did not record properly. No static recording data is therefore available for this part of the site, although it was covered during the transect surveys undertaken.

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Results

Preliminary Roost Assessment

Results of the assessment are detailed in Table F.2 and summarised below. Photos can found be in the photosheet to the rear.

Of the eleven buildings surveyed, one building has high potential to support roosting bats (B1), six have moderate potential (B2, B3, B4, B8, B9, B13), with the remainder having negligible potential.

B1 was inspected both internally and externally. The external inspection revealed a number of features suitable for use by roosting bats, including lifted tiles, missing mortar and a missing brick. The internal inspection found the loft void was generally well sealed, in regular use, and very clean, with no signs of roosting bats. Although roosting bats are likely absent from the loft void, the external features noted are suitable for crevice-dwelling species of bat, such as pipistrelle species Pipistrellus sp.

B2, B3, B4 and B8 have external features suitable for roosting bats, including gaps beneath weatherboarding, in mortar and under corrugated roofing.

B9 has a loft void with numerous access points, and is adjacent to a tree line. Internal features were present which could be suitable for both crevice-dwelling and hanging species, such as brown long-eared Plecotus auritus.

B13 is derelict and open, so easily accessible to bats. Some internal features suitable for crevice-dwelling species were noted. Due to its openness it is unlikely to be suitable as a day roost for hanging species, but as it is close to woodland where high bat activity was recorded in 2017, it is likely this building is used as a night roost (feeding perch).

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Table F.2 Results of Building Inspection Survey

Building Ref.	Building Description	External features/ evidence	Internal features/ evidence	Bat roost potential
B1	Residential bungalow in current use. Constructed in 1960s with a hipped roof and wooden soffit box. Flat roofed sections with bitumen felt on top of bay windows and small extension to north on western side, and south on eastern side.	On most faces there is a gap under the roof tiles c. 2 tiles down from the ridge. Under a line of lifted tiles below the ridge on the eastern side there is visibly less moss cover beneath. Missing mortar under hip tiles on south-eastern corner and north-western corner. Gaps under roof tiles around the chimney on the western side. Some lifted tiles around window and in valley near window. Missing brick at the top of the wall on the western side.	Rough sawn timber beams with purlin. Open loft void with no trusses. Loft is generally well sealed and has recently been re-insulated, and is in regular use. The roof liner laps over the top of the ridge beam, forming a seal. There are two tears in the bitumen roof liner in the south-east section of the roof which provide access to the tiles and space under the ridge beam. The section with the window is very bright, but elsewhere is dark. Good ventilation gaps to soffit. No signs of droppings, feeding debris or urine signs.	High
B2	Breezeblock construction with corrugated asbestos pitched roof. The building is split into two sections, a two storey section to the north (B2a) and a single storey section to the south (B2b).	Gap at apex of B2a at northern end. Gap under metal cladding and asbestos insulation along wall between B2a and B2b. Gaps at ridge and under subsided sections of roof on B2b (tenant noted hornets' nest is present and active in summer). Opportunities for crevice-dwelling bats in gaps under corrugated roofing material, in brickwork and at top of wall under roof.	Within B2a, roof is boarded underneath, with no loft void. Gaps between asbestos and internal sarking boards. Within B2b is a fibreglass sealed space which used to be used previously to grow mushrooms. Unlikely to be suitable for bats.	Moderate
B3	Two storey building of brick construction with corrugated asbestos pitched roof.	Gappy plastic weatherboarding on the eastern side, and gappy metal flashing on the western side with large gaps at the top of the wall beneath the roof. Crack in mortar on western end. Gaps under corrugated roofing on both north and south sides, some of which are cobwebbed. Extension linking B3 and B4 has very gappy plastic weatherboarding.	Roof is boarded underneath, with no loft void.	Moderate
B4	Single storey building comprised of five adjacent round-roofed sections (B4a-e west to east) of brick	Numerous gaps behind weather boarding, in mortar and at tops of walls / doors. Bricked up windows and doors on B4c and B4d with a 9inch wide gap at the top across the length of	No loft void, building is open to corrugated roof. Some units are actively used for workshop space (B4a, b) and office space (B4e). Some units are used	Moderate

Building Ref.	Building Description	External features/ evidence	Internal features/ evidence	Bat roost potential
	construction with single-skinned corrugated asbestos roof. B4a and b are in use as workshops. B4e linked to B3 by conservatory.	the window; the void leads up to the roof. Dropping found on ledge of B4c beneath gap, the morphology and composition of which indicated it was from a bat. Gaps between the brickwork and corrugated asbestos roofing in the south-east corner of B4e. Some holes in corrugated bitumen roof leading to space underneath.	for storage (B4c, d) and are rarely disturbed; direct access was not possible to these sections. Disused sections could be suitable for bats if access to interior is possible.	
B5	Single storey building of brick construction with corrugated asbestos pitched roof.	Small gaps at apex and where roof panelling overlaps, but expandable foam can be seen at eaves.	N/A	Negligible
B6	Single storey building with corrugated metal cladding and corrugated asbestos pitched roof.	No internal roof lining, so temperature of building is likely to fluctuate a lot, making it unsuitable for roosting bats.	N/A	Negligible
B7	Single storey building of breezeblock construction with corrugated asbestos pitched roof.	Building was open, so bats could enter through the doorway.	Half the roof is unlined, and half is lined in blue plastic. Some gaps are visible around the rotten rafters, but no evidence of roosting bats was seen.	Negligible
B8	L-shaped lean-to / shack with concrete walls, a half-pitched corrugated metal roof and awning to the south. Lots of dense ivy and ash tree growing on south-west side of building in corner of "L".	Gap between metal and bitumen liner draped over rafters c. 4 inches wide. No features for bats to hang off, but suitable for crevice-dwellers.	N/A – access not possible	Moderate
B9	Single storey building of breezeblock construction with corrugated asbestos pitched roof.	Gaps under eaves all along sides of building.	Timber A-frame roof with timber beams on top of dividing walls, unlined. Access only possible to southern section as no loft hatches or access through dividing walls. Gaps along ridge line and eaves throughout, gaps through dividing walls around beams. Lots of ash seeds, mouse droppings and cobwebs, which could obscure bat droppings.	Moderate

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Building Ref.	Building Description	External features/ evidence	Internal features/ evidence	Bat roost potential
B10	Small single storey service building of breeze block construction with a corrugated asbestos roof.	Well sealed with no apparent gaps or potential roosting features.	N/A	Negligible
B11	Single storey, flat roofed storage containers / site office	N/A	N/A	Negligible
B12	Single storey, flat roofed storage containers / site office	N/A	N/A	Negligible
B13	Dilapidated single storey barn. Roof has partially collapsed and completely covered with dense ivy.	Open doors and partially bricked-up windows provide access points. No external features offering roosting opportunities noted.	No enclosed roof space, corrugated asbestos resting on supporting beams. Beams covered with encroaching ivy. Missing bricks in south-west provide access into cavity wall. Gap around wooden door frame c. 1 inch wide. Gaps between beams and roof for crevice-dwellers, or beams for hanging-species. Interior of building open and quite exposed.	Moderate
B14	Brick out-building; mostly collapsed – roof no longer present.	None identified.	None identified.	Negligible
B15	Small single storey brick garage with flat roof with corrugated asbestos.	Well sealed with no apparent gaps or potential roosting features.	N/A	Negligible
B16	Glass greenhouse.	N/A	N/A	Negligible
B17	Campsite toilet block	N/A	N/A	Negligible

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Dusk Emergence / Dawn Return to Roost Surveys

Summary of roosting activity

Current roosting by a single common pipistrelle was confirmed within B3, emerging from under a ridge tile on 06 June 2018. A roost was also identified within B4 with a soprano pipistrelle bat flying low from the north of the building on the 15 May and 06 June 2018, and seen emerging from a hole in the brickwork in section d on 12 June 2018. Buildings with confirmed and potential bat roosts have been identified within the bat emergence and return to roost survey plan (CSA/3467/122).

General bat activity

At least six species of bat were noted within the survey locality during the 2017/2018 surveys, including common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus, Nathusius' pipistrelle Pipistrellus nathusii, Myotis species, noctule Nyctalus noctule and brown long-eared Plecotus auritus. The majority of activity was attributed to common pipistrelle bats, with low numbers of common pipistrelle bats identified foraging around the hedgerows associated with the buildings. Low numbers of noctule and soprano pipistrelle were recorded passing over the site, with passes from Nathusius' pipistrelle and Myotis recorded on occasion.

Transect Survey Results

The dates and weather conditions for each transect survey are provided in Table F.3 below.

Table F.3 Bat transect survey weather conditions

Survey Date	Sunset/ Sunrise Time	Start Time	End Time	Temperature (°C)		Precip-itation	Cloud Cover (Oktas)		Wind (Beaufort Scale)	
				Start	End		Start	End	Start	End
06/09/17	19:37	19:33	21:37	14	15	Dry	0	1	0	1
09/05/18	20:46	20:46	22:46	12	13	Dry	4	8	1	2
06/06/18	21:11	21:05	23:11	18	20	Dry	5	7	1	1

At least eight species of bat were recorded at the site during the transect surveys, comprising common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus, Nathusius' pipistrelle Pipistrellus nathusii, Pipistrellus species, noctule Nyctalus noctula, Nyctalus species, serotine Eptesicus serotinus, big bat species, Myotis species, brown long-eared Plecotus auritus, barbastelle Barbastella barbastellus and bat species. The number of bat contacts recorded for each species are summarised in Table F.4 below. The locations of each bat contact and the overall distribution of activity across the Site are illustrated in Figures F.2 and F.3.

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Bat activity was predominantly recorded along the Site boundaries, in particular the northern and western boundaries, and was dominated by common and soprano pipistrelle calls. Some calls from Myotis species, noctule, pipistrelle species, serotine, brown long-eared and barbastelle were also recorded. Fewer calls were recorded along the southern Site boundary and around the commercial buildings, although there was activity recorded around the bungalow and garden. The greatest amount of bat activity was recorded along the northern and western Site boundaries. Barbastelle, brown long-eared and noctule were only recorded here, and the majority of soprano pipistrelle were recorded here. The northern Site boundary comprises the edge of a parcel of woodland which extends north and includes a stream. Serotine were recorded in the more open habitats in the east and west of the Site, and a single Nathusius' pipistrelle was recorded in the arable field. Common pipistrelle calls were relatively ubiquitous around the Site boundaries.

Table F.4. Summary of bat contacts recorded during the transect surveys

Month	Barbastelle	Bat Sp	Big Bat	Brown long-eared	Common pipistrelle	Myotis species	Nathusius' pipistrelle	Noctule	Pipistrellus species	Serotine	Soprano pipistrelle
May	5	1	4	4	190	0	0	19	3	3	6
June	0	0	0	0	42	2	1	4	1	5	17
September	1	0	0	1	129	39	0	12	1	1	87

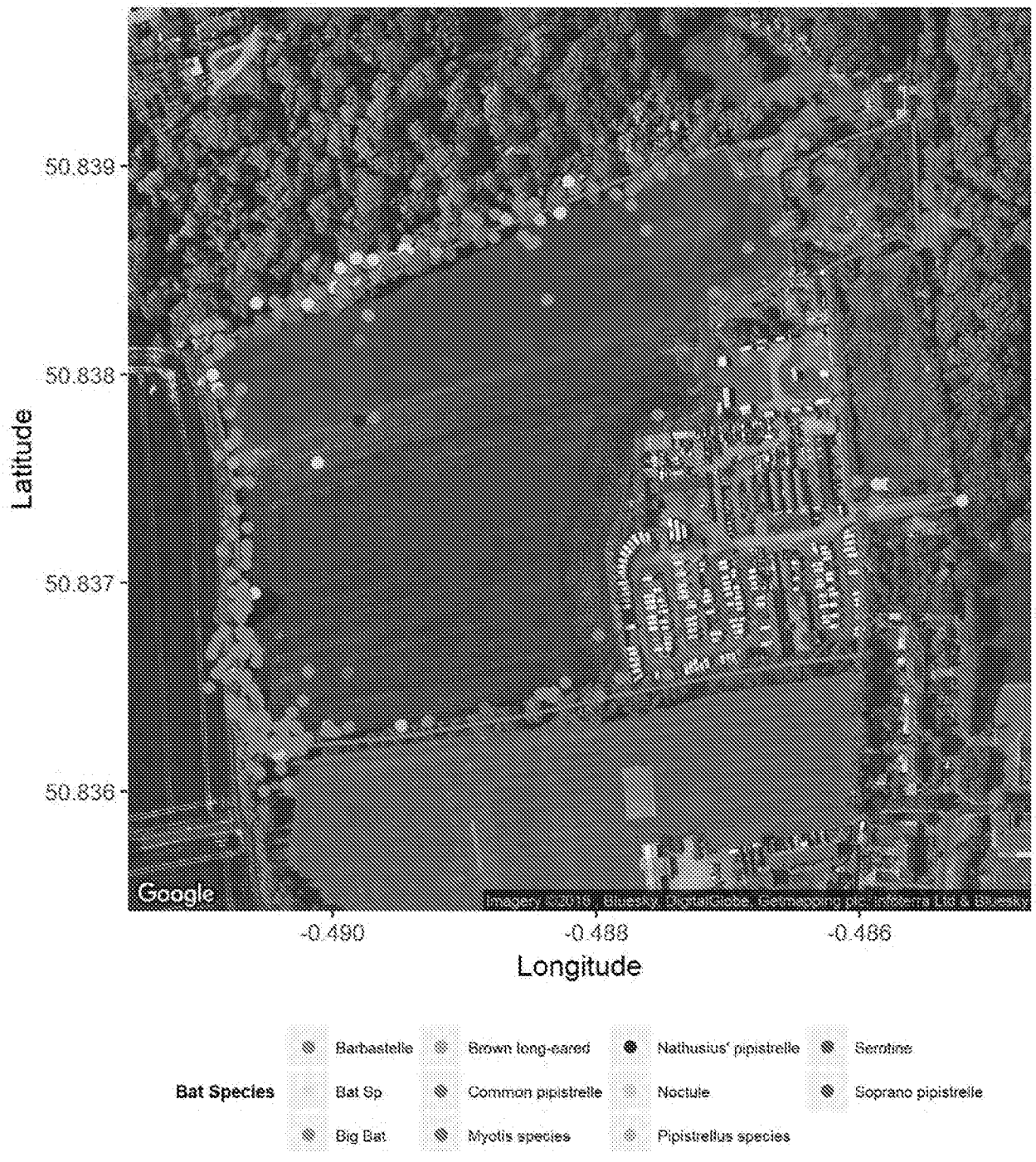


Figure F.2. The locations of individual bat contacts recorded during transect surveys

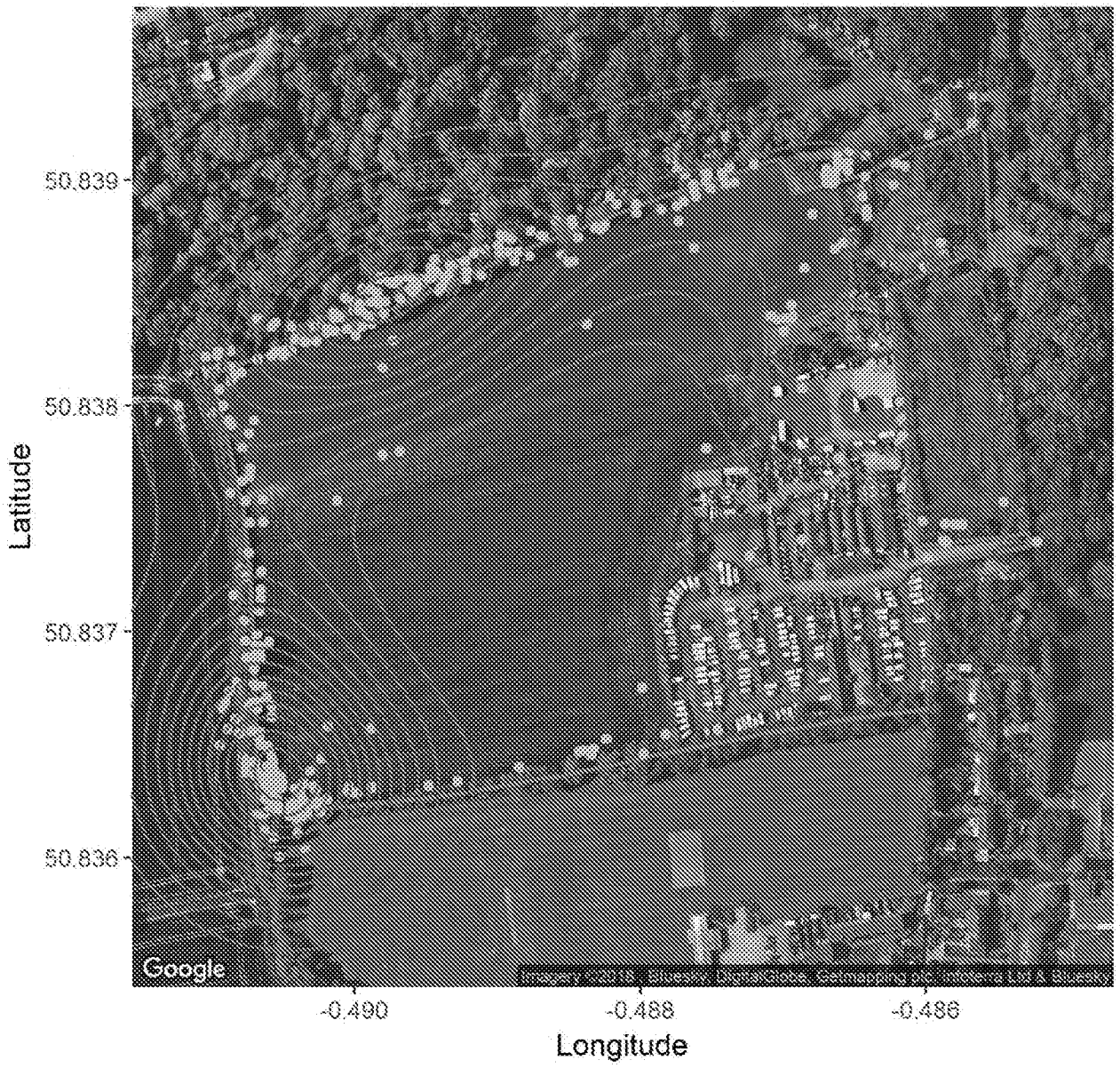


Figure F.3. The locations of each bat contact recorded during transect surveys, with contour lines indicating the density of contacts. Closer contours represent more concentrated bat activity.

Static Monitoring Results

The weather conditions experienced during the five nights where data was analysed are provided in Table F.5 below.

Table F.5. Overnight weather conditions during static monitoring periods

Survey Month	Dates Sampled	Temperature (°C)		Precipitation	Cloud Cover (%)		Wind (mph)	
		Min	Max		Min	Max	Min	Max
September	06/09/17	15	17	Dry	0	74	12	13
September	07/09/17	12	17	Dry	84	100	8	21
September	08/09/17	15	17	Moderate rain at 21.00	16	100	13	24
September	09/09/17	11	12	Dry	0	25	18	22
September	10/09/17	9	13	Dry	0	39	7	24
September	20/09/17	15	15	Dry	46	46	23	23
September	21/09/17	14	15	Dry	0	58	21	25
September	22/09/17	11	12	Dry	0	0	8	12
September	23/09/17	11	15	Dry	0	54	10	14
September	24/09/17	14	17	Dry	0	78	9	14
May	10/05/18	9	13	Dry	3	37	5	15
May	11/05/18	10	14	Light rain from 21:00 to 03:00	51	100	4	14
May	12/05/18	9	11	Very light rain at 21:00 and light rain at 03:00	56	89	5	9
May	13/05/18	8	11	Dry	3	17	8	17
May	14/05/18	11	16	Dry	9	86	11	16
June	08/06/18	13	16	Dry	25	69	5	7
June	09/06/18	13	16	Dry	25	93	6	10
June	10/06/18	13	16	Dry	24	32	9	10
June	11/06/18	12	16	Very light rain at 21:00 and 00:00	39	88	9	12

The total number of bat passes recorded across all monitoring locations for each bat species are provided in Figure F.4 and Table F.6 below.

Calls from common pipistrelle were the most frequently recorded, in addition to a large number of calls from soprano pipistrelle and Myotis species. A significant number of barbastelle calls were also recorded, with a small number from noctule, Nyctalus species, pipistrelle species, brown long-eared, Nathusius' pipistrelle and Nyctalus/Eptesicus species.

The majority of calls were recorded at MP1 (northern boundary, woodland edge, early September 2017) and MP3 (western boundary, hedgerow). A large number of soprano pipistrelle and Myotis species calls were recorded at MP1, and common pipistrelle at MP3 with fewer calls from other species than MP1 but the greatest number of species recorded overall. A moderate number of calls were recorded at MP5 (northern boundary, woodland edge, May 2018). Few calls were recorded at MP2 (tree in north-east of Site), MP4 (building in north-east of Site) or MP6 (southern boundary).

Two common pipistrelle calls were recorded by the static detector deployed inside B13 in June 2018. These calls were not indicative of cluttered flying conditions, so are most likely to be from bats passing by the door of the building, rather than using the interior space itself. No other calls were recorded.

It should be noted that comparisons drawn of the number of passes by different species can only give an indication of relative species abundance at the Site, as detectability varies between species.

Figure F.5 and Table F.7 show the total bat passes per hour recorded at all monitoring points surveyed.

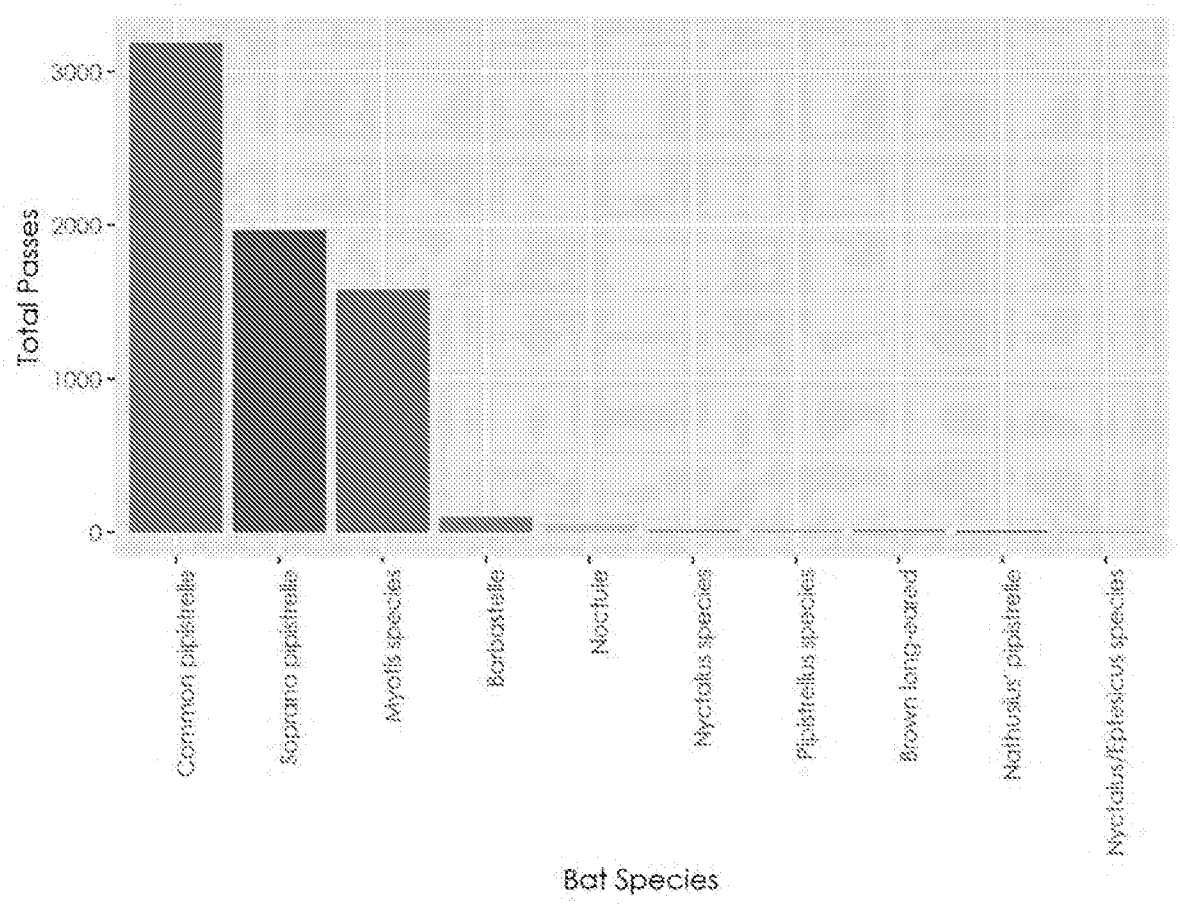


Figure F.4. Bat passes per species recorded in total during the static monitoring surveys

Table F.6 Bat passes per species recorded in total during static monitoring periods (early and late September 2017, and May 2018) with two detectors per monitoring period

Common pipistrelle	Soprano pipistrelle	Myotis species	Barbastelle	Noctule	Brown long-eared	Nathusius' pipistrelle	Nyctalus species	Nyctalus/Eptesicus species	Pipistrellus species
3190	1966	1579	96	49	13	5	20	2	18

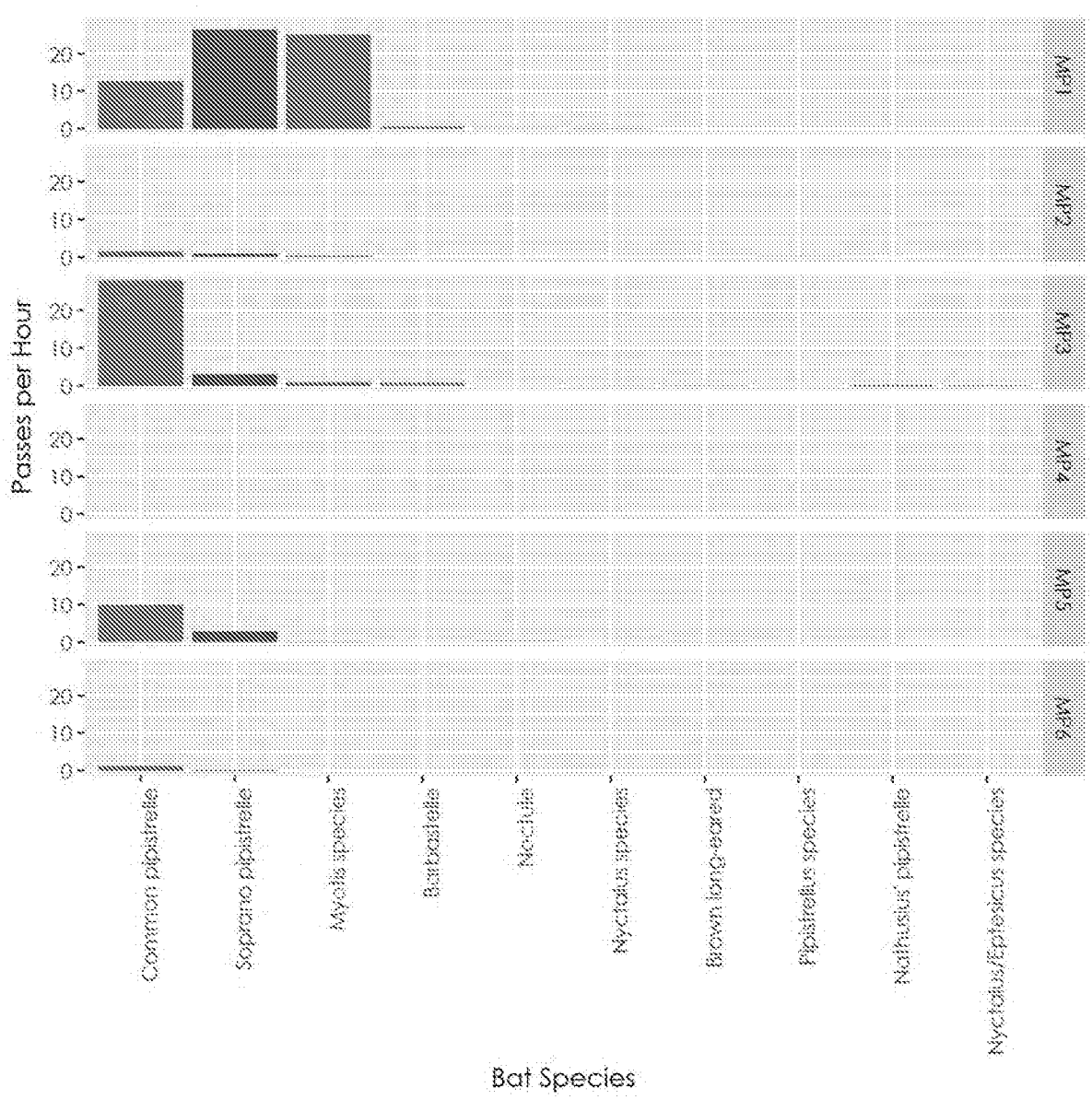


Figure F.5. Average bat passes per hour recorded for each bat species at each static monitoring point, across all monitoring periods

Table F.7. Average bat passes per hour recorded for each bat species at each static monitoring point, across all monitoring periods

MP	Common pipistrelle	Soprano pipistrelle	Myotis species	Barbastelle	Noctule	Nyctalus species	Brown long-eared	Pipistrellus species	Nathusius' pipistrelle	Nyctalus/Eptesicus species
MP1	12.69	26.41	24.97	0.67	0.40	0.18	0.05	0.02	0.00	0.02
MP2	1.46	0.94	0.37	0.02	0.02	0.02	0.02	0.15	0.00	0.00
MP3	27.93	2.89	0.89	0.85	0.14	0.08	0.06	0.06	0.06	0.02
MP4	0.08	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.00
MP5	10.12	2.90	0.17	0.00	0.31	0.06	0.10	0.02	0.02	0.00
MP6	1.19	0.15	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00

Photosheet



Plate 1. Northern and western aspect of bungalow (B1)

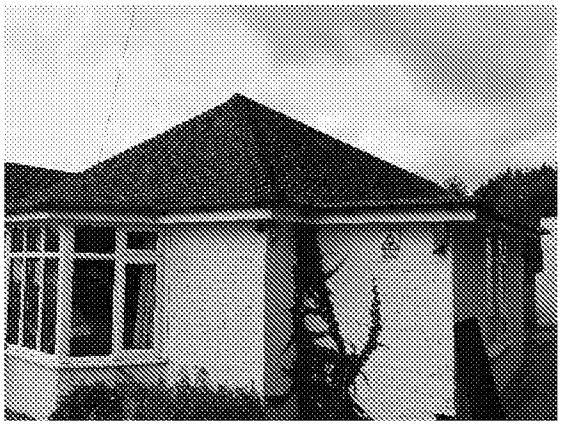


Plate 2. Southern and eastern aspect of bungalow (B1) with missing mortar under hip tiles.



Plate 3. Western aspect of extension section of bungalow (B1) with gaps under tiles around window and in valley.



Plate 4. Northern aspect of bungalow (B1) with gaps under tiles around chimney.

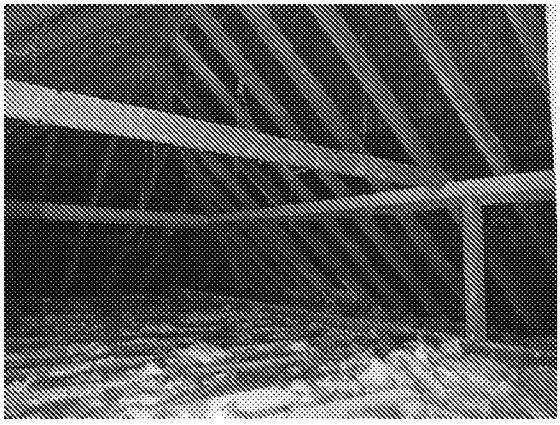


Plate 5. Loft of bungalow (B1)



Plate 6. B2a from the east

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Plate 7. Wall between B2a and B2b showing gappy metal cladding.



Plate 8. B2b from the east

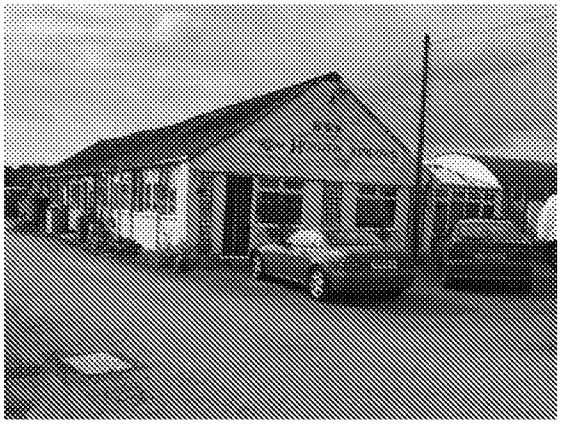


Plate 9. B3 from the east



Plate 10. B3 from the west

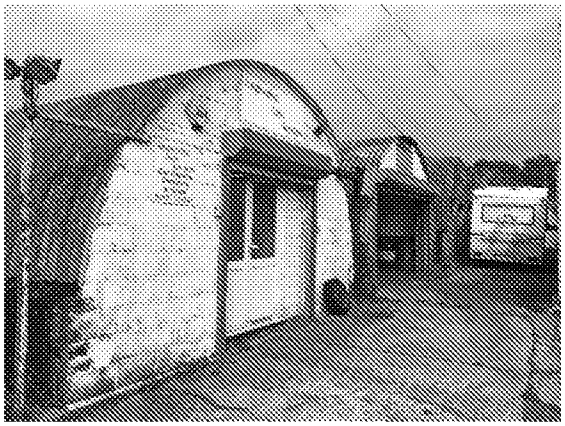


Plate 11. B4 from the west

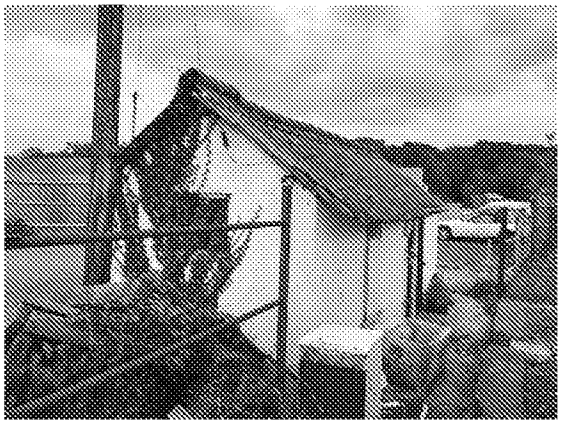


Plate 12. B5

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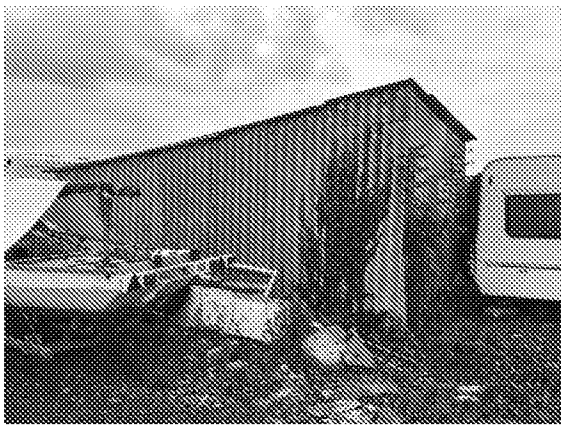


Plate 13. B6

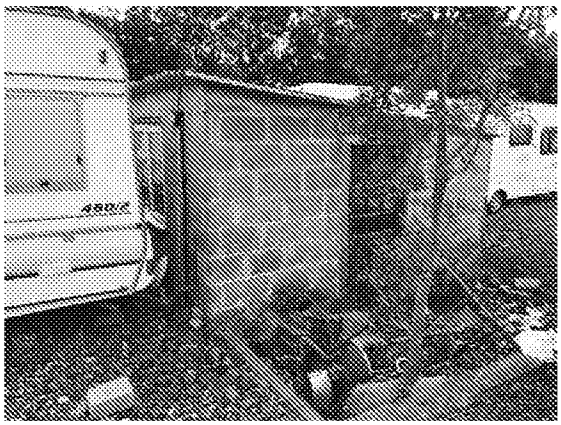


Plate 14. B7

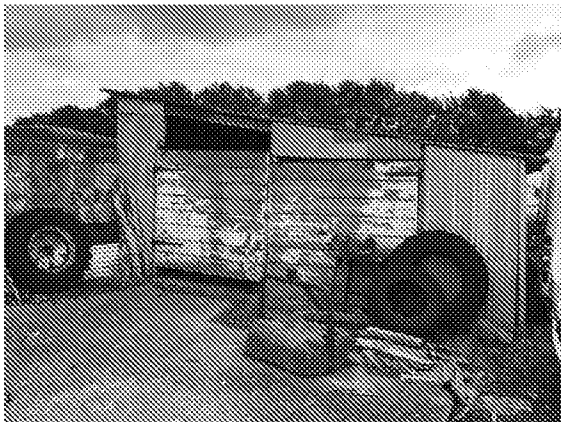


Plate 11. B8



Plate 12. B9



Plate 15. B15



Plate 16. B13 – ivy covered dilapidated barn

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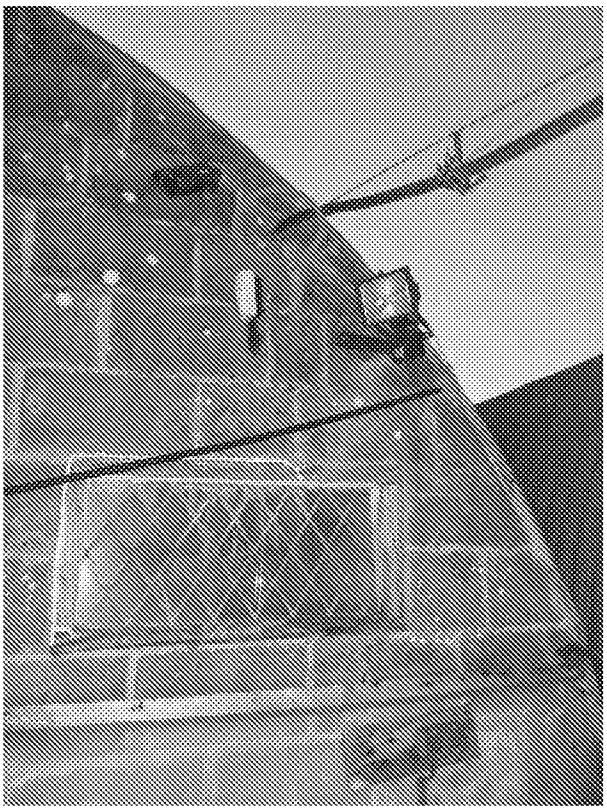


Plate 17. B4d showing hole in brickwork where soprano pipistrelle emerged in June 2018



Plate 17. B3 showing ridge tiles where common pipistrelle emerged in June 2018

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N

Legend

Site boundary

Walked transects

0 50 100metres

CSA environmental

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Project:	Land West of Arundel Road, Angmering	Date: June 2018	Drawing No.: CSA/3467/109
Drawing Title:	Bat Activity Survey Transect Routes Plan	Scale @ A4: See scale bar	Rev: A
Client:	Gladman Developments Ltd.	Drawn: JT	Checked: CC

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N

Legend

Site boundary

High levels of utilisation

Low levels of utilisation

0 50 100metres

CSA environmental

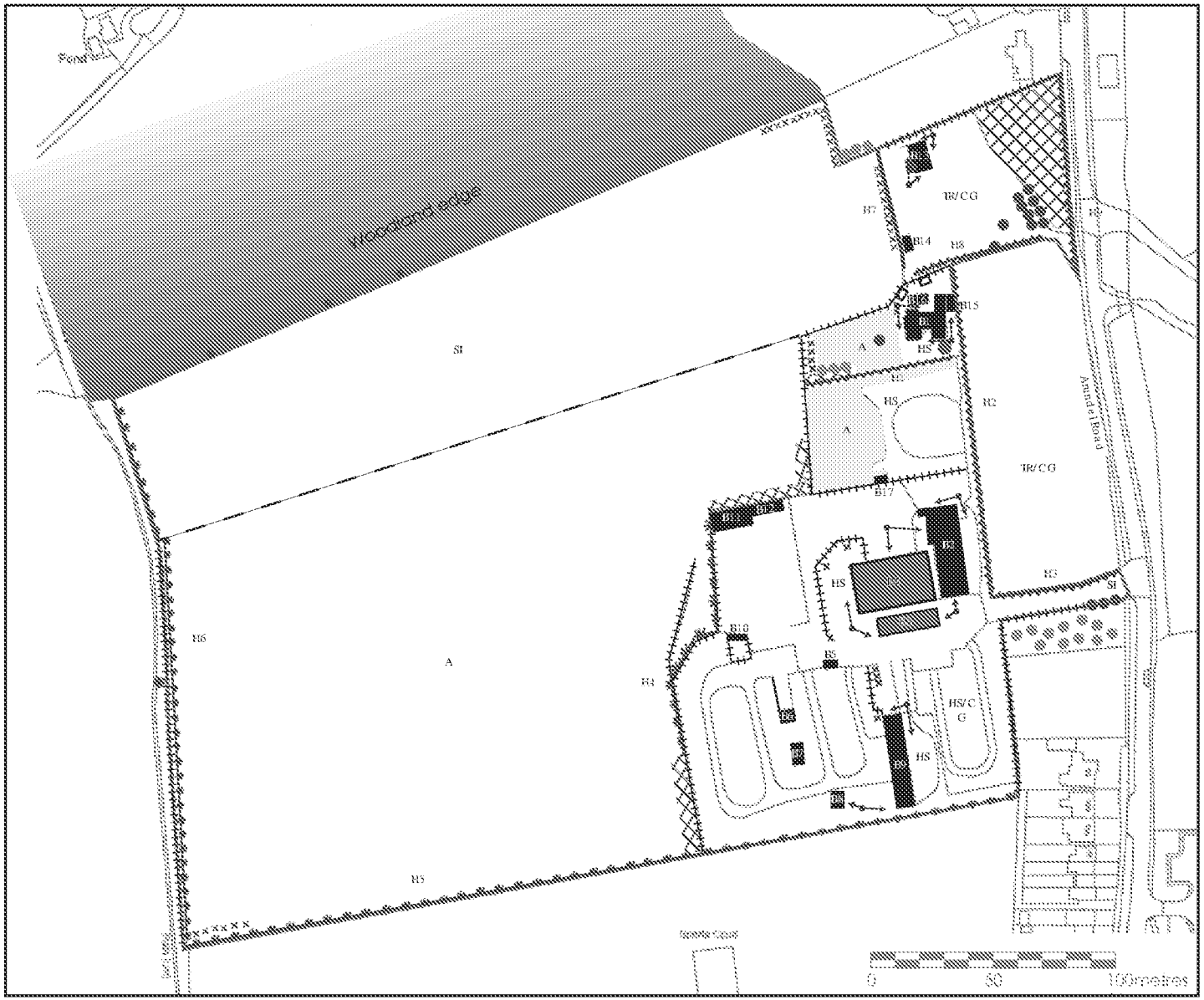
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Project:	Land West of Arundel Road, Angmering	Date: June 2018	Drawing No: CSA/3467/110
Drawing Title:	Bat Habitat Utilisation Plan	Scale @ A4: See scale bar	Rev: A
Client:	Gladman Developments Ltd.	Drawn: JT	Checked: CC

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CSA environmental Office 20, Cliffdale, 93 Ditchling Road, Brighton BN1 4ST t: 01273 573871 e: brighton@csaenvironmental.co.uk w: csaenvironmental.co.uk	Project: Land West of Arundel Road, Angmering	Date: June 2018	Drawing No: CSA/3467/122
	Drawing Title: Bat Emergence and Return to Roost survey Plan	Scale @ A4: See scale bar	Rev: A
	Client: Gladman Developments Ltd.	Drawn: AS	Checked: JT

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Appendix G

Dormouse Survey Report

Legislation

The hazel dormouse Muscardinus avellanarius is legally protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is afforded significant further protection as a European Protected Species under the Conservation of Habitats and species Regulations 2017 (as amended).

Collectively and in summary, this legislation inter alia makes it an offence to:

- Intentionally or deliberately kill, injure or capture dormice;
- Intentionally, deliberately or recklessly disturb dormice in such a way as to be likely to significantly affect the ability of any significant group of dormice to survive, breed, or rear or nurture their young or the local distribution of or abundance of the species;
- Intentionally or recklessly damage, destroy or obstruct access to places used by Dormice for shelter or protection (whether occupied or not) or intentionally or recklessly disturb a dormouse whilst it is occupying such a place;
- Damage or destroy a breeding site or resting place of a dormouse;
- Possess or transport a dormouse (or any part thereof) unless under licence; and
- Sell or exchange dormice.

Development proposals affecting the dormouse require a European Protected Species licence from Natural England.

Methods

Dormouse nest tubes were installed at the site on 27 March 2018 by Jessica Tait GradCIEEM and Kate Wolstenholme. The intention of these surveys is to determine the presence or likely absence of dormice within suitable habitat within all areas that will be impacted. A total of 63 dormouse nest tubes were distributed across the Site, along boundary vegetation, including hedgerows and patches of scrub. The location of these nest tubes is shown in the Dormouse Survey Plan (CSA/3467/118).

Nest tubes are made from stiff, double-walled black plastic sheets or similar material, 25cm long with a 5cm x 5cm cross-section. A thin plywood tray is inserted into the tube with a short projection at one end and an end block at the other which seals the tube. The tubes are then tied in a suitable location along a horizontal branch in vegetation. Dormice are known to readily use these tubes to build their nests (Natural England, 2006).

Monthly checks of these tubes for the presence of dormice and/or their nests commenced in April 2018. The checks are being undertaken by

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Jessica Tait, Kate Wolstenholme and licensed surveyor Alexandria Shaw GradCIEEM (2017-32017-CLS-CLS). Bird droppings and other material such as wood mouse nests are cleaned out if found, to maintain the potential of each tube to be used by dormice.

Limitations

Checks of the final nest tube (number 63) have thus far not been possible due to a locked gate preventing access at the time of survey. On the second (May) check, it was noted that two treadles/trays were in need of replacement (replacement completed during the June check), meaning these two tubes of the 63 were not available for use for a period during between 18 April and 14 May 2018. In the June visit, tube 57 could not be found so was not checked.

For dormice which escaped on approach to the tubes, it was not possible to collect any biometric data (i.e. weight, sex, age class, breeding status).

Otherwise, no further limitations to the survey have been encountered.

Results

The results of the dormouse survey are detailed in Table G.1 and summarised below.

The presence of dormice on site was confirmed during the May check, with two individuals clearly observed escaping from tubes 35 and 58 (within each of which nests had been built) on approach. No biometric data on the two dormice were recorded as these were escapees and not handled.

An additional six likely dormouse nests were recorded during the survey, with no dormice present. A possible dormouse nest constructed of bracken was recorded in tube 59 in May, which was damp and unoccupied at the time of survey. Further possible dormouse nests were recorded in tubes 8 and 22 in June, 36 in July, and 39 and 42 in September, all of which were constructed of woven grass and leaves, and were empty at the time of survey. Nest photographs are provided below.

The locations of these findings are shown on the Dormouse Survey Results Plan (CSA/3467/120), with dormice recorded along Hedgerows H6 at the west of the Site and H2 at the east, and possible dormouse nests along H3 and H9 at the east, and the woodland edge along the northern site boundary.

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Table G. 1 Results of the April, May and June 2018 dormouse survey visits at land to the west of Arundel Road, Angmering.

Tube No.	Location	Date and Surveyor(s)					
		18/04/18	14/05/18	06/06/18	03/07/18	02/08/18	05/09/18
		JT/KW	JT/KW	AS/JT	AS/KW	AS	AS/JT
1	H1	-	-	-	-	-	-
2	H1	-	-	-	-	-	2 x green leaves
3	H1	-	-	-	-	-	-
4	Scrub west of Bungalow garden	-	-	-	Treadle out, replaced	Treadle out, replaced	Treadle out
5	H8	-	-	-	-	-	-
6	H8	-	-	-	-	-	-
7	H8	-	-	-	-	-	Green and brown leaves and some strips of grass.
8	Ash by gate on H9	-	-	Possible dormouse nest, woven grass and green leaves.	Same as previous month. No new nest material.	Same as previous month	Same as previous month
9	NE scrub corner	-	-	-	-	-	Green and brown leaves, wood mouse (male, 11g)
10	NE scrub corner	-	-	-	-	-	-
11	NE scrub corner	-	-	-	-	-	-
12	NE scrub corner	-	-	-	Treadle out, replaced	-	-
13	H7	-	Needs new treadle	Treadle replaced	-	-	Food cache
14	H7	-	-	-	-	-	Food cache
15	H7	-	-	-	Not found	-	Green and brown leaves, food cache
16	H7	-	-	-	-	-	-

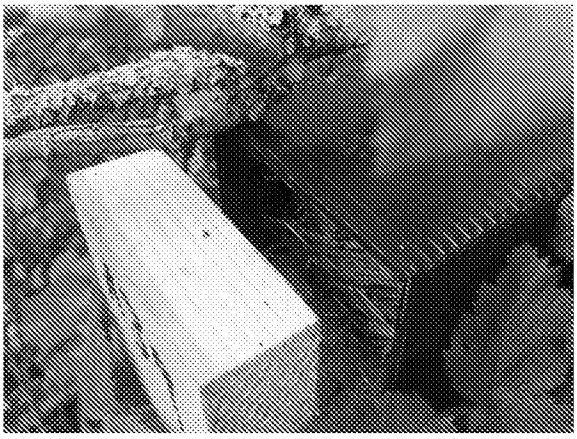
Tube No.	Location	Date and Surveyor(s)					
		18/04/18	14/05/18	06/06/18	03/07/18	02/08/18	05/09/18
		JT/KW	JT/KW	AS/JT	AS/KW	AS	AS/JT
17	Woodland edge	-	-	-	-	-	-
18	Woodland edge	-	-	-	-	Treadle out, replaced	-
19	Woodland edge	-	-	-	-	-	Food cache
20	Woodland edge	-	-	-	-	-	-
21	Woodland edge	-	-	-	-	Treadle out, replaced	Treadle out
22	Woodland edge	-	-	-	-	-	-
23	Woodland edge	-	-	Possible dormouse nest, woven grass, leaves, bracken.	Same as previous month. No new nest material	Same as previous month	Same as previous month
24	Woodland edge	-	-	-	-	-	Food cache
25	Woodland edge	-	-	-	-	-	Food cache
26	Woodland edge	-	-	-	-	-	-
27	Woodland edge	-	-	-	-	-	-
28	Woodland edge	-	-	Needs new treadle	Treadle replaced	-	-
29	Woodland edge	-	-	-	Few brown leaves	Treadle out, replaced	-
30	Woodland edge	-	-	-	-	-	Food cache
31	Woodland edge	-	-	-	-	-	Food cache
32	Woodland edge	-	-	-		-	Food cache
33	Woodland edge	-	Start of birds nest	Same as previous	Same as previous	Same as previous	Same as previous, with food cache
34	H6	-	-	-	-	-	-
35	H6	-	Dormouse escaped, white tail tip. Nest with green leaves and woven grass	Same nest, green leaves.	Same nest, one green leaf, warm nest.	Same nest, no new material.	Same as previous month, plus food cache

Tube No.	Location	Date and Surveyor(s)					
		18/04/18	14/05/18	06/06/18	03/07/18	02/08/18	05/09/18
		JT/KW	JT/KW	AS/JT	AS/KW	AS	AS/JT
36	H6	-	-	-	Possible dormouse nest with tightly woven grass and green leaves.	Same as previous month, nest damp.	Same as previous month.
37	H6	-	-	-	-	-	-
38	H6	-	-	-	-	-	-
39	H6	-	-	-	Not found	Not found	Possible dormouse nest, woven grass, old and damp.
40	H6	-	-	-	-	-	-
41	H6	-	-	-	-	Brown and green leaves, not woven	Same material, damp
42	H6	-	-	-	-	-	Possible dormouse nest, woven grass and green leaves
43	H6	-	-	-	-	-	-
44	H5	-	-	-	-	-	-
45	H5	-	-	-	-	-	-
46	H5	-	-	-	Treadle out, replaced	-	-
47	H5	-	-	-	-	-	-
48	H5	-	-	-	-	-	-
49	Corner of H5 and H4	-	-	Wren's nest with fledglings possibly in tube or very nearby, so tube not checked.	-	-	-
50	H4	-	-	-	-	Couldn't reach	-
51	H4	-	-	-	-	-	-
52	H4	-	-	-	-	-	-

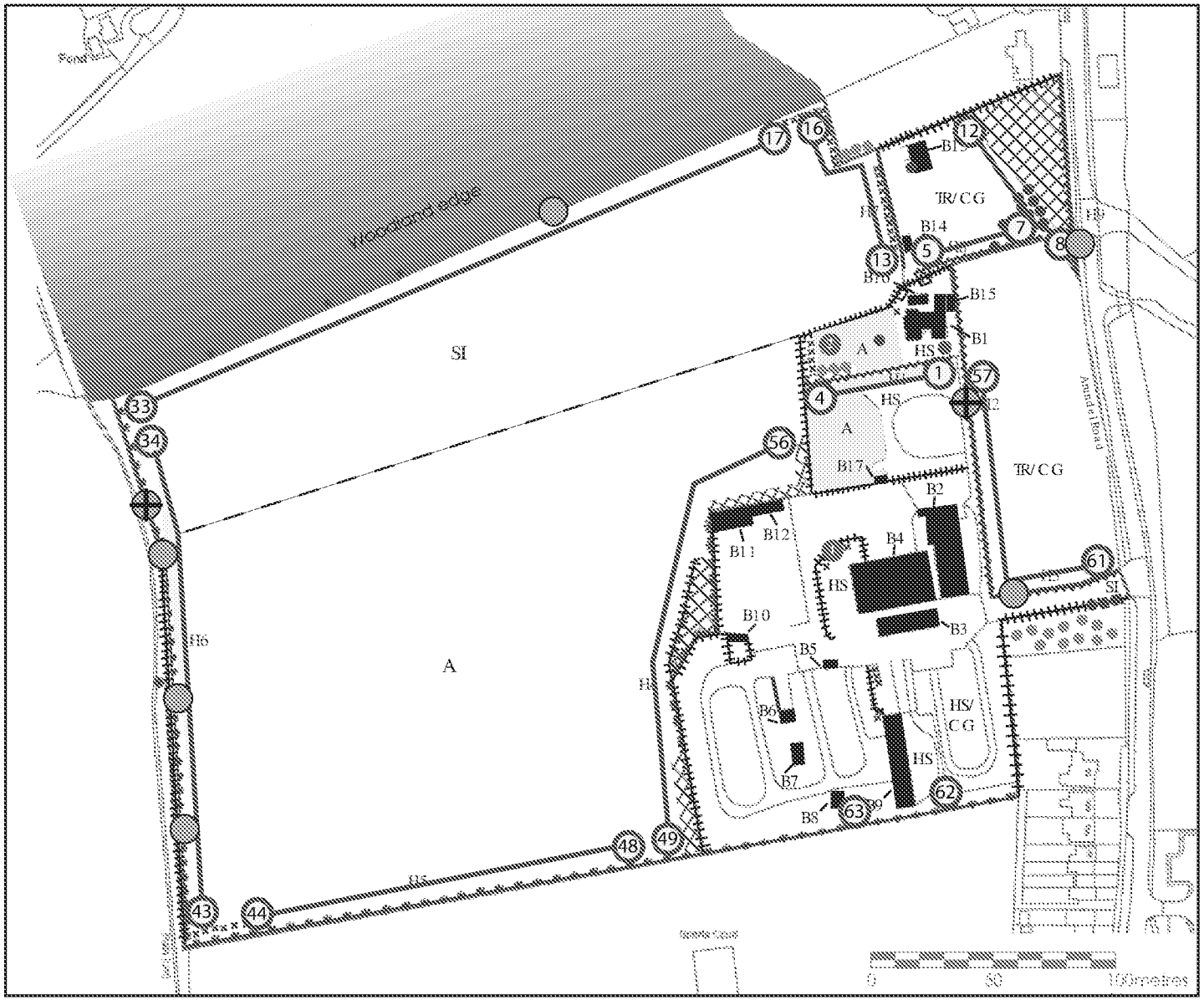
Tube No.	Location	Date and Surveyor(s)					
		18/04/18	14/05/18	06/06/18	03/07/18	02/08/18	05/09/18
		JT/KW	JT/KW	AS/JT	AS/KW	AS	AS/JT
53	H4	-	-	-	-	Green and brown leaves	Same as previous month
54	H4	-	-	-	-	-	-
55	Field maple corner of B11	-	Needs new treadle	Treadle replaced	-	-	-
56	Scrub between telegraph pole and B12	-	-	Not found	Not found	Not found	Not found
57	H2	-	-	-	Green and brown leaves	Same as previous month	Same as previous month
58	H2	-	Dormouse escaped, nest of woven grass and leaves.	Same nest, no new material	Same nest, no new material.	Same as previous month, no new material	Wood mouse (male, 23g)
59	Corner of H2 and H3	-	Possible dormouse nest, tightly packed bracken, damp.	Same nest, no new material.	Same nest, no new material.	Same nest, no new material.	Same nest, no new material.
60	H3	-	-	-	-	-	-
61	H3	-	-	-	-	-	-
62	H5, on elder within caravan park	-	-	-	-	-	-
63	H5, ivy bramble bank east of B9	Gate locked	Gate locked	Gate locked	-	Couldn't find	-

Below: dormouse nest at Hedgerow H6, from which a dormouse with white tail tip was observed escaping in May 2018.

Right: possible dormouse nest at H2.







CSA environmental Office 20, Citibase, 95 Ditchling Road, Brighton BN1 4ST t 01273 573871 e brighton@csaenvironmental.co.uk w csaenvironmental.co.uk	Project: Land West of Arundel Road, Angmering	Date: September	Drawing No: CSA/3467/120
	Drawing Title: Dormouse Survey Plan	Scale @ A4: See scale bar	Rev: A
	Client: Gladman Developments Ltd.	Drawn: JT	Checked: CC

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Appendix H

Badger Survey Report

Legislation

Badgers and their setts are protected under the Protection of Badgers Act 1992 therefore a Natural England licensing system exists to permit certain works that would otherwise be illegal. Works that require a license include direct impacts to badger holes and certain works within close proximity to a badger sett that may disturb badgers.

Method

A dedicated badger survey was conducted in April 2018 by Jessica Tait GradCIEEM, using standard survey methods, searching the Site and immediately adjacent areas for field signs of badger and mapping any present such as:

- Feeding signs such as snuffle holes made during foraging.
- Hairs caught on vegetation or fences.
- Latrines, usually positioned on territorial boundaries.
- Foraging tracks through vegetation or under fences.
- Badger setts.

When badger setts are found the number of holes are recorded as well as the level of usage. Recording this information gives an indication of the type of sett by categorising it according to the criteria listed in Table 2 below (Harris et al. 1989, Cresswell et al. 1990, Wilson et al. 1997).

Table G.1. Criteria used to determine sett type.

Sett Type
Main Setts - These usually have a large number of holes with large spoil heaps, and the sett generally looks well used. There will be well-used paths to and from the sett and between sett entrances. Although normally the breeding sett is in continuous use, it is possible to find a main sett that has become disused due to excessive digging or some other reason; it should be recorded as a disused main sett. In the first survey, the average size of an active main sett was twelve holes (including all categories of use).
Annexe setts - They are often close to a main sett, usually less than 150 metres away, and are usually connected to the main sett by one or more obvious well-worn paths. They usually have several holes, but may not be in use all the time even if the main sett is very active. In the first survey the average size was five holes (including all categories of use).
Subsidiary setts - These often only have a few holes; four (including all categories of use) was the average number in the first survey. They are usually at least 50 metres from a main sett, and do not have an obvious path connecting with another sett. They are not continuously active.
Outlying setts - These usually have only one or two holes, often have little spoil outside the hole, have no obvious path connecting with another sett, and are only used sporadically. When not in use by badgers, they are often taken over by foxes or even rabbits. However, they can still be recognised as badger setts by the shape of the tunnel (not the actual entrance hole), which is usually at least 250mm in diameter, and is rounded or a flattened oval shape. Fox and rabbit tunnels are smaller and often taller than broad.
Hole Type
Well used holes - These are clear of any debris or vegetation, are obviously in regular use, and may or may not have been excavated recently.

Partially used holes - These are not in regular use and have debris such as leaves and twigs in the entrance, or have moss and / or other plants growing in or around the entrance. Partially used holes could be in regular use after a minimal amount of clearance.
Disused holes - These have not been in use for some time, are partially or completely blocked, and could not be used without a considerable amount of clearance. If the hole has been disused for some time, all that may be visible is a depression in the ground where the hole used to be, and the remains of the spoil heap, which may be covered in moss or plants.

Results

Signs of badger activity and a badger sett were observed on Site. Full details have not been included here for confidentiality reasons, to protect badgers. Further information and a survey results plan (CSA/3467/121) have been included within a separate badger report (CSA/3467/06).

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Appendix I

Reptile Survey Report

Legislation

All native British reptiles are afforded protection against intentional or reckless killing and injury, under the Wildlife and Countryside Act 1981. This includes the widespread reptile species, slow-worm Anguis fragilis, common lizard Zootoca vivipara, grass snake Natrix natrix and adder Vipera berus.

Two rare species, sand lizard Lacerta agilis and smooth snake Coronella austriaca, are additionally protected under the Conservation of Habitats and Species Regulations 2017 which afford strict protection (via Regulation 41) for species listed within Schedule 2. However the Site does not offer opportunities for these species.

In addition to their legal protection, all British reptile species are also included on a list of species of principal importance for conserving biodiversity in England, which was drawn up in response to the Natural Environment and Rural Communities (NERC) Act 2006 (Section 41).

Methods

Approximately 106 refugia, comprising of squares of roofing felt (minimum size of 0.5 x 0.5m) were distributed across all suitable areas of habitat on 27 March 2018. Mats were distributed across the site offering suitable habitat opportunities for reptiles to determine presence / absence. Areas of the site included within the survey are shown on the Reptile Survey Plan (CSA/3467/119).

Following a period of 'bedding-in' ten daytime survey visits were carried out from 19 April to 07 June 2018, during which time the refugia were checked for the presence of reptiles. Careful visual searching between refugia was also undertaken. This survey effort is considered to provide a reasonable survey effort with which to establish the presence/ absence of reptile species at the Site. On each occasion the surveys were carried out in suitable weather conditions for reptile basking as shown in Table J1. The full results are presented in Table I.2, alongside the date of each survey.

Table I.1 Reptile survey weather conditions April – June 2018

Survey Date	Time	Temperature (°C)	Cloud Cover (Oktas)	Wind (Beaufort Scale)	Precipitation
19/04/2018	10.45-11.15	18	0/8	1	None
25/04/2018	15.45-16.30	13	3/8	3	Rain just before survey
01/05/2018	17.00-17.30	11	1/8	4	None
09/05/2018	17.00-17.30	14	2/8	3	None
14/05/2018	17.30-18.00	17	3/8	5	None
01/06/2018	13.15-14.30	19	8/8	1	Rain overnight
07/06/2018	10.30-11.30	16	7/8	2	None

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Results

A single common lizard was found during reptile surveys within Area B (see Reptile Survey Plan CSA/3467/119). No other reptiles were recorded during these surveys. Based on suitable reptile habitat which forms c. 2.2ha of the Site, the estimated common lizard population size, using guidance from HGBI (1998)[3] is considered to be low (<50/ha). Full results can be found in Table J2.

[3] Herpetofauna Groups of Britain and Ireland (HGBI), 1998. Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards. HGBI Advisory Notes for Amphibian and Reptile Groups (ARGs). Halesworth: Froglife.

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Appendix J

GCN survey report
Pond plan (CSA/3467/112)

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Legislation

Great crested newts are legally protected as European Protected Species (EPS) under Part 3 (Section 41) of the Conservation of Habitats and Species Regulations 2010. These Regulations make it an offence to:

- Deliberately capture, injure, kill or capture a great crested newt
- Deliberately disturb great crested newts, impairing their ability to survive, breed, reproduce or rear/nurture their young
- Damage or destroy a breeding site or resting place used by a great crested newt

Great crested newts are also fully protected under the Wildlife & Countryside Act 1981, making it an offence to:

- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place of shelter or protection
- Intentionally or recklessly obstruct access to any structure or place of shelter or protection

Disturbance of great crested newts is covered by both the 2010 Regulations and the 1981 Act. Disturbance that impairs survival or successful reproduction would be covered by the Regulations, while less significant acts of disturbance may only be covered by the Act.

It is important to note that great crested newts and their habitats (such as breeding ponds) are protected throughout the year, regardless of whether or not newts are present at the time.

Great crested newts are also listed as a species of principal importance for the conservation of biodiversity in England, under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006. The S41 species list is used to guide decision-makers, including planning authorities, in implementing their duty under Section 40 of the NERC Act to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Licensing

Where development is proposed that would result in an offence under the Habitats and Species Regulations, a statutory derogation licence may be granted by Natural England to permit an act that would otherwise be unlawful. To obtain an EPS licence for development, it must be demonstrated that the purpose of the act to be licensed is for:

"*preserving public health or public safety or other imperative reasons of* overriding public interest including those of social or economic nature and beneficial consequences of primary *importance for the environment*" (Regulation 53(2)(e))

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In addition, Natural England will not grant an EPS licence unless they are satisfied that:

"There is no satisfactory alternative" (Regulation 53(9)(a))
"The action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in *their natural range" (Regulation 53(9)(b))*

Methods

In accordance with Natural England's Great Crested Newt Mitigation Guidelines (2001), a desktop search was undertaken to identify ponds within 500m of the Site which may have potential to support breeding great crested newts Triturus cristatus, using Ordnance Survey (OS) mapping, the MAGIC database and aerial photography. 500m is the generally accepted typical maximum dispersal range of this species, with great crested newt most likely to use terrestrial habitat within 250m of breeding ponds.

The desk based search for ponds and subsequent site visits identified eight water bodies occurring within 500m of the Site. These ponds are all identified on the Pond Plan (CSA/3467/112).

Habitat Suitability Index (HSI) Assessment

Where ponds were situated within a 500m radius and connected to the Site by traversable terrestrial habitats, access permission was requested to undertake a Habitat Suitability Index (HSI) assessment, using the standard approach set out by Oldham et al (2000). These assessments were undertaken by licensed surveyor Jessica Tait GradCIEEM (Natural England GCN Licence Ref: 2016-26999-CLS-CLS) and Kate Wolstenholme. Pond 7, located c. 435m north-west of the Site was not assessed as this had been filled in.

Presence / Likely Absence Surveys

Following the HSI assessments, great crested newt presence / likely absence surveys were undertaken in suitable ponds within 500m of the survey area in accordance with Natural England guidelines. Access was granted for Ponds 1, 2, 5 and 7. Pond 3 was not surveyed as access was not granted, and Ponds 4 and 8 were not surveyed as they scored 'poor' suitability in the HSI assessment.

Survey visits were undertaken to confirm the presence / absence of GCN were completed in spring 2018 (surveys undertaken on 27 March and the 18, 25 April, and 01 May), using a combination of bottle trapping, torchlight searching, and egg searching survey techniques. On each survey where possible bottle traps were set out in the evening, before dusk. The traps were then checked and removed early the following morning and any captured newts were examined, recorded and then released. All surveys were undertaken by at least two surveyors, including at least one licenced great crested newt surveyor.

Torchlight surveys were carried out after dark at suitable temperatures, where the ponds were surveyed visually with one million candlepower Clulite TM

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torches. Any amphibians seen were recorded, as well as air temperature, vegetation cover and turbidity of the water.

Egg searches were also conducted amongst any pond vegetation for the presence of great crested newt eggs.

Limitations

The pond assessments were undertaken outside of the optimum time period (May to September, inclusive) and so the aquatic vegetation coverage is unlikely to reflect that present during the GCN breeding season. For the HSI calculations, surveyors predicted the extent of vegetation cover in summer, based on the current extent and estimated growth rates of plant species.

Access permission was not granted for all ponds at the time of the HSI assessment; however, some ponds could be viewed and assessed as best as possible from public footpaths. Pond 5 was viewed from a distance, and was assumed to be largely similar to pond 6.

Precautionary assumptions were made regarding the presence of wildfowl and fish during the habitat suitability assessment of ponds 5 and 6. Once full access permission was granted for the presence / likely absence surveys, a large number of fish and wildfowl were noted in both ponds, meaning they were less suitable for GCN than originally assessed. However, on a precautionary basis, due to the excellent surrounding terrestrial habitat and connectivity to the site, full surveys were completed.

Similarly, no fish were noted during the HSI assessment of pond 1. During the presence / likely absence surveys, fish were recorded, meaning the pond is less suitable for GCN than originally assessed. However, as the pond is on site and would be lost as a result of the proposed development, it was surveyed on a precautionary basis.

Results

HSI Assessment

The HSI assessment concluded that Ponds 1, 2, 3, 5 and 6 had 'average' suitability to support breeding great crested newts, whilst both Pond 4 and Pond 8 had 'poor' suitability, as shown in Table J1.

Presence / Likely Absence Surveys

The presence / likely absence surveys found no evidence of GCN within any of the ponds that were surveyed. Other amphibians were recorded during the surveys however, including breeding common toad Bufo bufo and common frog Rana temporaria. Unidentified small newts seen during torchlight surveys were also recorded. Full results can be found below in Table J.2.

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Table J.1 Summary of Habitat Suitability Index assessment results in December 2017 for ponds within a 500m radius of land to the west of Arundel Road, Angmering

Pond no.	SI_1	SI_2	SI_3	SI_4	SI_5	SI_6	SI_7	SI_8	SI_9	SI_{10}	HSI	Suitability
	Location	Pond Area	Pond Drying	Water Quality	Shade	Fowl	Fish	Ponds	Terrestrial Habitat	Macrophytes		
1	Zone A	<50m^2	Never Dries	Moderate	0-60%	Absent	Absent	6	Moderate	46-50%	0.65	Average
2	Zone A	125m^2	Sometimes Dries	Moderate	86-90%	Absent	Absent	7	Good	21-25%	0.66	Average
3	Zone A	50-100m^2	Sometimes Dries	Moderate	0-60%	Minor	Absent	11	Moderate	86-90%	0.65	Average
4	Zone A	<50m^2	Never Dries	Poor	0-60%	Absent	Major	6	Good	<1%	0.36	Poor
5	Zone A	>2000m^2	Never Dries	Poor	86-90%	Minor	Minor	9	Good	<1%	0.61	Average
6	Zone A	>2000m^2	Never Dries	Poor	86-90%	Minor	Minor	10	Good	<1%	0.61	Average
8	Zone A	1900m^2	Never Dries	Moderate	0-60%	Major	Major	2	Good	46-50%	0.34	Poor



N

Site Boundary

c. 500m radius from Site Boundary

Pond location and number

Pond number	Distance to Site	HSI Score	Suitability
1	On-Site	0.65	Average
2	95m east	0.66	Average
3	260m south-west	0.65	Average
4	180m north	0.57	Below average
5	85m north-west	0.61	Average
6	260m west	0.61	Average
7	435m north-west	Filled in	-
8	480m north-west	0.34	Poor

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Project:	Land West of Arundel Road, Angmering	Date: Dec 2017	Drawing No: CSA/3467/112
Drawing Title:	Pond Plan	Scale @ A4: See scale bar	Rev: -
Client:	Gladman Developments Ltd.	Drawn: JT	Checked: CC

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Pond Assessment

GENERAL INFORMATION	
Pond Number: 1	Site description: Garden pond next to hedge, some amenity grassland and introduced shrub planting. Plastic liner and stone border. Plants include water lily and waterweed.
OS Grid Reference: TQ066053	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	<50m^2	0.05
3. Number of years in 10 pond dries up Estimate or ask landowner	Never Dries	0.9
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
5. Percentage perimeter shade to at least 1m from shore Estimate	0-60%	1
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Absent	1
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Absent	1
8. Number of ponds within 1km not separated by barriers	6	0.84
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	46-50%	0.8

PHOTOGRAPH



HSI SCORE	CATEGORY
	Poor (<0.5)
	Below average (0.5 – 0.59)
0.65	Average (0.6 – 0.69)
	Good (0.7 – 0.79)
	Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 2	Site description: Pond in campsite on edge of woodland / amenity grassland. Island in the middle. Steep earth banks, ditch and scrubby margins. Plants include iris and sedge. Leaf litter.
OS Grid Reference: TQ068053	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	$125m^2$	0.25
3. Number of years in 10 pond dries up Estimate or ask landowner	Sometimes Dries	0.5
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
5. Percentage perimeter shade to at least 1m from shore Estimate	86-90%	0.4
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Absent	1
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Absent	1
8. Number of ponds within 1km not separated by barriers	7	0.85
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Good	1
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	21-25%	0.55

PHOTOGRAPH



HSI SCORE	CATEGORY
	Poor (<0.5)
	Below average (0.5 – 0.59)
0.66	Average (0.6 – 0.69)
	Good (0.7 – 0.79)
	Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 3	Site description: Ditch-fed pond in corner of arable field, connected to wider landscape via hedge/ditch. Lots of typha, some bramble scrub, young willow trees. Grassy bank c. 2m tall.
OS Grid Reference: TQ062049	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	50-100m^2	0.1
3. Number of years in 10 pond dries up Estimate or ask landowner	Sometimes Dries	0.5
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
5. Percentage perimeter shade to at least 1m from shore Estimate	0-60%	1
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Minor	0.67
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Absent	1
8. Number of ponds within 1km not separated by barriers	11	0.975
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	86-90%	0.9

PHOTOGRAPH		
	HSI SCORE	CATEGORY
		Poor (<0.5)
		Below average (0.5 – 0.59)
	0.65	Average (0.6 – 0.69)
		Good (0.7 – 0.79)
		Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 4	Site description: Small, lined pond with several inlet pipes and no vegetation.
OS Grid Reference: TQ063055	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	<50m^2	0.05
3. Number of years in 10 pond dries up Estimate or ask landowner	Never Dries	0.9
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Poor	0.33
5. Percentage perimeter shade to at least 1m from shore Estimate	0-60%	1
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Absent	1
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Absent	1
8. Number of ponds within 1km not separated by barriers	6	0.84
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Good	1
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	<1%	0.3

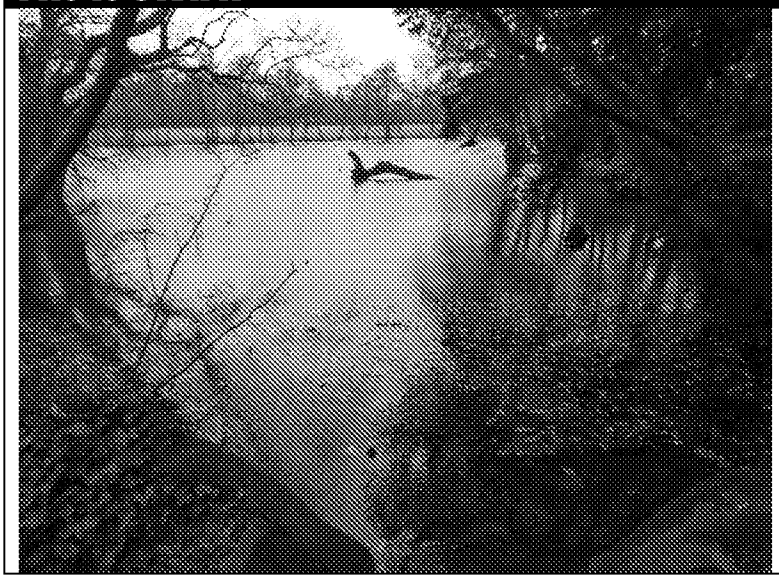
PHOTOGRAPH		
Landowner could not be contacted. Pond was viewed from the driveway, so photograph is not shown here.	HSI SCORE	CATEGORY
		Poor (<0.5)
	0.57	Below average (0.5 – 0.59)
		Average (0.6 – 0.69)
		Good (0.7 – 0.79)
		Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 5	Site description: Large pond with sluice gate, mature trees at margins, surrounded by woodland on one side and grassland on other. Lots of leaf litter, little vegetation.
OS Grid Reference: TQ061053	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	>2000m^2	1
3. Number of years in 10 pond dries up Estimate or ask landowner	Never Dries	0.9
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Poor	0.33
5. Percentage perimeter shade to at least 1m from shore Estimate	86-90%	0.4
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Minor	0.67
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Minor	0.33
8. Number of ponds within 1km not separated by barriers	9	0.9
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Good	1
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	<1%	0.3

PHOTOGRAPH



HSI SCORE	CATEGORY
	Poor (<0.5)
	Below average (0.5 – 0.59)
0.61	Average (0.6 – 0.69)
	Good (0.7 – 0.79)
	Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 6	Site description: Large pond with sluice gate, mature trees at margins, surrounded by woodland on one side and grassland on other. Lots of leaf litter, little vegetation.
OS Grid Reference: TQ059052	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	>2000m^2	1
3. Number of years in 10 pond dries up Estimate or ask landowner	Never Dries	0.9
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Poor	0.33
5. Percentage perimeter shade to at least 1m from shore Estimate	86-90%	0.4
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Minor	0.67
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Minor	0.33
8. Number of ponds within 1km not separated by barriers	10	0.95
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Good	1
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	<1%	0.3

PHOTOGRAPH



HSI SCORE	CATEGORY
	Poor (<0.5)
	Below average (0.5 – 0.59)
0.61	Average (0.6 – 0.69)
	Good (0.7 – 0.79)
	Excellent (>0.8)

Pond Assessment

GENERAL INFORMATION	
Pond Number: 8	Site description: Large pond within pasture/improved grassland with mature trees. Plants include rushes, reeds, scrub, water lilies, sedge. Shallow earth banks.
OS Grid Reference: TQ061058	

HABITAT SUITABILITY FACTORS		SI SCORE
1. Map location A (optimal), B (marginal) or C (unsuitable)	A	1
2. Pond area in m^2 Estimate	1900m^2	0.81
3. Number of years in 10 pond dries up Estimate or ask landowner	Never Dries	0.9
4. Water quality 1 = bad, 2 = poor, 3 = moderate, 4 = good	Moderate	0.67
5. Percentage perimeter shade to at least 1m from shore Estimate	0-60%	1
6. Waterfowl impact (excluding moorhen) 1 = major, 2 = minor, 4 = absent	Major	0.01
7. Fish presence 1 = major, 2 = minor, 3 = possible 4 = absent	Major	0.01
8. Number of ponds within 1km not separated by barriers	2	0.6
9. Terrestrial habitat 1 = none, 2 = poor, 3 = moderate, 4 = good	Good	1
10. Percentage of pond surface occupied by aquatic vegetation (March – May)	46-50%	0.8

PHOTOGRAPH



HSI SCORE	CATEGORY
0.34	Poor (<0.5)
	Below average (0.5 – 0.59)
	Average (0.6 – 0.69)
	Good (0.7 – 0.79)
	Excellent (>0.8)

CSA

environmental

Appendix B

CSA Environmental Ecological Mitigation and Enhancement Strategy

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CSA

environmental



Land west of Arundel Road, Angmering

Ecological Mitigation and Enhancement Strategy

Prepared by
CSA Environmental

on behalf of
Gladman Developments

Report Ref: CSA/3467/09

July 2019

urban design | ecology | landscape | heritage

UNRESTRICTED (PUBLIC DOCUMENT)

This report may contain sensitive ecological information. It is the responsibility of the Local Authority to determine if this should be made publicly available.

Report Reference	Date	Revision	Prepared by	Approved by	Comments
CSA/3467/09	31/07/2019	-	JT	CC	

ARUN DISTRICT COUNCIL A/[illegible]/EST

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Appendix C: Specification of Proposed Wildlife Boxes and Hibernacula

Appendix D: Bat Mitigation Strategy

Appendix E: Dormouse Mitigation Strategy

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EXECUTIVE SUMMARY

This report has been prepared by CSA Environmental on behalf of Gladman Developments. It sets ecological mitigation and enhancement measures to be implemented in association with proposed mixed development, to include demolition of the existing buildings, at Land west of Arundel Road, Angmering (hereafter referred to as 'the Site').

The Site currently comprises an arable field with an area of semi-improved grassland, bounded by mature hedgerows and woodland, and developed land to the east (comprising a residential plot and commercial units) (as shown on the Habitats Plan CSA/3378/102).

Ecological Features identified within this report comprise the following:

- Habitats and Flora: Hedgerows and trees
- Fauna: Bats, nesting birds, badgers, dormice, other mammals, reptiles and amphibians

This report sets out a strategy for avoidance, mitigation and where necessary compensation for potential impacts to these ecological features, as well as provision of ecological enhancement measures to be delivered alongside the proposed development.

A monitoring strategy for these ecological mitigation and management measures is included in order to inform their successful implementation and maintenance. Responsible parties are identified and mitigation proposals are assimilated into a Works Schedule so as to aid enactment.

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1.0 INTRODUCTION

1.1 This Ecological Mitigation and Enhancement Strategy (EMES) has been prepared by CSA Environmental on behalf of Gladman Developments. It sets ecological mitigation and enhancement measures to be implemented in association with proposed residential development and provision of a new children's play area, attenuation pond and associated landscaping at Land west of Arundel Road, Angmering (hereafter referred to as 'the Site'). The proposed development is shown on the Development Framework Plan (CSA/3467/136).

1.2 The Site occupies an area of c. 9.1ha and is located around central grid reference TQ 065 053, to the north of Angmering. It consists of an arable field with an area of semi-improved grassland, bounded by mature hedgerows and woodland, and developed land to the east (comprising a residential plot and commercial units) (as shown in the Habitats Plan CSA/3378/102, provided in Appendix A).

1.3 Important Ecological Features (IEFs) identified within this report comprise the following:

- Habitats and Flora: Hedgerows and trees
- Fauna: Bats, nesting birds, badgers, dormice, other mammals, reptiles and amphibians

1.4 This document sets out how potential impacts of development construction and operation will be addressed and details ecological enhancement measures to be delivered in line with the 'mitigation hierarchy' set out within the British Standard BS 42020:2013, which involves the following step-wise process:

- Avoidance – avoiding adverse effects through good design;
- Mitigation – where impacts are unavoidable, mitigation should be employed to minimise adverse effects;
- Compensation – where residual effects remain after mitigation it may be necessary to provide compensation to offset any harm;
- Enhancement – maximise opportunities to deliver biodiversity benefits, which can be delivered alongside the above to resolve potential adverse effects.

1.5 Mitigation to be implemented to avoid, mitigate and / or compensate for potential impacts to these IEFs are set out within this document, together with details of implementation and legal responsibilities (as appropriate) and monitoring.

1.6 Mitigation prescriptions have been informed by ecological survey information collected between 2017 and 2018, provided as part of the Ecological Impact Assessment (CSA/3467/07), which should be read in conjunction with this report.

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2.0 LEGISLATION, PLANNING POLICY & STANDING ADVICE

Legislation

2.1 Key wildlife legislation of relevance to ecological features identified within this Strategy are listed below:

- The Conservation of Habitats and Species Regulations 2017 (as amended)
- Wildlife and Countryside Act 1981 (as amended)
- Protection of Badgers Act 1992
- Natural Environment and Rural Communities (NERC) Act 2006
- The Hedgerow Regulations 1997

European Protected Species

2.2 The Conservation of Habitats and Species Regulations 2017 (as amended) enacts the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora, and Council Directive 79/409/EEC on the Conservation of Wild Birds, into UK law. The Regulations allow for the designation of Statutory Nature Conservation-sites (SACs and SPAs) and European Protected Species ('EPS' including all UK bat species, great crested newt, hazel dormouse and otter) which are assigned a greater level of protection than under national legislation.

2.3 These regulations make it an offence to deliberately capture, injure, kill or disturb (impairing their ability to survive, breed reproduce or rear/nurture their young) an EPS or to damage or destroy a breeding site or resting place of an EPS. Where development is proposed that would result in an offence under the Habitats and Species Regulations an EPS licence needs to be granted by Natural England to permit an act that would otherwise be unlawful. This provides for a specific derogation from the legislation, to prevent a legal infringement occurring.

2.4 EPS species of relevance to the proposed development and this EMES comprise the following;

- Bats (roosting bat(s) within buildings B3 and B4 to be lost during construction phase; potential impacts to bat foraging and dispersal considered in relation to construction and operation phases)
- Dormouse (present within hedgerows and scrub on-Site, with suitable habitat connectivity to the wider landscape)

UK Protected Species

2.5 The Wildlife and Countryside Act 1981 (as amended) forms the primary piece of UK legislation relating to the protection of habitats and species.

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The following fauna protected by this legislation, of relevance to construction and operational phases of development are as follows:

- Birds - With regards to wild birds, the Act makes it an offence to kill, injure or take any wild bird, or to take, damage or the nest of a wild bird, or to take or destroy eggs. Potential for impacts to nesting birds nesting during vegetation clearance and demolition of buildings. Species listed on Schedule 1 of the Wildlife and Countryside Act, 1981; therefore the birds, their nests, eggs and young are fully protected at all times throughout the UK. It is also an offence to intentionally or recklessly disturb Schedule 1 species at an active nest site with eggs or young or before eggs are laid, or to disturb the dependent young.

2.6 Under Section 5, Schedule 9(4) of the Act it is an offence to intentionally or recklessly disturb a species whilst occupying a structure or place which it uses for shelter or protection, or to obstruct access to such a place. This schedule will be of relevance to the following:

- Bats
- Dormice

2.7 Under Section 5, Schedule 9(1) of the Act is an offence to intentionally or recklessly kill or injure a species listed under this schedule. This schedule will be of relevance to the following:

- Reptiles – Common lizard Zootoca vivipara were recorded adjacent to the Site at land between New Place Bungalow and Arundel Road, Angmering (Ref: A/131/16/OUT), and a low population is present on Site. Suitable habitat is present reptile species on-Site along field margins, within grassland and scrub.

2.8 The Protection of Badgers Act, 1992 affords protection to badgers and their setts. A badger sett occurs on Site, therefore potential impacts to this species which could occur during the site preparation and construction phase have been considered. Precautionary measures to be implemented in order to avoid any potential impacts to badgers and an offence are set out herein.

<u>Priority Species for Conservation</u>

2.9 Section 40(1) of the Natural Environment and Rural Communities (NERC) Act 2006 states that each public authority "must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity". This legislation makes it clear that planning authorities should consider impacts to biodiversity when determining planning applications, with particular regard to the Section 41 list of 56 habitats and 943 species of principal importance, irrespective of whether they are covered by other legislation.

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2.10 The S41 list was taken forward for action under the UK BAP (first published in 1994). The UK BAP has now been superseded by the Biodiversity 2020 Strategy, which continues to prioritise the S41 list, setting national targets for the period to 2020, and the UK Post-2010 Biodiversity Framework, which shows how these contribute to targets at the European level. Whilst BAPs are therefore no longer formally recognised, many of the tools and resources originally developed for the BAP remain in use, such as the background information which still forms the basis of work at national level. However, the Sussex BAP has not been update since 2007 and no current target for biodiversity within Sussex are currently available.

2.11 S41 list species and Birds of conservation Concern (BoCC) of relevance to the 'construction and operational phases' include:

- S41 Habitats (ponds, hedgerows);
- S41 bat species (common pipistrelle, soprano pipistrelle Pipistrellus pygmaeus, brown long-eared Plecotus auritus and barbastelle bat Barbastella barbastellus);
- S41 bird species (habitats at the site have the potential to support a range of S41 and/or SBAP species e.g. starling Sturnus vulgaris, swift Apus apus, skylark Arlauda arvensis, song thrush Turdus philomelos and yellowhammer Emberiza citrinella);
- BoCC bird species (habitats at the site have the potential to support a range of BoCC species e.g. dunnock Prunella modularis, yellowhammer Emberiza citrinella); and

Planning Policy and Guidance

2.12 Relevant national and local planning policy and guidance considered within the Strategy document are listed below:

- National Planning Policy Framework (NPPF) 2019
- Arun District Local Plan 2003 saved policies
- Arun District Local Plan 2011-2031 draft policies
- Angmering Neighbourhood Plan

National Planning Policy Framework

2.13 Within the NPPF with regards to ecology and biodiversity, Chapter 15: Conserving and Enhancing the Natural Environment, paragraph 170, states that states that the planning system and planning policies should minimise impacts on and provide net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

2.14 Paragraph 175 sets out the principles that local planning authorities should apply when determining planning applications:

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- If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts).

- Development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest.

- Development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists.

- Development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.

2.15 The Government Circular 06/2005, which is referred to within the NPPF, defines statutory nature conservation sites and protected species as a material consideration in the planning process.

Arun District Development Plan

2.16 The Development Plan for the Arun district includes the following documents of relevance to the proposed development:

- The 'saved policies' of the adopted Arun District Local Plan 2003
- The 'draft policies' of the Arun District Local Plan 2011-2031
- Angmering Neighbourhood Plan

2.17 Within the Arun District Local Plan 2011-2031 (Adopted July 2018), the draft policies of relevance to the proposed development include:

- Policy ENV SP1 Natural Environment
  "Arun District Council will encourage and promote the preservation, restoration and enhancement of biodiversity and the natural environment through the development process and particularly through policies for the protection of both designated and non-designated sites. Where possible it shall also promote the creation of new areas for habitats and species. In relation to designated sites, development will be permitted where it protects sites listed in Tables 17.1-17.7 that are recognised for the species and habitats contained within them."

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- Policy ENV DM1 Designated Sites of biodiversity or geological importance

  "a) Proposed development likely to have an adverse effect on land with the designated features of any Site of Biodiversity or Geological Importance as listed in Tables 17.1-17.7 or any subsequently designated sites (either individually or in combination with other developments), will not normally be permitted. Consideration will be given to the exact designated features present on the site, their scarcity/rarity and recognition of the protection offered by their existing status. Development on wildlife sites with the highest value will only be permitted exceptionally where the following can be demonstrated:

  i. There is no alternative solution (which shall be adequately demonstrated by the developer).
  ii. There are reasons of public health or public safety or
  iii. There are benefits of primary importance to the environment or
  iv. There are imperative reasons of overriding public interest.

  Notwithstanding the above however, the presumption in favour of sustainable development does not apply where development requiring appropriate assessment under the Birds or Habitats Directives is being considered, planned or determined.

  b) In determining any planning application affecting Sites of Biodiversity or Geological Importance the Council will ensure that the intrinsic natural features of particular interest are safeguarded or enhanced having regard to;

  i. The European, National or Local status and designation of the site;
  ii. *The nature and quality of the site's features, including its* rarity value;
  iii. The extent of any adverse impacts on the notified features of interest;
  iv. The need for compensatory measures in order to re-create remaining features of habitats on or off the site.

  c) Where appropriate the Council will ensure the effective management of designated sites through the imposition of *planning conditions or Section 106 agreements as appropriate."*

- Policy ENV DM4 Protection of Trees

  "Development will be permitted where it can be demonstrated that trees protected by a Tree Preservation Order(s), (TPO) identified as Ancient Woodland, in a Conservation Area or contributing to local amenity, will not be damaged or destroyed now and as they reach maturity, unless development:

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b. Would result in the removal of one or more trees in the interests of good arboricultural practice. This shall be demonstrated by the developer following the advice of a suitably qualified person which shall be guided by BS 5837 (2012). Details of any advice received having regard to BS 5837 (2012) shall be submitted, in writing, as part of a planning application; or
c. Would enhance the survival and growth prospects of other protected trees;
d. The benefits of the proposed development in a particular location outweigh the loss of trees or woodland, especially ancient woodland.

Where planning permission is granted in any of the above instances, conditions shall be used to ensure that, for any trees which are removed as part of a development, at least an equivalent number of a similar species and age (where practical) are planted on the proposed development site. Sufficient space for replacement trees to mature without causing future nuisance or damage shall be provided. The planting of new trees shall form an integral part of the design of any development scheme.

Proper provision must be made for the protection and management of trees or areas of woodland onsite when undertaking development. A management plan shall be provided as part of a planning application in accordance with BS 5837 (2012) in order to ensure that trees are adequately protected during development and appropriately maintained in the future. Conditions for the continued protection of trees on sites shall be included in any planning permission given.

Where there are existing trees on or adjacent to a development site, developers shall be required to provide:

e. Land and tree surveys
f. A tree constraints plan
g. An arboricultural impact assessment to include a tree protection plan and arboricultural method statement

These will ensure that development is planned to take a comprehensive view of tree issues at an early stage in the design process and that development works do not have a negative *impact on existing trees."*

- Policy ENV DM5 Development and Biodiversity
"Development schemes shall, in the first instance, seek to achieve a net gain in biodiversity and protect existing habitats on site. They shall also however incorporate elements of biodiversity including green

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walls, roofs, bat and bird boxes as well as landscape features minimising adverse impacts on existing habitats (whether designated or not). Development schemes shall also be appropriately designed to facilitate the emergence of new habitats through the creation of links between habitat areas and open spaces. Together, these provide a network of green spaces which serve to reconnect isolated sites and facilitate species movement.

Where there is evidence of a protected species on a proposed development site, planning applications shall include a detailed survey of the subject species, with details of measures to be incorporated into the development scheme to avoid loss of the species. This involves consideration of any impacts that will affect the species directly or indirectly, whether within the application site or in an area outside of the site, which may be indirectly affected by the proposals. All surveys shall be carried out at an appropriate time of year and shall be undertaken by a qualified and, where appropriate, suitably licensed person.

All developments shall have regard to Natural England's standing advice for protected species."

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3.0 AIMS AND OBJECTIVES

Overview

3.1 In line with national and local planning policy, this strategy aims to minimise adverse effects on protected species and Important Ecological Features (IEFs) during the construction and operation phases of development. To meet this aim, objectives have been set out for each protected species and IEF below.

3.2 Where appropriate, impact avoidance and mitigation measures during the construction phase will be delivered as part of a Construction Environmental Management Plan (CEMP), to be agreed with Arun District Council at the reserved matters stage.

3.3 Mitigation, compensation and enhancement measures during the operational phase (including management and monitoring) will be delivered as part of a Landscape and Ecological Management Plan (LEMP), to also be agreed with Arun District Council at the reserved matters stage.

Habitats and flora

Aim

3.4 The Strategy aims to retain, protect and where possible reinstate semi-natural habitat resources (with a focus on S41 habitats protected under the NERC Act 2006) across the Site.

Objectives

3.5 Retain and protect hedgerows, trees and grassland on-Site, wherever possible.

3.6 Undertake replacement hedgerow and tree planting, or grassland seeding, of equal or greater quality or quantity to that which is lost.

Policy and legislation

3.7 Objectives are in line with the NPPF and Local Planning Policy (Arun District Council policy ENV SP1, DM4 and DM5) by maintaining the conservation status of habitats present and the fauna they support, and protecting trees and hedgerows.

Fauna

Aim

3.8 This strategy will aim to avoid or minimise adverse effects to protected species, or compensate for these effects if they cannot be prevented.

Objectives

3.9 Retain habitat which is suitable to support protected species on-Site, where possible.

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3.10 Where habitat is lost as a result of development seek to reduce potential impacts through sensitive working practices, timing of works and mitigation provision, in particular to protected species at risk of harm or disturbance (bats, dormice, badgers, nesting birds, reptiles) if present.

3.11 Minimise potential for visitor related impacts to habitats the fauna they support onsite and in the local area through the provision of suitable formal and informal POS within the development.

3.12 Ensure that mitigation is legally compliant and subject to Natural England licencing as appropriate.

Policy and legislation

3.13 This will ensure that the proposed development is in line with legislation contained within the Conservation of Habitats and Species Regulations 2017, the Wildlife and Countryside Act 1981 (as amended), and the Protection of Badgers Act 1992.

3.14 This will aim to conserve species of conservation interest, and biodiversity, which will be in line with national planning policy, and local policies ENV SP1 and DM5.

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4.0 POTENTIAL IMPACTS IN THE ABSENCE OF MITIGATION

Overview

4.1 The potential impacts of both the construction and operational phase have been assessed in detail within the Ecological Impact Assessment (CSA/3467/07). The proposed development is shown on the Development Framework Plan (CSA/3467/136). A summary of those potential impacts is provided below.

Construction Phase

Construction Phase Description

4.2 The Construction Phase will comprise the following:

- Cessation of arable cultivation
- Demolition of existing buildings
- Removal of hedgerows H1, H4, H7 and H9, and partial loss of H3 and H5
- Clearance of semi-improved grassland, amenity grassland, scrub, tall ruderal/ colonising ground vegetation, and a pond
- Construction of residential dwellings, associated gardens, parking, access infrastructure, and a play area
- The establishment of formal and informal Public Open Space (POS) including new tree, thicket and meadow planting, as well as recreational routes
- Construction of a Sustainable Urban Drainage System (SUDS) including a large attenuation basin set within the POS to the north-west of the developed area
- Strengthening of boundary vegetation with new native species planting

Potential Impacts

4.3 In the absence of mitigation, the construction phase has the potential to result in the following Impacts:

- Pollution through production of dust, run-off and artificial lighting, which could negatively impact upon retained habitats, the nearby Decoy Ponds (ponds P5 and P6) and Black Ditch stream within the woodland to the north of the Site, and other habitats downstream of the Site;
- Loss of all arable habitat onsite, which may provide a foraging resource for a range of invertebrates, mammals and birds;
- Loss of three species-rich hedgerows (H1, H4, H9), a species-poor hedgerow (H7), and a small number of trees;
- Minor permanent loss of semi-improved grassland, tall ruderal and scrub habitat to construct new dwellings, which will lead to a temporary loss of habitat for foraging bats, badgers and nesting birds

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until planting matures, and a minor net loss in terrestrial habitat for reptiles and amphibians;
- Loss of small amount aquatic habitat through removal of garden pond, but provision of a SuDS basin;
- Demolition of all onsite buildings, which includes the loss of two buildings with bat roosts (individual common pipistrelle bats);
- Risk of killing / injury of bats, dormice, badgers, other mammals, nesting birds, reptiles and amphibians, during Site clearance and construction.

Operational Phase

Operational Phase Description

4.4 The Operational Phase will comprise the following:

- Occupation of new residential dwellings
- Increase in human activity, including use of vehicles and presence of domestic pets
- Increased artificial lighting and anthropogenic noise
- Management of habitats within POS

Potential Impacts

4.5 In the absence of mitigation, the operational phase has the potential to result in the following Impacts:

- Increase in ambient lighting, and subsequently decrease in suitability of habitats for bats and other light-sensitive species;
- Increased risk to wildlife from killing / injury through traffic collisions, becoming trapped drains and predation from domestic cats;
- Increased disturbance through recreational use of onsite habitats, which may deter some species from breeding successfully onsite.

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5.0 ASSESSMENT OF EFFECTS

Overview

6.1 The potential impacts of both the construction and operational phase have been assessed in detail within the Ecological Impact Assessment (CSA/3467/07). The proposed development is shown on the Development Framework Plan (CSA/3467/136). A summary of those potential impacts is provided below.

Construction Phase

Construction Phase Description

5.2 The Construction Phase will comprise the following:

- Cessation of arable cultivation
- Demolition of existing buildings
- Removal of hedgerows H1, H4, H7 and H9, and partial loss of H3 and H5 for vehicular and pedestrian access and to facilitate construction
- Clearance of semi-improved grassland, amenity grassland, scrub, tall ruderal/ colonising ground vegetation, and a pond
- Construction of residential dwellings, associated gardens, parking, access infrastructure, a play area, employment land and sports pitches
- Construction of a Sustainable Urban Drainage System (SuDS) including a large attenuation basin set within the POS to the north-west of the developed area
- The establishment of formal and informal Public Open Space (POS) including new tree, woodland, thicket and meadow planting, as well as recreational routes

Potential Impacts

5.3 In the absence of mitigation, the construction phase has the potential to result in the following Impacts:

- Pollution through production of dust, run-off and artificial lighting, which could negatively impact upon retained habitats, the nearby Decoy Ponds (ponds P5 and P6) and Black Ditch stream within the woodland to the north of the Site, and other habitats downstream of the Site
- Loss of all arable habitat onsite, which may provide a foraging resource for a range of invertebrates, mammals and birds
- Loss of three species-rich hedgerows (H1, H4, H9), partial loss of two species-rich hedgerows (H3, H5), a species-poor hedgerow (H7), and a small number of trees
- Minor permanent loss of semi-improved grassland, tall ruderal and scrub habitat to construct new dwellings, which will lead to a temporary loss of habitat for foraging bats, badgers and nesting birds

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until planting matures, and a minor net loss in terrestrial habitat for reptiles and amphibians
- Loss of small amount aquatic habitat through removal of garden pond, but provision of a SuDS basin
- Demolition of all onsite buildings, which includes the loss of two buildings with bat roosts (used by individual common pipistrelle bats)
- Risk of killing / injury of bats, dormice, badgers, other mammals, nesting birds, reptiles and amphibians, during Site clearance and construction

Operational Phase

Operational Phase Description

5.4 The Operational Phase will comprise the following:

- Occupation of new residential dwellings
- Use of new commercial centre and sports pitches
- Increase in human activity, including use of vehicles and presence of domestic pets
- Increased artificial lighting and anthropogenic noise
- Management of habitats within POS

Potential Impacts

5.5 In the absence of mitigation, the operational phase has the potential to result in the following Impacts:

- Increase in ambient lighting, and subsequently decrease in suitability of habitats for bats and other light-sensitive species;
- Increased risk to wildlife from killing / injury through traffic collisions, becoming trapped drains and predation from domestic cats;
- Increased disturbance through recreational use of onsite habitats, which may deter some species from breeding successfully onsite.

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6.0 IMPACT AVOIDANCE AND MITIGATION MEASURES

Impact Avoidance and Mitigation Measures

Habitats and Flora

Hedgerows and Trees

6.1 The trees, six species-rich and three species-poor hedgerows on-Site are of local value, and support a range of fauna. Where possible all hedgerows and trees on-Site will be retained and protected, with a 5m buffer strip, and habitat loss be mitigated for through replacement planting. The proposed development will include c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting, and c. 490 trees, with scope for additional planting in the POS and residential parcels.

6.2 All construction will strictly adhere to a Construction Environmental Management Plan (CEMP). The CEMP will ensure the impact to onsite habitats from construction noise, dust and run-off is minimised.

6.3 Hedgerows and trees around the margins of the Site will largely be retained, with significant semi-natural habitat buffers (5m in width). These features will be protected during construction by appropriate fencing in line with BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations (BSI, 2012). These measures will be detailed within a Tree Protection Plan, to be agreed with Arun District Council as part of detailed planning consent. The habitat buffers will help to further reduce potential impacts to retained vegetation.

Fauna

Roosting Bats

6.4 Under the current development proposals, no trees considered to hold potential roosting opportunities for bats will be lost.

6.5 Roosting bat(s) are present within B3 and B4, with a single common pipistrelle observed emerging from B3, and a soprano pipistrelle from B4; both of which shall be demolished under the development proposals. No other bats were seen emerging or return to roost in any of the other buildings surveyed.

6.6 A Bat Mitigation Strategy has been set out in Appendix D (summarised below), which aims to avoid direct impacts to roosting bats and mitigate for the loss roosting sites to ensure that the favourable conservation status of common and soprano pipistrelle bats is maintained. Final details shall need to be confirmed at the Reserved Matters planning stage, and it is considered that any necessary updates and implementation could be secured by way of a suitably worded pre-commencement planning condition.

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- Avoidance of Direct Impacts (e.g. killing and injury): Demolition of B3 and B4 will be undertaken sensitively, using methods which aim to minimise the risk of killing or injuring roosting bats. Features which are known to be used or have potential to be used by roosting bats on B3 and B4 will be removed by hand under an ecological watching brief.
- Maintaining Favourable Conservation Status: To mitigate for the loss of roost locations, four replacement bat boxes will be sited in pairs on trees as close to each roost to be lost as possible, on south-east to south-west aspects, close to suitable foraging habitat (vegetation), away from possible access by domestic cats (e.g. window ledges, fences), and positioned at a height of between 3 to 6 metres. Indicative locations for these boxes have been provided on the Ecological Mitigation and Enhancement Strategy Plan (CSA/3467/111), which will be revised at the Reserved Matters stage once the final site layout is available.
- European Protected Species Licencing (EPSL): Demolition of B3 and B4 will need to be covered by EPS licence. The Bat Mitigation Strategy detailed herein shall form the basis of a Methods Statement for the EPSL application; which can be made once full (Reserved Matters) planning consent has been obtained and all relevant conditions have been discharged. Based on 2018 survey results; mitigation for loss of these 'low conservation status' roosts, could be progressed under a traditional 'mitigation' EPS licencing or via the Bat Mitigation Class Licencing (BMCL) system. Dependant on the timescales within which the EPSL application comes forwards, update survey work may be required to inform the application (i.e. should demolition works be delayed beyond summer 2019).

Foraging and Commuting Bats

6.7 The majority of habitat currently utilized by bats for foraging and commuting will be retained, with significant buffers from new development being provided in many parts of the Site through the creation of new semi-natural habitats (c. 490 new trees, c. 0.2ha meadow seeding, and a c. 0.25ha SuDS basin) which will also be of value to bats due to the invertebrate prey they will support.

6.2 Light spill onto habitat used by commuting and foraging bats will be minimised through design of a sensitive lighting scheme. Sensitive lighting will be implemented throughout the construction and operational phases as follows, unless a different standard is required by Mid Sussex District Council as Highways Authority for adoptable roads:

- Construction phase:
  - Illumination of retained boundary vegetation and mature trees will be avoided, wherever practicable, during low light conditions.

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- In instances where illumination is necessary the intensity and duration will be kept to a minimum.
- Down lighting will be used where possible.

- Operational Phase:
  - Lighting throughout the Site will be kept to a minimum and installed on motion sensors or timers where practicable.
  - Direct and indirect Illumination of the boundary vegetation and mature trees will be avoided where possible.
  - Down lighting will be used throughout to minimise light spill and sky glow.
  - Lighting to be installed on the Site will conform with the following spectral specifications, in accordance with BCT (2018):
    - LED luminaires used where possible
    - No metal halide fluorescent sources
    - Minimal emission of ultra-violet light
    - Warm white spectrum (ideally <2700Kelvin where possible) with peak higher than 550nm
    - Luminaires with 0% upward light ratio and good optical control
    - Careful consideration of column heights to minimise light spill
    - Bollard / low level downward directional luminaires where required
    - As a last resort, accessories such as baffles, hoods or louvres to minimise light spill

6.3 These measures accord with the Bat Conservation Trust and the Institution of Lighting Professionals Guidance Note on Artificial Lighting and Bats (2018).

Dormice

6.8 The dormouse survey recorded dormice using the eastern and western hedgerows (H2 and H6) with a peak count of two individuals, and six likely dormouse nests along the woodland edge, eastern and western hedgerows (H3, H6, H9).

6.9 Under the Development Framework Plan, the proposed development will result in the loss of c. 0.4ha of scrub and hedgerow (c. 335m in total length) to allow creation of the primary site access and provide room for development. In the absence of mitigation this could result in direct impacts to and habitat loss for dormice.

6.10 A Dormouse Mitigation Strategy has been set out in Appendix E (summarised below), which aims to avoid direct impacts to dormice and mitigate for habitat loss to ensure that the favourable conservation status of this species can be maintained. Final details shall need to be confirmed at the Reserved Matters planning stage, and it is considered

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that any necessary updates and implementation could be secured by way of a suitably worded pre-commencement planning condition.

- Avoidance of Direct Impacts (e.g. killing and injury): To minimise the risk of killing, injury and disturbance of dormice during vegetation clearance, a standard two-stage clearance methodology will be used which will aim to persuade any dormice present to re-locate into retained habitat, as recommended within the Mitigation and Compensation Methods Section of the Dormouse Conservation Handbook[1].

- Maintaining Favourable Conservation Status: The majority of hedgerows will be retained in the proposed development, maintaining habitat connectivity along the northern, western and southern boundaries. Retained boundary vegetation will be buffered by a significant amount of new tree and thicket planting (c. 0.4ha thicket, c. 0.5ha woodland belt, c. 490 new trees), as shown on the Development Framework Plan (CSA/3467/136), resulting in a significant enhancement. Planting specifications will be provided at the detailed planning stage; however to ensure good habitat provision will include native species of benefit to dormice, such as hazel Corylus avellana and blackthorn Prunus spinosa, which provide suitable food resources and a dense shrubby understorey. In addition 20 dormouse nest boxes shall be provided within retained habitat.

- Management prescriptions for hedgerows will be set out within the LEMP and agreed with Arun District Council at the detailed planning stage. Hedgerows will be sensitively managed for the benefit of wildlife, including dormice should they be present. Cutting intervals lengthened to allow flowering and fruiting, and to maintain their value as dispersal routes. Alternative sides of the hedgerow will be cut over winter (Dec–Feb) at 3 to 5 year intervals in order to maintain the availability of flowers and fruits and to prevent hedgerows becoming outgrown and gappy.

- European Protected Species Licencing (EPSL): Impact avoidance and compensation measures will need to be secured via an EPS licence from Natural England. The Dormouse Mitigation Strategy detailed herein shall form the basis of a Methods Statement for the EPSL application; which can be made once full (Reserved Matters) planning consent has been obtained and all relevant conditions have been discharged. The proposed development scheme is considered to offer significant scope for the provision of compensatory habitat for dormice and subject to sensitive working practices / seasonality of vegetation works then direct impacts to this species should be avoided and their favourable conservation status maintained, meeting EPSL requirements.

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Badger

6.11 Signs of badger activity and a badger sett were observed on Site. Full details have not been included here for confidentiality reasons, to protect badgers. Further information has been included within a separate badger report (CSA/3467/06).

6.12 The habitat on site used by badgers is to be retained and buffered by new planting as part of the proposed development, therefore impacts upon badgers are not currently anticipated. However, badgers are highly mobile and new setts could be created onsite at any time. An update badger survey will be completed prior to the Reserved Matters application, to ensure any badger setts are taken account of at the design stage. As a precaution, a pre-construction check will be completed to confirm the absence of setts prior to the start of site clearance and construction works. Should any active setts be identified which would be impacted by the construction phase, appropriate mitigation (i.e. sett closure) would need to be undertaken under licence from Natural England before works could commence.

6.13 Precautionary measures to be implemented during the construction phase, to prevent any harm / injury to badgers which may cross the site, shall comprise the following and will be detailed within the CEMP:

- Where any pits/trenches are left open overnight, secured planks should be placed within these at an angle of no more than 45 degrees in order to provide a means of escape for any badgers.
- In the event that badgers are found to be trapped or injured within the site no attempt should be made to approach the badger and the RSPCA should be contacted immediately.
- Due to the inquisitive nature of badgers any litter, tools and machinery that could potentially cause harm should be kept away from badgers by appropriate overnight storage.
- Avoid presenting new digging opportunities for badgers, e.g. by leaving stockpiled soil on the edge of the development for prolonged periods.

Nesting Birds

6.14 The majority of suitable foraging, dispersal and nesting resources will be maintained through the retention of semi-natural habitats within the POS and retained trees will be protected during construction. Habitat loss will be mitigated for through replacement planting, including c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting, and c. 490 trees, with scope for additional planting in residential parcels.

6.15 The proposed development will result in a loss of nesting habitat for species such as swallow Apus apus which nest in buildings as all on-Site buildings will be demolished, and a some minor loss for species which nest in scrub vegetation such as dunnock Prunus modularis (c. 0.4ha of

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scrub and hedgerows and c. 10 trees will be removed, as shown on EMES Plan, CSA/3467/111).

6.16 Disturbance impacts to nesting and foraging birds shall be minimised through the sensitive design of access routes through POS, with some dense undisturbed areas of scrub and trees being maintained.

6.17 As for dormice, sensitive management of hedgerows will mitigate impacts to nesting birds during the operation phase. Management prescriptions will be set out within the LEMP to be agreed with Arun District Council at the detailed planning stage.

6.18 Demolition of buildings and any removal/ pruning of hedgerows or trees during the construction or operation phases will be undertaken sensitively, avoiding the peak nesting season of 1st March to 1st October inclusive. If this is not feasible, clearance / demolition will immediately follow a check by a suitably qualified ecologist to confirm there are no active birds' nests present.

6.19 If an active bird's nest is found, an exclusion zone will be set up around the nest and no works will take place until the ecologist has verified that all dependent young have fledged. The radius of this exclusion zone will be species-dependent, varying according to the conservation status and vulnerability to disturbance of the species in question.

Reptiles

6.20 Rough grassland field margins / areas of scrub provide potential for reptiles to be present. The majority of suitable reptile habitat on-Site (c. 1ha of hedgerows and field margins) will be retained within the POS along the edges of the development. The proposed development provides good scope for the favourable conservation status of any reptile population which may be present on-Site to be maintained, subject to the implementation of suitable impact avoidance and habitat management measures.

6.21 The proposed development will result in a loss of habitat suitable for reptiles, as c. 0.4ha of scrub and hedgerows, and c. 0.2ha of tall ruderal/colonising ground will be lost, and c. 1.8ha of grassland of limited suitability for reptiles. This will be mitigated for through a significant amount of new planting, including seeding of c. 0.2 ha native species-rich wildflower meadow, c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting, and c. 490 trees, and creation of SuDS features, with scope for additional planting in residential parcels.

6.22 The POS will be designed and managed to ensure it remains suitable to support reptiles, including grassland with a dense and tussocky sward, and some scrub to provide cover and foraging resources for reptiles. Appropriate management measures which seek to avoid adverse impacts to reptile species will be set out within a LEMP to be agreed at the detailed planning stage, but key principles are summarised here:

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- Existing grassland and hedgerow bases will be retained where possible, and additional areas of meadow created within the POS.
- Following establishment, some areas of grassland will be left to grow long during the summer, with a hay cut taken in late summer to no lower than 150mm.
- Cutting within long grassland must occur during suitable weather conditions (warm and sunny, temperature at least 10°C) to minimise the risk of harming reptiles.
- Low intervention scrub management will help to maintain open grassland areas for basking reptiles which will involve annual strimming back of encroaching scrub in late autumn.
- Arisings from habitat management will be raked up and used to make habitat piles, which will provide refuge, foraging and egg-laying resources for reptiles and other fauna.
- Access routes and planting in the POS will be sensitively designed with an aim to minimise disturbance from walkers and dogs. Some areas will be designed which limit public access through the absence of recreational paths and planting of dense, thorny plant species in key locations.

6.23 As only a small number of reptiles are present within habitats to be lost, and a large amount of habitat is to be retained, a full translocation exercise is not considered warranted in this instance. Instead, habitat manipulation and displacement into retained habitat is considered appropriate to minimise the risk of harming individuals. Where suitable reptile habitat will be lost, the following approach will be taken to minimise the risk of killing / injury of individuals:

- Habitat manipulation will be used to displace reptiles into the retained habitat, including hedgerows (c. 0.3ha) and grassland along the northern boundary (c. 0.1ha).
- Vegetation clearance will be carried out under an ecological watching brief and during warm, dry weather conditions to ensure reptiles have the best chance of dispersing away from harm.
- Vegetation will be cleared using a two-stage approach (aligned with clearance of dormouse habitat). First above-ground vegetation will be cut over winter to c. 30cm to prevent nesting birds and dormice utilising the habitat in summer. In summer, once reptiles and dormice are out of hibernation, the remaining habitat will be cleared to ground level. Where required, roots will be grubbed out and any debris piles will be destructively searched.
- Retained habitat will be enhanced through creation of log piles and hibernacula to raise its carrying capacity, and ensure that the denser population can be supported.

Amphibians

6.24 There is a small garden pond on-Site and five within a dispersible distance which could support amphibians, and the hedgerows, scrub and field margins provide suitable terrestrial habitat. Survey results

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indicate GCN are likely absent from the Site and surrounding ponds, but a large breeding population of the common toad Bufo bufo (a S41 species) has been recorded in the pond c. 145m north-west of the Site.

6.25 The proposed development will result in the loss of the small pond which was found to contain goldfish during surveys; no amphibians were recorded present. A significant amount of suitable terrestrial habitat on-Site will be retained within the POS (c. 0.4ha of hedgerows and field margins), and new planting will provide replacement habitat, including seeding of c. 0.1ha native species-rich wildflower meadow and creation of SuDS features. As for reptiles, management of the POS will ensure that meadow habitat remains suitable for GCN through a low-intensity cutting regime, with arisings used to create habitat piles.

6.26 An attenuation basin will be created as part of a SuDS system, which will include a permanent core. The banks will be seeded with species-rich wildflower mixes to provide suitable terrestrial habitat, and the wet core will be planted with native aquatic and marginal species to provide suitable aquatic habitat.

6.27 The proposed development scheme is considered to offer significant scope for the provision of compensatory habitat for amphibians (i.e. through new planting, of SuDS basin, log piles), and subject to sensitive working practices / seasonality of vegetation works direct impacts could be avoided and the favourable conservation status of these species maintained.

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7.0 COMPENSATION AND ENHANCEMENT MEASURES

Aims and Objectives

12.1 Compensation and enhancement measures for protected species and IEFs, relevant to the construction and operation phases of development, are set out herein to address the following aims and objectives:

- Compensate / offset any residual impacts from development where this is not possible through impact avoidance and mitigation measures;
- Undertake habitat creation which will be in line with national and local planning policy;
- Provision habitat enhancement features of benefit to S41 species known to be present onsite / locally;
- Provide long-term benefits for wildlife during the operational phases through suitable habitat provision and management;
- Ensure that habitat management practices ensure that the value of retained and newly created habitats are maximised through the implementation of a suitable Landscape and Ecology Management Plan (LEMP).

Compensation and Enhancement Measures

Native Grassland Creation

12.2 The proposed scheme will provide the scope for a significant amount of new meadow planting (c. 0.2ha) within the POS along the northern, western and southern boundaries, and within the attenuation basin. The ecological value of retained areas of existing grassland and new species-rich native grassland seeding will be maximised through the implementation of appropriate management to be secured through a LEMP.

12.3 Species rich native grassland areas will be managed as meadow habitat, with a single hay cut taken in August or September depending on the species mix allowing sufficient time for flowering and seeding. Grass cutting and clearance of encroaching scrub will be in line with herptile mitigation measures as appropriate, to ensure that opportunities for herptiles continue to be provided across the site in the long term.

12.4 Habitat creation will increase foraging opportunities a variety of fauna. The value of these areas of informal open space shall be maximised by the use of pesticides being avoided to ensure that healthy invertebrate (e.g. worm / mollusc) populations thrive which provide an important foraging resource for badgers, bats, birds and herptiles.

12.5 In the POS sensitive design of access routes and management practices which retain some dense undisturbed areas of scrub will be

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implemented to discourage access from people and dogs, to minimise habitat disturbance to herptiles, birds and other species.

Hedgerow, Buffer and Tree Planting

12.6 The proposed scheme will provide the scope for a significant amount of new buffer and tree planting within the POS (c. 1ha : c. 0.4ha thicket, c. 0.5ha woodland belt, c. 490 new trees). Within informal areas of open space, native species of known benefit to wildlife will be selected to maximise the biodiversity value, such as oak Quercus robur, hawthorn Crataegus monogyna and blackthorn Prunus spinosa.

12.7 Landscape design will seek to provide a range of eco-tones between areas of tree / woodland planting and grassland areas through the use of low growing shrubs at woodland block margins. New trees and thickets will also be planted throughout the wildflower meadow areas. Through this habitat diversification, a habitat matrix will be produced, offering a greater variety of opportunities for wildlife. This will benefit invertebrates and herptiles in particular by creating open basking opportunities and refuge areas. Foraging resources will be increased for a range of fauna, including bats and birds.

12.8 Within development areas, the use of native tree and hedgerow planting shall be incorporated into areas of more formal planting as appropriate. This will provide benefits in terms of habitat connectivity as well as boosting resources across the development.

12.9 The new planting will compensate for the minor loss of current bird nesting habitat through hedgerow, scrub and tree removal, with a significant net gain of available foraging and nesting habitat. Natural roosting opportunities for bats, such as abandoned woodpecker holes, rot holes and splits, will take significantly longer to develop.

12.10 Sensitive management of hedgerow and tree planting, along with retained existing habitat, will be delivered through the LEMP. Management shall take account of ecological constraints such as the bird nesting period (March to August inclusive), herptile active season (March to September inclusive), and aim to maintain or increase the abundance and diversity of invertebrate prey species.

Wildlife Features

12.11 To enhance roosting opportunities for bats across the site six artificial bat roost boxes (2FN Bat Box or equivalent; see Appendix C) will be erected on retained trees along the Site boundaries and within the open space and along Site boundaries, in addition to the four proposed as mitigation; these will be installed prior to demolition of the buildings as a matter of good practice. Ten bat tubes (Habibat, or similar) will be installed into new buildings within the development by way of enhancement. These will be located in sheltered areas close to retained / new planting and away from new external light sources. All bat boxes will be located with a broadly south-facing aspect, at a height of c. 3-

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6m above ground level and away from areas which could be accessible by predators (e.g. domestic cats). Details of the locations and specifications of new bat roost enhancement features will be provided within the LEMP at the Reserved Matters stage, with indicative locations provided on the EMES plan (CSA/3467/111).

12.12 Lost nesting opportunities for bird species which nest in the on-Site buildings will be compensated for and enhanced with the provision of a variety of artificial, purpose-built nest boxes. By way of compensation for the demolished buildings, a total of 10 bird boxes will be installed into new buildings within the development (NHBS integrated starling box, terraced sparrow box, and swift box or equivalent; see Appendix C). By way of enhancement, a total of 10 woodcrete nest boxes (1MR Avianex nest box, or equivalent; see Appendix C) will be erected on trees throughout the proposed POS and along the Site boundaries. These will be located in sheltered areas close to retained / new planting and away from new external light sources. All bird boxes will be located with a broadly north-facing aspect away from direct sunlight and prevailing winds, at a height of c. 2-4m above ground level and away from areas which could be accessible by predators (e.g. domestic cats). Details of will be provided within the LEMP.

12.13 To enhance sheltering opportunities for herptiles and invertebrates, dead wood created through habitat management will be retained onsite and used to create log or brash piles. A minimum of five log piles, one hibernacula, and three invertebrate boxes will be provided within the POS. Locations to be detailed within the LEMP.

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8.0 MANAGEMENT AND MONITORING

Management

18.1 Basic prescriptions for habitat management of retained and newly created semi-natural habitats have been set out within this report as appropriate. It is envisaged that this shall form a framework for the development of a Landscape and Ecology Management Plan (LEMP) to be produced alongside detailed development proposals at the Reserved Matters stage. The LEMP will include the following:

- Details of habitat types and areas to be provided;
- Planting and seeding specification;
- Details of management for both establishment of new habitats and ongoing management, with details of at least the first 10 years of management to be set out;
- A works schedule detailing annual management actions; and
- Details of management responsibilities and funding.

18.2 The agreed LEMP shall be submitted alongside EPSL applications for bats and dormice as applicable and its implementation shall secure long-term habitat provision and enhancement for these species.

Monitoring

18.3 A programme of monitoring shall be included within the LEMP to ensure that the success of mitigation and management can be measured, and measures amended as necessary to achieve the objectives set out within this document. It is envisaged that any monitoring frame work shall cover the following:

- Planting – success of new planting to inform replacement as necessary;
- Habitat Assessment – to assess the biodiversity value of habitat delivered in relation to the pre-development baseline;
- Fauna – species specific surveys as appropriate where specific mitigation and compensation measures have been provided to inform further mitigation action requirements and in line with any Natural England / EPS licencing requirements. Bat and dormouse monitoring requirements have been set out in Appendices D and E, respectively.

18.4 A monitoring report will be provided to the Local Planning Authority and species records sent to Sussex Biological Records Centre.

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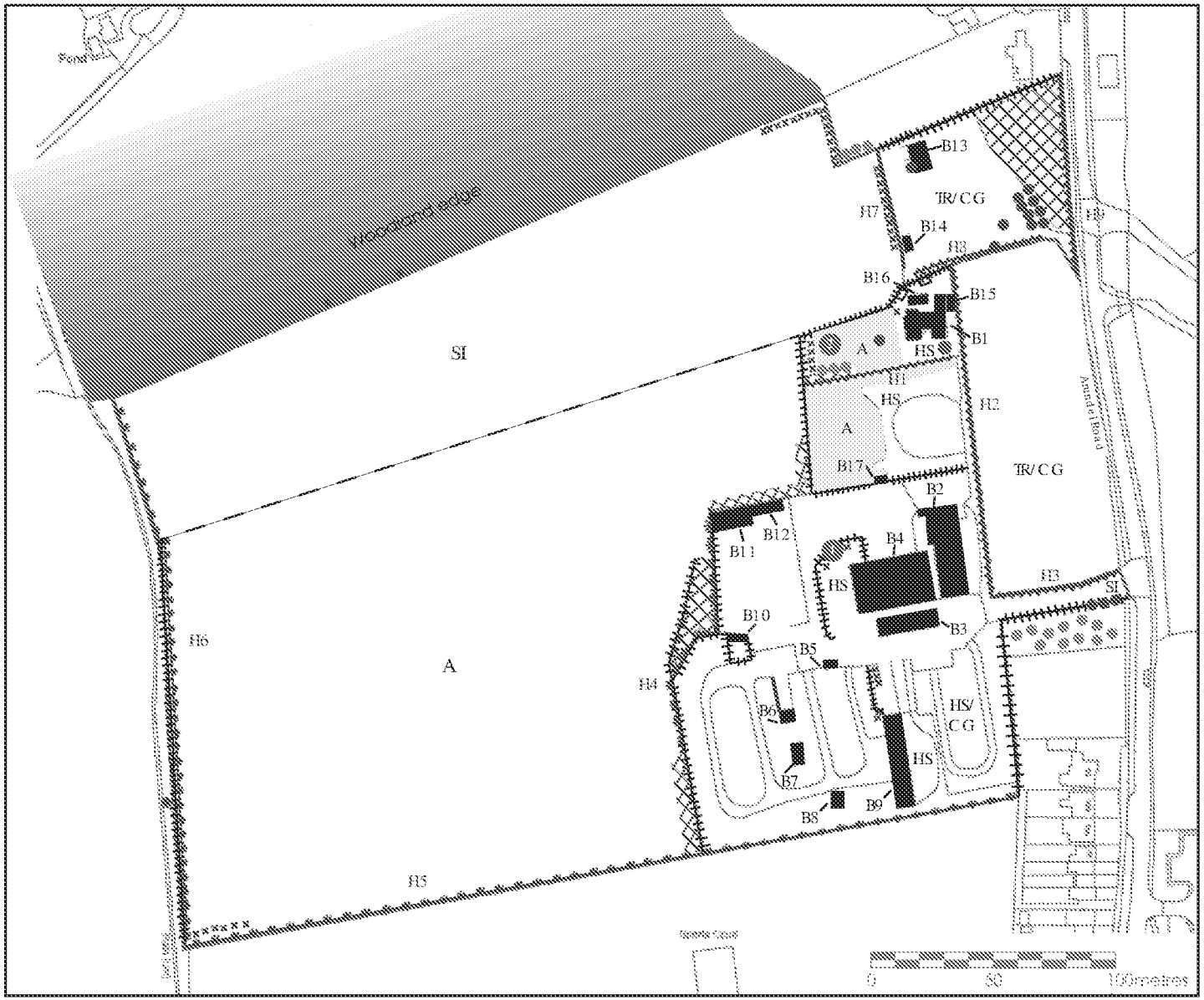
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Appendix A

Habitats Plan (CSA/3467/102)

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- Site Boundary
- Species-rich hedge with trees (H4-6)
- Species-rich hedge (H1-3 & 8-9)
- Species-poor hedge (H7)
- Fence
- A — Arable
- SI — Semi-improved grassland
- A — Amenity grassland
- Dense scrub
- Scattered scrub
- CG — Colonising ground
- HS — Hard standing
- TR — Tall ruderal
- Buildings (B1-13)
- Wall
- Individual trees - deciduous
- Individual trees - coniferous
- Pond
- Trees with features suitable for roosting bats
- 1 - Brash pile; 2 - Garden: amenity grassland with ornamental planting, mature trees & shrubs, chestnut post & rail fencing

N

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Project:	Land West of Arundel Road, Angmering	Date: January 2017	Drawing No.: CSA/3467/102
Drawing Title:	Habitats Plan	Scale @ A4: See scale bar	Rev: A
Client:	Gladman Developments Ltd.	Drawn: KW/JT	Checked: JT

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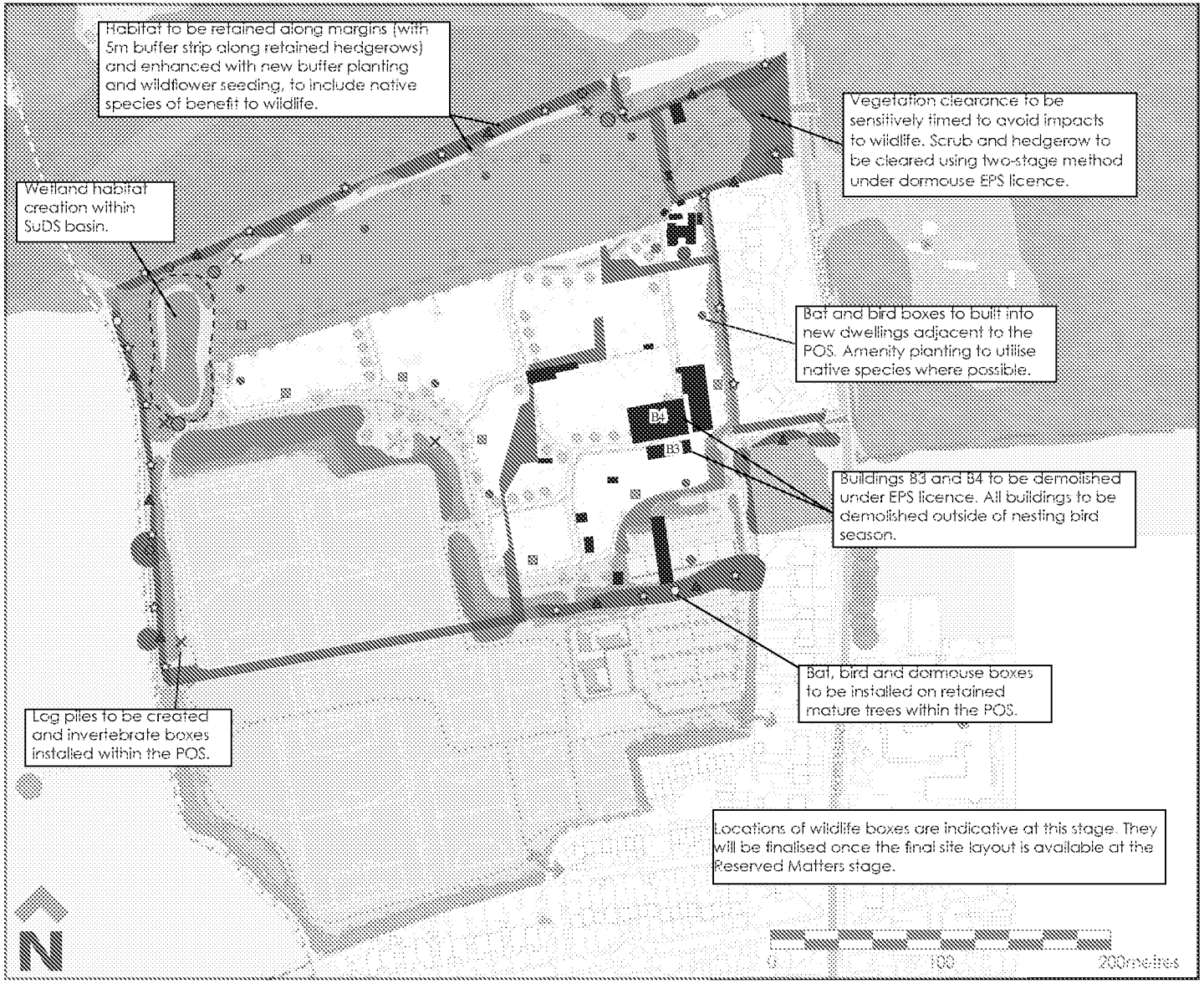
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Appendix B

Ecological Mitigation and Enhancement Plan
(CSA/3467/111)

ARUN DISTRICT COUNCIL A/122/19/RES

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- Site Boundary
- Hedgerows (with 5m buffer strip), scrub, trees and woodland edge to be retained (c. 0.3ha)
- New woodland belt planting (c. 0.5ha)
- New thicket planting (c. 0.4ha)
- Long grassland to be retained/created (0.3ha)
- New aquatic/marginal habitat to be created (c. 0.1ha dependent on final drainage strategy)
- Hedgerows, scrub and a small number of trees to be removed (0.4ha)
- Grassland/ruderal to be removed (c. 2ha)
- Pond to be removed
- Buildings to be demolished
- Log pile to be installed
- SuDS basin to be created (c. 0.25ha)
- 20 x Dormouse nest boxes to be erected on retained mature trees as mitigation
- 4 x Bat boxes (Schwegler 2FN or similar) to be installed in pairs on retained trees as mitigation
- 6 x Bat boxes (Schwegler 2FN or similar) to be installed in pairs on retained trees as enhancement
- 10 x Bird boxes (Schwegler 1MR or similar) to be erected on retained mature trees
- 10 x Bat tubes (Habitat or similar) to be installed into new dwellings as enhancement
- 10 x Bird boxes (to include 3 x starling boxes, 3 x sparrow terraces and 4 x swift boxes) to be installed into new dwellings
- 3 x invertebrate boxes as enhancement

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Project:	Land West of Arundel Road, Angmering	Date: July 2019	Drawing No.: CSA/3467/111
Drawing Title:	Ecological Mitigation and Enhancement Strategy	Scale @ A4: See scale bar	Rev: F
Client:	Gladman Developments Ltd.	Drawn: JT	Checked: CC

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ARUN DISTRICT COUNCIL A/48/2019/RES

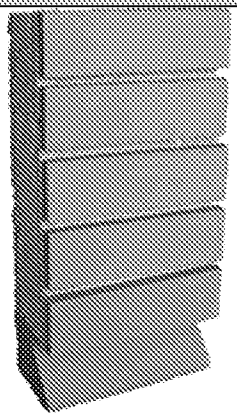
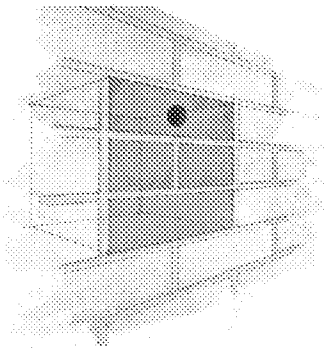
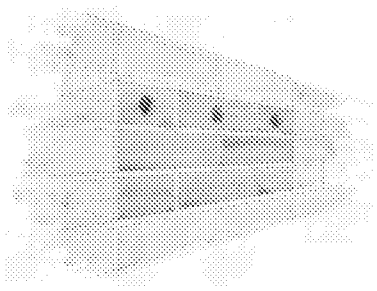
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Appendix C

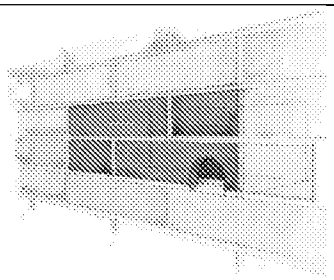
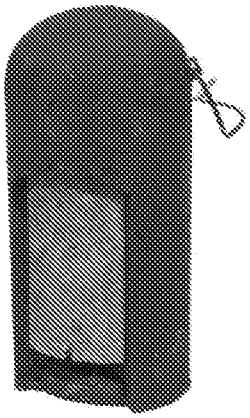
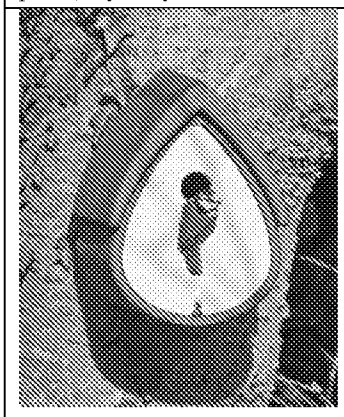
Specification of Proposed Wildlife Boxes and Hibernacula

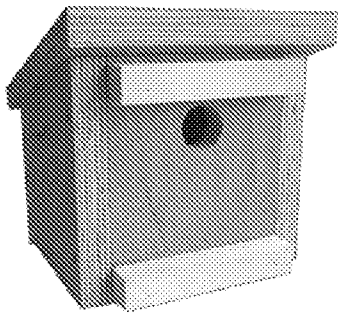
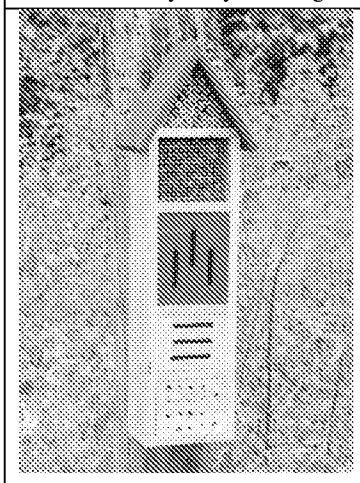
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Table C1 Wildlife boxes to be installed in POS

Product	Description	Location[1]
 Habibat Bat Box (or equivalent) x 10 tubes by way of enhancement	Suitable for: Crevice-dwelling bats Design: Made of insulating concrete with an internal roost space. A variety of facings can be fitted to suit any existing brick, wood, stonework or rendered finish, rendering the box unobtrusive and aesthetically pleasing. Positioning: Will be sited on buildings away from possible access by domestic cats (e.g. window ledges, fences), and is best positioned at a height of between 3 to 6 metres. Will be sited on southeast to southwest aspects, close to suitable foraging habitat (vegetation).	Integrated into new buildings
 Starling Box (NHBS, or equivalent) x 3 boxes by way of compensation	Suitable for: Starling Design: Large, solid box made of insulating concrete with an internal nesting space which can be incorporated into the fabric of a building as it is built or renovated. The box is designed especially to be unobtrusive and aesthetically pleasing. Positioning: Will be sited on buildings away from possible access by domestic cats (e.g. window ledges, fences). Best positioned at a height of at least 2m favouring north-east to north-west orientations where possible.	Integrated into new buildings
 Terraced Sparrow Box (NHBS, or equivalent) x 3 boxes by way of compensation	Suitable for: House sparrow Design: Large, solid box made of insulating concrete with three internal nesting spaces, allowing three pairs to nest close to each other. This design of box is ideal for house sparrows which are extremely social and prefer to nest near to other pairs. The box is designed to be incorporated into the fabric of a building as it is built or renovated and is both unobtrusive and aesthetically pleasing. Positioning: Will be sited on buildings away from possible access by domestic cats (e.g. window ledges, fences). Best positioned at a height of at least 2m favouring north-east to north-west orientations where possible.	Integrated into new buildings

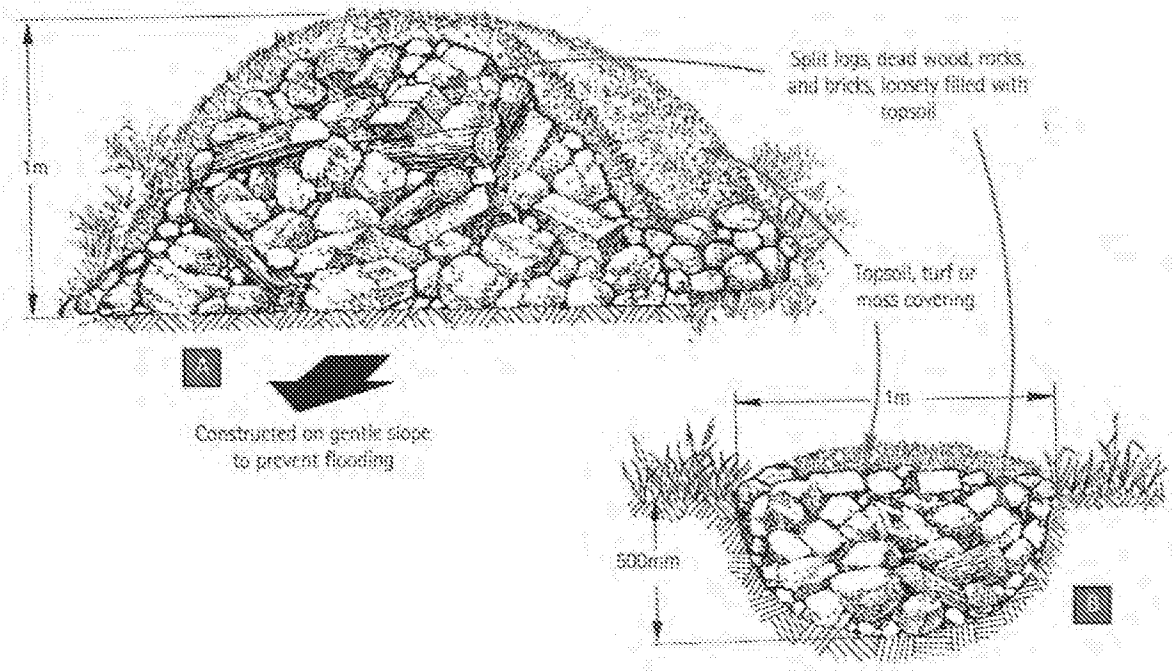
[1] Indicative locations shown on Ecological Mitigation and Enhancement Strategy Plan (CSA/3467/111)

 Swift Box (NHBS, or equivalent) x 4 boxes by way of compensation	Suitable for: Swift Design: Large, solid box made of insulating concrete with three internal nesting spaces, allowing three pairs to nest close to each other. This design of box is ideal for house sparrows which are extremely social and prefer to nest near to other pairs. The box is designed to be incorporated into the fabric of a building as it is built or renovated and is both unobtrusive and aesthetically pleasing. Positioning: Will be sited on buildings away from possible access by domestic cats (e.g. window ledges, fences). Best positioned at a height of at least 2m favouring north-east to north-west orientations where possible.	Integrated into new buildings
 2FN Bat Box (or equivalent) x 4 boxes (to be installed in pairs) by way of mitigation x 6 boxes (to be installed in pairs) by way of enhancement	Suitable for: Crevice-dwelling bats Design: Woodcrete material, which will not rot, leak, crack or warp, and will last for at least 20 - 25 years, making it suitable for long-term mitigation projects Positioning: Will be sited on trees and is best positioned at a height of between 3 to 6 metres. Bat boxes will be sited in open sunny positions with southeast to southwest aspects.	On mature trees within POS and on Site boundaries
 1MR Avianex nest box (or equivalent) x 10 boxes (to be installed in pairs) by way of enhancement	Suitable for: Hole-nesting bird species Design: Woodcrete material, which will not rot, leak, crack or warp, and will last for at least 20 - 25 years, making it suitable for long-term mitigation projects Positioning: Will be sited on trees and is best positioned at a height of at least 2m favouring north-east to north-west orientations where possible.	On mature trees within POS and on Site boundaries

 FSC Heavy Duty Dormouse Box X 20 boxes by way of mitigation	Suitable for: Dormice Design: Made from ¾" FSC marine plywood and is very robust and sturdy. Positioning: Will be sited on trees and is best positioned at a height of at least 1.5m, well away from public areas.	On mature trees within POS and on Site boundaries
 CJ Wildlife Insect tower x 3 to be installed by way of enhancement	Suitable for: variety of insects Design: The nesting tubes are ideal for solitary bees to build their nests in, the vertical slots are designed to encourage butterflies, other refuge holes are perfect for ladybirds and lacewings and the pine cones offer an excellent habitat for a range of other species. Positioning: Will be sited on a tree facing north-east to north-west, in dappled shade.	On mature trees within POS and on Site boundaries

Schwegler and CJ Wildlife products can be purchased from the NHBS website www.nhbs.com

Figure C1 Hibernacula Design Taken from Great Crested Newt Conservation Handbook. Froglife 2001. Design A can be used on impermeable soils and free-draining soils whereas B should only be used on free-draining soils.



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Appendix D

Bat Mitigation Strategy

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Introduction

This mitigation strategy has been produced to ensure compliance with the Wildlife and Countryside Act 1981 (as amended) and Conservation of Habitats and Species Regulations 2017, and demonstrate that the proposed development would pass the third legal test to be licensable by Natural England, i.e. "the action authorised will not be detrimental to the maintenance of the population of the species concerned [bats] at a favourable conservation status in their natural range". The first two of these legal tests relate to planning need and project design, which will be demonstrated within the Reasoned Statement of the EPS licence application.

Demolition of on-site buildings is proposed in order to facilitate residential development for which detailed planning permission is sought. Two of the buildings on-site (B3 and B4) have been confirmed to support roosting bats.

All UK bat species are legally protected under the Wildlife and Countryside Act, 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017. This makes it illegal to:

- Deliberately/intentionally capture, injure or kill a bat;
- Intentionally or recklessly disturb a bat whilst within in its roost; and
- Damage, destroy or obstruct access to a bat roost.

The legal protection afforded to bats and their roosts means that a Natural England licence and appropriate mitigation will be required to permit the proposed works, which would result in the destruction of bat roosts. This mitigation strategy sets out the mitigation and enhancement measures to be undertaken at the Site to ensure that an offence is avoided and that the favourable conservation status of local bat species is maintained.

Survey and Site Assessment

Full methods and results of survey work undertaken in 2017 and 2018 are presented within the Ecological Impact Assessment (EcIA) (CSA/3467/01), but are summarised below.

The following survey work was undertaken in 2017 and 2018:

- Desk study (September 2017)
- Extended Phase 1 Habitat survey (September 2017)
- Building inspection for bats (September 2017)
- Bat activity transects (September 2017 – June 2018)
- Bat remote monitoring (September 2017– June 2018)
- Bat emergence / return to roost surveys (September 2017– June 2018)

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Desk Study

SxBRC provided 13 bat records from within the search area, including common pipistrelle Pipistrellus pipistrellus, soprano pipistrelle Pipistrellus pygmaeus and brown long-eared bats Plecotus auritus. The closest record was an unspecified pipistrelle species feeding roost c. 245m south-east of the site in 2014.

Field Surveys

A number of the onsite buildings and trees adjacent to northern and western Site boundaries were noted to have features suitable to support roosting bats during the Phase 1 survey. Although the trees along the southern boundary are of a sufficient size, they are in good condition do not exhibit any features suitable to support roosting bats.

Of the 17 buildings identified on-site, one building was assessed as having moderate potential to support roosting bats (B1), four as having low potential (B2, B3, B4 and B13), and two low to negligible potential (B8, B9), with the remainder having negligible potential. Internal inspections of B1, B8, B9 and B13 did not reveal any evidence of past or current use by roosting bats.

Bat emergence / return to roost surveys completed in 2018 revealed that roosting bat(s) are present within B3 and B4, with a single common pipistrelle observed emerging from under a ridge tile on B3 on 06 June 2018, and a soprano pipistrelle bat flying low from the north of B4 on the 15 May and 06 June 2018, and seen emerging from a hole in the brickwork in section d of B4 on 12 June 2018. The roost(s) identified are considered to be of low conservation significance.

During the bat emergence / return to roost, transect surveys and static monitoring undertaken across the Site, at least eight species of bat were recorded. Bat activity was predominantly recorded along the Site boundaries, particularly along the northern Site boundary, which is a woodland edge with a stream and ponds to the north, and western hedgerow; species diversity was also greater at these locations.

Predicted Impacts

Under the current development proposals, no trees considered to hold potential roosting opportunities for bats will be lost. However, two buildings confirmed to support low numbers of common and soprano pipistrelle bats (B3 & B4) will be lost.

During the construction phase, foraging and commuting habitat will be lost in the east and north-east of the Site as hedgerows, scrub, trees, grassland and the pond are removed. This will reduce habitat

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connectivity from Steyne Wood to the north, through the Site to the woodland across Arundel Road to the east. However, the POS will include a significant amount of buffer planting along the edge of Steyne Wood, and the majority of the site boundaries, strengthening commuting routes. In addition, new meadow planting and a SuDS basin will provide a variety of foraging habitats.

During the operational phase, ambient light levels could be increased due to artificial street lighting, although it should be noted that significant floodlighting is currently in place within the industrial park.

In the absence of mitigation, the proposed development could have an adverse impact on bats, through roost loss / disruption of foraging habitat. However, this effect is predicted to be limited to the Site level, given the small number of minor confirmed roosts and focus of bat activity within retained habitats to the north and west.

Mitigation and Compensation Measures

European Protected Species Licensing

As roosting bats are present in B3 and B4, demolition of these buildings will need to take place under European Protected Species (EPS) licence. Given the low conservation status to of the roosts identified, EPS licencing may be progressed by the traditional Natural England approach or via Bat mitigation Class Licencing (BMCL). Whichever route is chosen, the following mitigation and compensation measures shall be implemented as part of the scheme and secured by EPSL as appropriate.

Working Methods

To minimise the risk of killing or injury of roosting bats during the demolition of buildings B3 and B4, the following working methods will be used:

- A toolbox talk will be given to the site manager and contractors involved prior to the start of works to inform them of the procedures to be taken. This be delivered by the name ecologist or accredited agent listed on the EPSL
- 10 bat boxes (Schwegler 2FN or similar; four as mitigation and six as enhancement) will be installed on retained mature trees along the Site boundaries (indicative locations shown on EMES plan, CSA/3467/111). The mitigation boxes will be installed before demolition commences, so that in the event a bat is found during demolition, it can be moved to a bat box. The remaining boxes will be installed during the construction period.
- Immediately prior to demolition, a bat licensed ecologist will complete a final internal inspection and detailed external inspection of B3 and B4.

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- An ecologist will be present to oversee the soft strip of key areas of B3 and B4 which could conceal bats, focusing on the areas where bat evidence has previously been observed (i.e. lifted ridge tiles of B3 and hole in brickwork of B4). The bat ecologist will check any crevices suitable for bats that are exposed as part of these works, using an endoscope and a high powered torch, as necessary. This approach will minimise the potential for disturbance, killing or injury of bats (in the unlikely event that any individuals are present).
- If bats are found, the bat worker will catch them by hand and place them in a breathable holding bag for immediate relocation to one of the bat boxes onsite. Care will be taken to move the bat quickly and with minimal handling.
- Once the relevant roof areas have been stripped under supervision, the remainder of the demolition will then continue without the supervision of an ecologist. In the unlikely event than any bat is found during any of the subsequent demolition work, contractors must immediately stop work on that building and contact CSA for advice.

Timing of Works

Under Natural England guidelines, given the low conservation value of the roosts involved there is no requirement to restrict the timing of works. However, as the roosts present are summer roosts, it is recommended that to minimise the risk of killing, injuring or disturbing roosting bats, demolition works be undertaken in winter.

New Roost Creation

To mitigate for the loss of roost locations, four replacement bat boxes (Schwegler 2FN or 2FN-DFP, suitable for pipistrelle species) will be installed in pairs on retained mature trees as close to each roost to be lost as possible. on south-east to south-west aspects, close to suitable foraging habitat (vegetation), away from possible access by domestic cats (e.g. window ledges, fences), and positioned at a height of between 3 to 6 metres. Indicative locations for these boxes have been provided on the Ecological Mitigation and Enhancement Strategy Plan (CSA/3467/111).

Habitat Retention and Creation

The majority of habitat currently utilized by bats for foraging and commuting will be retained, with significant buffers from new development being provided in many parts of the Site through the creation of new semi-natural habitats (c. 0.4ha thicket, c. 0.5ha woodland belt, c. 490 new trees, c. 0.2ha meadow seeding, and a SuDS basin) which will also be of value to bats due to the invertebrate prey they will support. The new planting will strengthen habitat connectivity around the Site, and provide additional habitat around the new roosts to be created.

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Sensitive Lighting Scheme

In line with policies ENV SP1 and DM5, to maintain habitat suitability for bats light spill onto habitat used by commuting and foraging bats will be minimised through design of a sensitive lighting scheme, to be detailed at the Reserved Matters planning stage.

Sensitive lighting will be implemented throughout the construction and operational phases as follows, unless a different standard is required by Mid Sussex District Council as Highways Authority for adoptable roads:

- Construction phase:
    - Illumination of retained boundary vegetation and mature trees will be avoided, wherever practicable, during low light conditions.
    - In instances where illumination is necessary the intensity and duration will be kept to a minimum.
    - Down lighting will be used where possible.

- Operational Phase:
    - Lighting throughout the Site will be kept to a minimum and installed on motion sensors or timers where practicable.
    - Direct and indirect Illumination of the boundary vegetation and mature trees will be avoided where possible.
    - Down lighting will be used throughout to minimise light spill and sky glow.
    - Lighting to be installed on the Site will conform with the following spectral specifications, in accordance with BCT (2018):
        - LED luminaires used where possible
        - No metal halide fluorescent sources
        - Minimal emission of ultra-violet light
        - Warm white spectrum (ideally <2700Kelvin where possible) with peak higher than 550nm
        - Luminaires with 0% upward light ratio and good optical control
        - Careful consideration of column heights to minimise light spill
        - Bollard / low level downward directional luminaires where required
        - As a last resort, accessories such as baffles, hoods or louvres to minimise light spill

These measures accord with the Bat Conservation Trust and the Institution of Lighting Professionals Guidance Note on Artificial Lighting and Bats (2018).

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Monitoring and Reporting

A Site visit, by the project ecologist, will need to be undertaken to ensure that the mitigation proposed is undertaken to the agreed specification (e.g. installation of bat boxes) and in line with the EPSL.

As the roosts to be lost in B3 and B4 are of low conservation significance, no formal post-development monitoring is required (BCT, 2016). However, as a matter of good practice one formal check of the installed bat boxes will be undertaken by a licensed ecologist within year 1 or 2 (during the period May to August) following completion of the works to see whether there has been any uptake by bats, and if not whether any changes are required.

Confirmation that the measures outlined and relevant EPS licence have been completed will be provided in the form of a licence return to Natural England upon completion of the works, along with a short report to the Local Planning Authority.

Enhancement Measures

To enhance roosting opportunities for bats across the site, in addition to the four proposed for mitigation, six artificial bat roost boxes (2FN Bat Box or equivalent; see Appendix C) will be erected on retained trees along the Site boundaries and within the open space and along Site boundaries; these will be installed during the construction period.

In addition, ten bat tubes (Habibat, or similar) will be installed into new buildings within the development by way of enhancement. These will be located in sheltered areas close to retained / new planting and away from new external light sources.

All bat boxes will be located with a broadly south-facing aspect, at a height of c. 3-6m above ground level and away from areas which could be accessible by predators (e.g. domestic cats). Details of the locations and specifications of new bat roost enhancement features will be provided within the LEMP at the Reserved Matters stage.

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Conclusion

The proposed mitigation approach is in line with requirements for loss of roosts of low conservation status (as set out within the BCT Mitigation Guidelines) and is compliant with Natural England EPS licensing requirements. In addition, new habitat creation and provision of a sensitive lighting strategy shall ensure provision of foraging commuting habitat, retaining and enhancing opportunities for bats and dormice alike. Appropriate management of this habitat provision will be detailed within a LEMP, to include species population monitoring in line with Natural England EPS licensing requirements. These measures shall ensure that the favourable conservation status is maintained.

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Appendix E

Dormouse Mitigation Strategy

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Introduction

This mitigation strategy has been produced to ensure compliance with the Wildlife and Countryside Act 1981 (as amended) and Conservation of Habitats and Species Regulations 2017, and demonstrate that the proposed development would pass the third legal test to be licensable by Natural England, i.e. "the action authorised will not be detrimental to the maintenance of the population of the species concerned [dormice] *at a favourable conservation status in their natural range*". The first two of these legal tests relate to planning need and project design, which will be demonstrated within the Reasoned Statement of the EPS licence application.

Proposals to develop the Site will result in loss of scrub and hedgerow habitat known to support dormice. Dormice are a European Protected Species (EPS) and receive strong legal protection under both the Wildlife and Countryside Act, 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations) (as amended). These legislation make it illegal to:

- Deliberately capture, injure or kill a dormouse;
- Damage or destroy a dormouse resting place or breeding site;
- Deliberately or recklessly disturb a dormouse whilst it's in a structure or place of shelter or protection;
- Obstruct access to structures or places of shelter or protection.

The legal protection afforded to dormice means that a Natural England licence and appropriate mitigation will be required to permit the proposed works, which would result in the destruction of dormouse habitat. This mitigation strategy sets out the mitigation and enhancement measures to be undertaken at the Site to ensure that an offence is avoided and that the favourable conservation status of the local dormouse population is maintained.

Survey and Site Assessment

Full methods and results of survey work undertaken in 2017 and 2018 are presented within the Ecological Impact Assessment (EcIA) (CSA/3467/07), but are summarised below.

The following survey work was undertaken in 2017 and 2018:

- Desk study (September 2017)
- Extended Phase 1 Habitat survey (September 2017)
- Dormouse nest-tube surveys (April – September 2018)

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Desk Study

SxBRC provided two records of dormouse Muscardinus avellanarius within the search area, c. 950m east of the Site in 2015, and c. 950m north of the Site across the A27, both with limited connectivity to the Site.

Eight species-rich and one species-poor hedgerows are present on-Site which show some evidence of management. While some of these hedgerows are not considered to offer high quality opportunities for dormice, they do act to connect more optimal habitats in the wider surrounds. Dense patches of scrub are present at the Site along the eastern boundaries of the arable field and within the north eastern corner of the Site.

Field Surveys

The dormouse survey recorded dormice in the eastern and western hedgerows (H3 and H6) with a peak count of two individuals, and three likely dormouse nests along the woodland edge, and eastern hedgerows (H2 and H9). As a European Protected Species the population will be of at least Local importance given their local distribution and conservation status.

Predicted Impacts

It is envisaged that the proposed development will result in the loss of c. 0.4ha of scrub and hedgerows (c. 335m in total length) of Local importance to dormice to allow creation of the primary site access and provide room for development. This will result in a permanent loss of suitable nesting and foraging habitat (more than compensated for by new planting), and temporary reduction in habitat connectivity until new planting matures.

There is the potential for direct impacts to this species during the construction phase, as vegetation clearance activities may result in an offence whereby dormice are injured, killed or disturbed and/or their breeding or resting places are damaged or destroyed. During the operational phase, dormice may be at greater risk of predation due to domestic cats, and traffic collision.

Overall, in the absence of mitigation, the proposed development could have the potential for adverse impact on dormice significant at the Local level.

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Mitigation and Compensation Measures

European Protected Species Licensing

Impact avoidance and compensation measures will need to be secured via an EPS licence from Natural England. The proposed development scheme is considered to offer significant scope for the provision of compensatory habitat for dormice (i.e. provision of c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting, and 20 dormouse nest boxes on retained boundary vegetation), and subject to sensitive working practices / seasonality of vegetation works then direct impacts to this species would be avoided and their favourable conservation status maintained.

Working Methods & Timings

The proposed vegetation clearance works are considered to be limited in extent and mitigation through displacement of any resident animals is the most appropriate option. To clear the scrub in the north-east corner and centre of the site, hedgerows H1, H4, H7 and H9, and sections of H3 and H5, the below vegetation clearance working methods will be followed to persuade any dormice present to re-locate into retained habitat and avoid potential killing, injury and disturbance.

Works will be subject to seasonal constraints and will adopt the recommended standard two-stage clearance methodology as recommended within the Mitigation and Compensation Methods Section of the Dormouse Conservation Handbook[1].

Stage 1

- A toolbox talk will be provided to contractors by the licensed ecologist.
- Removal of surface vegetation to no lower than 30cm above ground level between November to February inclusive (typically accepted as the core dormouse hibernation period). This cut height is recommended to avoid impacts to dormice which may be hibernating at ground level within habitats to be removed.
- Clearance will be carried out in a set direction, moving progressively towards retained habitat, to encourage dormice to disperse into it. If retained habitat is present on both sides of the habitat to be cleared (i.e. H9 and scrub in north-east corner), clearance will begin in the centre and work outwards in both directions. If retained habitat is present in only one direction (e.g. H1, H4), clearance will begin at the furthest point from the retained habitat and work towards it.
- Habitat removal works will be undertaken sensitively using hand-held tools, under a close watching brief provided by a suitably qualified ecologist, to minimise any potential impacts to hibernating animals. Should any dormouse nests be found during these works they will

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carefully be removed and placed within areas of habitat to be protected during the construction phase. On emergence from hibernation dormice will be able to disperse into retained habitat.

- All material and arisings resulting from the vegetation clearance will be carefully removed from the cleared areas so as not to provide additional nest building habitat for dormice in summer months. Any existing piles of vegetation or logs within the habitat clearance areas will be left and dismantled by hand between May and September, outside of the hibernation period (to avoid potential impacts to hibernating animals).
- If vegetation is cleared during winter months, care will be taken to protect hibernating dormice on the ground by utilising a single drag-line route, along which vegetation is removed. This route may be checked for dormice and/or cleared of vegetation beforehand, if necessary.

Stage 2

- A toolbox talk will be provided to contractors by the licensed ecologist.
- A second stage of clearance will take place after the end of May to remove any remaining vegetation, to ensure no food source suitable for dormice (e.g. bramble flowers and fruit) re-establishes within the development area.
- Vegetation will be cleared under a watching brief and in stages, first to a height of c. 10cm and then gradually cleared to ground level to allow any reptiles which may be present to disperse. For stage 1, clearance will be carried out in a set direction, moving progressively towards retained habitat, to encourage dormice to disperse into it.
- Any potential hibernation features left during the first stage of clearance will be dismantled by hand. The first stage of clearance will also have ensured that impacts to nesting birds are avoided which would otherwise be likely at this time of year.
- This stage of work will also be subject to an ecological watching brief.

The following prescriptions will also be followed:

- Vehicular access to the Site will follow existing tracks, and avoid any unnecessary movement over on-site vegetation where possible.
- A single route to and from the clearance area for all vehicles and machinery will be designated and used at all times.

<u>Habitat Retention and Creation</u>

The majority of hedgerows will be retained in the proposed development, maintaining habitat connectivity along the northern, western and southern boundaries.

Retained boundary vegetation will be buffered by a significant amount of new tree and thicket planting (c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting and c. 490 trees), as shown on the

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Development Framework Plan (CSA/3467/136), resulting in a significant enhancement. Planting specifications will be provided at the detailed planning stage; however to ensure good habitat provision will include native species of benefit to dormice, such as hazel Corylus avellana and blackthorn Prunus spinosa, which provide suitable food resources and a dense shrubby understorey. Detailed planting proposals as be secured at the Reserved Matters planning stage.

Twenty dormouse nest boxes will be installed on retained mature trees along the Site boundaries, to provide additional nesting opportunities. These will be positioned at a height of at least 1.5m, well away from public areas to minimise the risk of disturbance. Indicative locations for these boxes have been provided on the Ecological Mitigation and Enhancement Strategy Plan (CSA/3467/111), which will be revised at the Reserved Matters stage once the final site layout is available.

Habitat Management

Management prescriptions for hedgerows will be set out within the LEMP and agreed with Arun District Council at the detailed planning stage. Hedgerows will be sensitively managed for the benefit of wildlife, including dormice should they be present. Cutting intervals lengthened to allow flowering and fruiting, and to maintain their value as dispersal routes. Alternative sides of the hedgerow will be cut over winter (Dec – Feb) at 3 to 5 year intervals in order to maintain the availability of flowers and fruits and to prevent hedgerows becoming outgrown and gappy.

Sensitive Lighting Scheme

In line with policy ENV SP1, to maintain habitat suitability for dormice, light spill onto suitable habitat will be minimised through design of a sensitive lighting scheme, to be detailed at the Reserved Matters planning stage. The scheme will aim to achieve a maximum light-spill of 1 lux onto the woodland edge to the north and retained boundary vegetation, following the same principles as that set out in section 6.4 for bats.

In the first instance, lighting columns to be erected alongside mature trees and hedgerows will be aligned and the height carefully considered so as to minimise light spill onto these habitat corridors. Luminaires will be selected with spectral specifications which minimise impacts to nocturnal fauna. Directional light sources and shielding, including anti-glare shields, louvres and cowls, will be used as a last resort to minimise light spill.

Where light spill onto retained / created habitats cannot be avoided additional mitigation measures, such as restricting the time periods when

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lighting is turned on, should be considered to ensure that habitat useable resources do not become fragmented by light disturbance.

Monitoring and Reporting

Site visit will be undertaken, by the project ecologist, to ensure that the mitigation proposed is undertaken to the agreed specification (e.g. installation of dormouse nest boxes).

Monitoring of the dormouse boxes is proposed to occur in years 1 and 3 post-development with monitoring checks undertaken in May, August and September each year (often the peak months). The results will be used to inform future management if necessary and will be reported to Natural England, the local records centre and any local interest groups. It is hoped that liaison with the local dormouse group can ensure that monitoring of the boxes is undertaken in the longer term.

Confirmation that the measures outlined and secured by EPS licence have been completed will be provided in the form of a licence return to Natural England upon completion of the works, along with a short report to the Local Planning Authority.

Enhancement Measures

The proposed scheme will include a significant amount of new tree and thicket planting (c. 0.4ha of new native thicket planting, c. 0.5ha of woodland belt planting, c. 490 trees), in addition to the provision of 20 new nest boxes. Overall, the scheme is anticipated to result in a significant increase in the amount of suitable habitat available on Site for dormice.

Conclusion

The proposed mitigation approach is in line with requirements for loss of roosts of low conservation status (as set out within the Dormouse Conservation Handbook) and is compliant with Natural England EPS licensing requirements. In addition, new habitat creation and provision of a sensitive lighting strategy shall ensure provision of foraging commuting habitat, retaining and enhancing opportunities for bats and dormice alike. Appropriate management of this habitat provision will be detailed within a LEMP, to include species population monitoring in line with Natural England EPS licensing requirements. These measures shall ensure that the local population status is maintained.

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Appendix C

Land at Arundel Ecological Site Walkover

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LAND AT ARUNDEL

Ecological Site Walkover



ECO07659
Land at Arundel
1
24 February 2021

rpsgroup.com

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Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
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EXECUTIVE SUMMARY

- RPS was commissioned by Redrow Homes to undertake an Ecological Site Walkover of land at Arundel, Angerming, Littlehampton, BN16 4ET.
- The application site is located on the northern edge of Angerming village, immediately to the north of the Angerming Sports and Social Club and allocated recreational land. The site is accessed off Arundel Road. The site benefits from outline application for the construction of up to 160 dwellings together with up to 1,393m^2 of B1/B2 units and land made available for expansion of current sports pitch provision, approved by Arun District Council in March 2020 (A/122/19/OUT). A range of ecology surveys were undertaken across the site by CSA Environmental between 2017 to 2019.
- The site is 9.1 hectares and is mixed use, comprising agricultural, industrial, and residential (New Place Bungalow) buildings. This residential building is approved for demolition as part of the outline application. Two oak trees within the western boundary are protected by a Tree Preservation Order.
- The aim of the 2021 verification walkover was to confirm the current ecological value of the site and establish the need for any further mitigation and enhancement measures.
- The RPS updated 2021 walkover confirmed the site conditions remain the same as outlined by CSA Environmental in previous studies.
- Due to the presence of confirmed bat roosts in Buildings B3 and B4, a Natural England European Protected Species Licence (EPS) and associated mitigation will be required prior to works commencing on these structures. An updated internal inspection of these buildings will be required for the future licence application.
- In addition, repeat emergence/re-entry surveys must be completed on Buildings B3 and B4 to gather data for a Natural England Licence Application. Natural England require data that has been collected within the past two years for submission with licence applications and the existing data collected by CSA Environmental is dated 2017/2018. If any other builings are found to have evidence of bat presence following internal inspections, these will also require emergence/re-entry surveys.
- Hazel dormouse were recorded within boundary vegetation during the CSA Environmental surveys and therefore a Natural England EPS licence and associated mitigation strategy will be required prior to works commencing on site.
- It is recommended that the following surveys and reporting are repeated to update the data for the Reserved Matters application and Natural England EPS licencing (bats and dormice):
    - Phase 2 bat surveys (emergence/re-entry) (CSA Environmental, 2017/2018);
    - Phase 2 hazel dormouse surveys (CSA Environmental, 2017/2018);
    - Phase 2 badger surveys (CSA Environmental, 2018); and
    - Phase 2 great crested newt surveys (CSA Environmental, 2018).
- An active badger sett was recorded on the northern boundary of the site during the updated walkover. It is recommended that the sett is monitored for signs of badger activity over an extended period (four weeks) to establish the extent of use. Once the layout for the scheme is confirmed, the sett may require closure under licence depending on the risk of disturbance from the proposed development. If closure is required, the monitoring data will be sufficient for a sett closure under a Natural England disturbance licence.
- An updated Ecological Mitigation and Enhancement Strategy relating to the Reserved Matters application will be required.

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1 INTRODUCTION

1.1 Site Location and Background

1.1.1 RPS was commissioned by Redrow Homes to undertake an Ecological Site Walkover of land at Arundel, Angerming, Littlehampton, BN16 4ET.

1.1.2 The application site is located on the northern edge of Angerming village, immediately to the north of the Angerming Sports and Social Club and allocated recreational land. The site is accessed off Arundel Road.

1.1.3 The site is 9.1 hectares and at the time of survey was mixed use, comprising agricultural, industrial, and residential (Building B1). This residential building is approved for demolition as part of the outline application. Two oak trees within the western boundary are protected by a Tree Preservation Order.

1.1.4 An outline application for the construction of up to 160 dwellings together with up to 1,393m^2 of B1/B2 units and land made available for expansion of current sports pitch provision was approved by Arun District Council in March 2020 (A/122/19/OUT).

1.1.5 As part of the outline planning application, detailed ecological information was submitted in support of the development, including:

- Ecological Impact Assessment (CSA Environmental, 2019);
- Ecological Mitigation and Enhancement Strategy (CSA Environmental, 2019A number of Phase 2 protected species were completed in support of the Ecological Mitigation and Enhancement Strategy and include the following;
- Preliminary Ecological Appraisal (CSA Environmental, 2017/2018);
- Preliminary Roost Assessment (CSA Environmental, 2017);
- Phase 2 bat surveys (emergence/re-entry and activity surveys) (CSA Environmental, 2017/2018);
- Phase 2 hazel dormouse surveys (CSA Environmental, 2017/2018);
- Phase 2 badger surveys (CSA Environmental, 2018);
- Phase 2 reptile surveys (CSA Environmental, 2018); and
- Phase 2 great crested newt surveys (CSA Environmental, 2018).

1.2 Purpose and scope of this report

1.2.1 The 2021 site walkover aims to:

- review and assess the habitats present on site compared to previous reports and note if any updating ecological surveys are required for a Reserved Matters planning application.
- provide outline options for mitigation measures as appropriate; and
- make recommendations for appropriate biodiversity enhancements in line with national and local planning policy.

1.2.2 To undertake a site walkover, an ecologist visited the site and systematically walked the area, noting habitats present.

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1.2.3 This report pertains to these results only; recommendations included within this report are the professional opinion of an experienced ecologist and therefore the view of RPS. The surveys undertaken as part of this review and subsequent are prepared in accordance with the British Standard for Biodiversity Code of Practice for Planning and Development (BS42020:2013).

1.3 Site Walkover

1.3.1 A updated site walkover was completed on the 2nd February 2021 by Frances Morris MRSB ACIEEM.

1.3.2 The site walkover followed the standard methodology (JNCC, 2010), and as described in the Guidelines for Preliminary Ecological Assessment (IEEM, 2012). In summary, this comprised walking over the survey area and recording the habitat types and boundary features present.

1.3.3 The surveyor looked for evidence of use including signs such as burrows, droppings, footprints, paths, hairs, refugia and particular habitat types known to be used by certain groups such as ponds. Any mammal paths were also noted down and where possible followed. Fence boundaries were walked to establish any entry points or animals signs such as latrines. Areas of bare earth were inspected for mammal prints. Areas of habitat considered suitable for protected species or those of conservation interest were recorded.

1.4 Limitations

Survey

1.4.1 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no investigation can ensure the complete characterisation and prediction of the natural environment.

1.4.2 Access into the bungalow grounds (Building B1) was not provided, and the building was occupied by residents therefore assessments of this building were made from the fence line.

1.4.3 During the site walkover one of the tenants would not provide access to their yard and therefore Building B2 could not be thoroughly surveyed.

1.4.4 The site walkover was carried out outside of the optimal survey season (April to October). Although the survey was carried out at a sub-optimal time of year, it is considered that sufficient information was obtained to enable an accurate assessment of the site to be carried out.

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2 RESULTS

2.1 Site walkover

2.1.1 The 2021 updated walkover results are presented in the form of survey notes below.Descriptions of the habitat types and boundary features are detailed below. Habitat descriptions are defined by broad habitat types (JNCC, 2010).

2.1.2 Site photographs can be found at Appendix A.

Buildings

2.1.3 Buildings were externally assessed during the site walkover for features suitable for supporting roosting bats. The site walkover confirmed that no physical changes have occurred to the buildings since the previous surveys (CSA Environmental, 2017). A number of buildings are considered suitable for supporting roosting bats and two are confirmed roosts.

Hardstanding

2.1.4 Areas of hardstanding were located throughout the site in the form of roads and car park. All areas remain as per previous surveys (CSA Environmental, 2017/2018).

Semi-improved grassland

2.1.5 An area of semi improved grassland was located to the north of the site which is in line with the assessment made by CSA Environmental in 2017/2018. The grassland showed signs of recent ploughing (ridge lines). The sward height was approximately 3cm as shown in Photo 2 in Appendix A. The semi improved grassland field margins were considered suitable for supporting common and widespread reptile species, as per previous reports (CSA Environmental, 2018).

Native hedgerow

2.1.6 As previously reported by CSA Environmental, the site is bordered to the south, west and north by native hedgerow. Directly adjacent to the northern boundary was an area of deciduous woodland. As previously reported by CSA Environmental, a badger sett with recent signs of activity was noted in the northern boundary hedgerow. Native hedgerow on site is considered suitable for supporting great crested newts, common and widespread reptiles, nesting birds and hazel dormouse.

Scrub

2.1.7 An area of scrub was present to the north east of the site with bramble encroachment. A trench had been excavated in this area, with vegetation clearance recently carried out a shown in Photo 10 in Appendix A. Areas of scrub on site were considered suitable for supporting great crested newts, common and widespread reptiles, nesting birds and hazel dormouse.

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Amenity garden

2.1.8 An amenity garden associated with Building B1 was present at the time of the site walkover. This area comprised amenity grassland and managed ornamental planting as per the previous survey (CSA Environmental, 2017).

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3 ECOLOGICAL RECOMMENDATIONS

3.1 Bats

3.1.1 Previous bat emergence/re-entry surveys recorded bat roosts in Buildings B3 and B4 with a single common pipistrelle *Pipistrellus pipistrellus* seen emerging from under a ridge tile on Building B3 on the 6th June 2018 and a soprano pipistrelle *Pipistrellus pygmaeus* seen emerging from Building B4 on the 12th June 2018.

3.1.2 Buildings B3 and B4 will therefore require a Natural England LowImpact Class licence to be in place and any associated mitigation measures prior to works commencing on site.

3.1.3 Previous internal surveys of the buildings were completed in 2017 and therefore to support an EPS licence application and assess the existing status of buildings on site, this should be repeated to gather up to date data.

3.1.4 In addition, repeat emergence/re-entry surveys must be completed on Buildings B3 and B4 to gather data for a Natural England Licence Application. If any other builings are found to have evidence of bat presence following internal inspections, these will also require emergence/re-entry surveys.

3.2 Hazel dormouse

3.2.1 Previous surveys found hazel dormice *Muscardinus avellanarius* present within the eastern and western hedgerows on the site and therefore a Natural England EPS licence will be required for vegetation removal.

3.2.2 It is recommended that dormouse surveys are repeated to collect additional survey data for a Natural Englang licence application. Natural England require data that has been collected within the last two for submission with licence applications and the existing data collected by CSA Environmental was collected in 2018.

3.3 Other species

3.3.1 A badger *Meles meles* sett showing signs of recent activity was noted on the northern boundary of the site during the 2021 walkover. It is recommended that the sett is monitored for signs of badger activity over an extended period (four weeks) to ensure that, if active, badger will not be disturbed by the works. Once the layout for the scheme is confirmed, the sett may require closure under licence depending on the proximity of construction work and likelihood of disturbance from the works footprint. If closure is required, the monitoring data will be sufficient for a Natural England disturbance licence application for sett closure.

3.3.2 An Ecological Mitigation and Enhancement Strategy (RPS, 2021) has been provided which details further mitigation requirements for great crested newts, common and widespread reptiles and birds. This has since been updated by RPS (RPS, 2021).

3.3.3 For the purposes of a Reserved Matters application in 2021, the following survey reports are considered accurate due to site conditions being wholly unchanged since previous surveys:

- Ecological Impact Assessment (CSA Environmental, 2019); and;
- Preliminary Ecological Appraisal (CSA Environmental, 2017/2018), supported by this report.

3.3.4 It is recommended that the following surveys and reporting are repeated to update the data for the Reserved Matters application and Natural England EPS licencing (bats and dormice):

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- Phase 2 bat surveys (emergence/re-entry) (CSA Environmental, 2017/2018);
- Phase 2 hazel dormouse surveys (CSA Environmental, 2017/2018);
- Phase 2 badger surveys (CSA Environmental, 2018); and
- Phase 2 great crested newt eDNA surveys (CSA Environmental, 2018).

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4 CONCLUSIONS

4.1.1 Habitats on site remain unchanged from the previous ecological surveys undertaken on the site in 2017 to 2019. It is therefore considered that the protected species assessments for reptiles and associated mitigation as detailed within the CSA Environmental reports submitted within the outline application (A/122/19/OUT), remain valid.

4.1.2 It is recommended that the following surveys and reporting are repeated to update the data for the Reserved Matters application and Natural England EPS licencing (bats and dormice);

- Phase 2 bat surveys (emergence/re-entry and activity surveys) (CSA Environmental, 2017/2018);
- Phase 2 hazel dormouse surveys (CSA Environmental, 2017/2018);
- Phase 2 badger surveys (CSA Environmental, 2018); and
- Phase 2 great crested newt eDNA surveys (CSA Environmental, 2018).

4.1.3 Prior to any works commencing on site, Natural England EPS licences will be required for hazel dormice and bats which have been recorded on the site, plus associated mitigation strategies.

4.1.4 As recommended, an updated Ecological Mitigation and Enhancement Strategy relating to the Reserved Matters application will also be required. This will detail any mitigation or enhancement with respect to birds, great crested newts, and common and widespread reptiles during all phases of the project.

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APPENDICES

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Appendix A

Site Photographs



Photo 1: Southern and eastern elevations of Building B2.



Photo 2: View looking north from south.



Photo 3: View looking east towards Building B1.



Photo 4: Hardstanding to east of site, used as car park.

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Photo 5: Open storage containers to east of site.



Photo 6: Eastern elevation of Building B10.



Photo 7: Standing water in north east corner of site.



Photo 8: Tree with ivy cover to south east of site.

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Photo 9: Scrub area to south east of site.



Photo 10: Recent trenching works to south east of site.



Photo 11: View looking south from northern boundary.



Photo 12: Western elevation of Building B3.

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Photo 13: Scrub and vegetation covering Building B13



Photo 14: Southern elevation of Building B3 (previous bat roost in apex)



Photo 15: Badger sett on northern boundary of site.



Photo 16: Eastern elevation of Building B2.

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Photo 17: Building B14 looking east.



Photo 18: Southern elevation of Building B5.



Photo 19: Eastern elevation of Building B5.

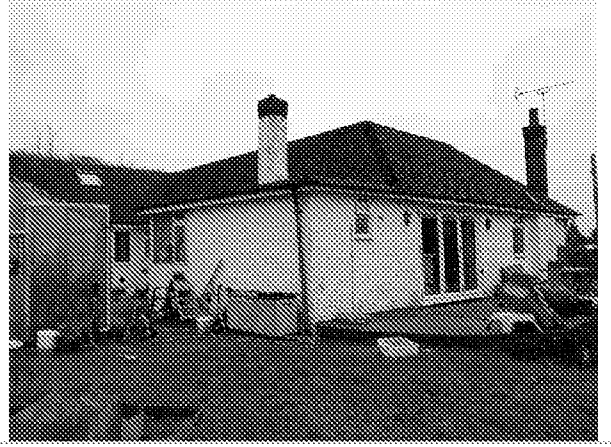


Photo 20: Northern and western elevations of Building B1.

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Photo 22: South east of site looking east.



Photo 73: Northern boundary of the site.

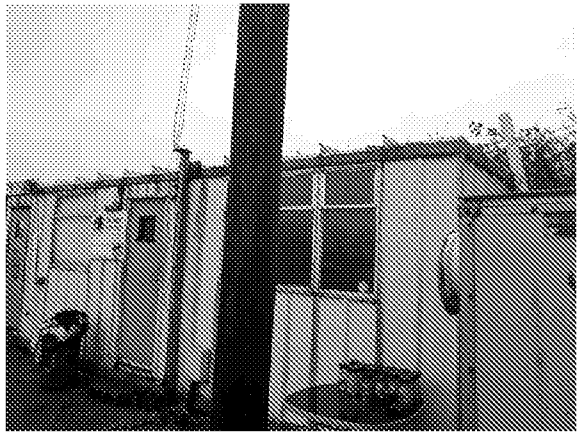


Photo 24: Western elevations of Building B12.



Photo 25: Southern elevation of Building B11.

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Photo 26: Northern elevation of Building B4.

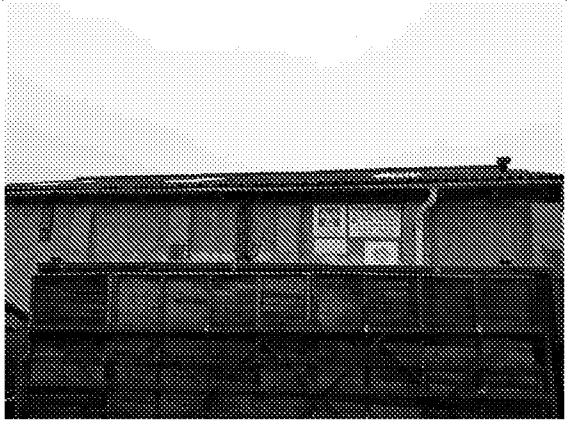


Photo 87: South western aspect of Building B1.

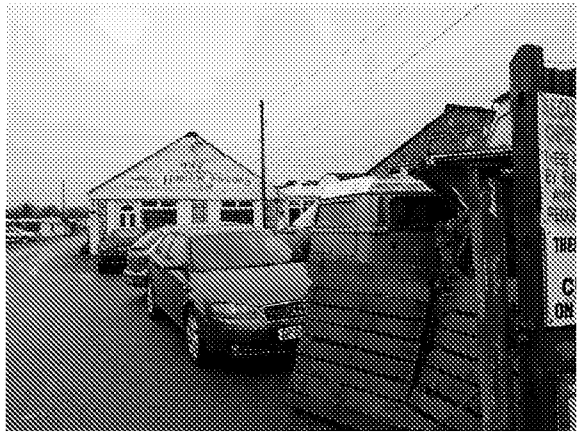


Photo 28: View of Building B2 looking north.

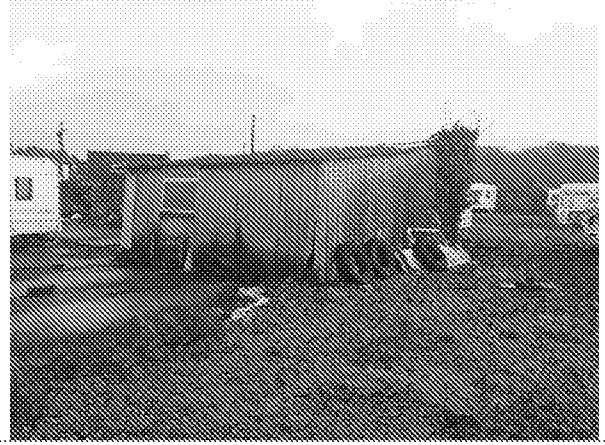


Photo 29: Building B12 looking south.

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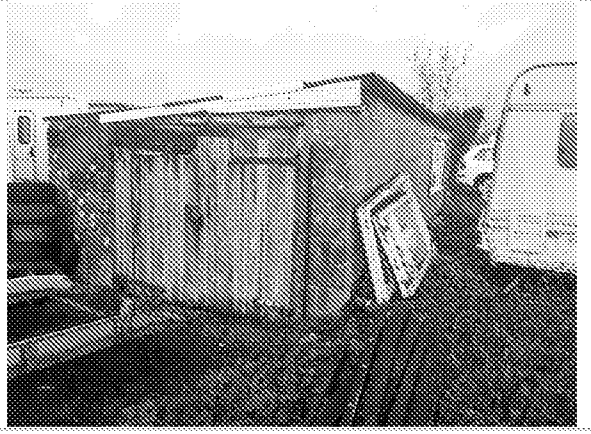


Photo 30: Building B7 looking north.

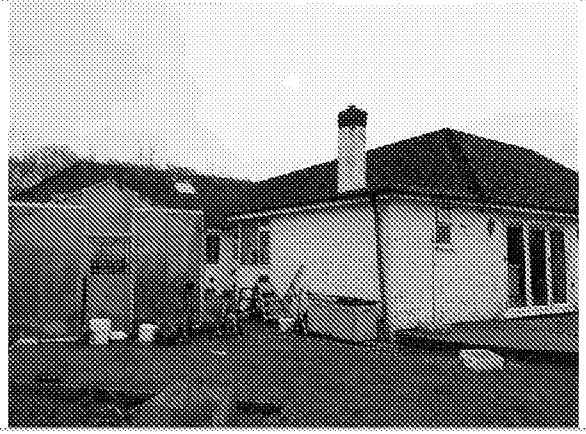


Photo 31: Building B1, residential property owned by the client.

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Appendix D

GCN eDNA Analysis Results

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Client: Claire Remon,
RPS Group

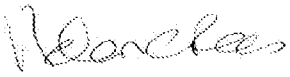
ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-1698	Condition on Receipt: High Sediment	Volume: Passed
Client Identifier: Pond 1 Arundel	Description: pond water samples in preservative	
Date of Receipt: 17/05/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	0 of 2	Real Time PCR	19/05/2021
Degradation Control[§]	Within Limits	Real Time PCR	19/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	19/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	20/05/2021	Date of issue:	20/05/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

ARUN DISTRICT COUNCIL A/48/22/RES

Client: Claire Remon,
RPS Group

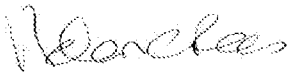
ADAS
Spring Lodge
172 Chester Road
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Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-1699	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 6 Arundel	Description: pond water samples in preservative	
Date of Receipt: 17/05/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	0 of 2	Real Time PCR	19/05/2021
Degradation Control[§]	Within Limits	Real Time PCR	19/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	19/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	20/05/2021	Date of issue:	20/05/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Client: Claire Remon,
RPS Group

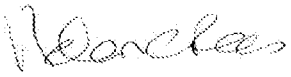
ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-1700	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 3 Arundel	Description: pond water samples in preservative	
Date of Receipt: 17/05/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	0 of 2	Real Time PCR	19/05/2021
Degradation Control[§]	Within Limits	Real Time PCR	19/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	19/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	20/05/2021	Date of issue:	20/05/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

ARUN DISTRICT COUNCIL A/48/22/RES

Client: Claire Remon,
RPS Group

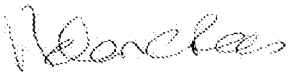
ADAS
Spring Lodge
172 Chester Road
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WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-1701	Condition on Receipt: Medium Sediment	Volume: Passed
Client Identifier: Pond 5 Arundel	Description: pond water samples in preservative	
Date of Receipt: 17/05/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	0 of 2	Real Time PCR	19/05/2021
Degradation Control[§]	Within Limits	Real Time PCR	19/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	19/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	20/05/2021	Date of issue:	20/05/2021

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Appendix 1: Interpretation of results

Sample Condition

Upon sample receipt we score your samples according to quality: good, low sediment, medium sediment, high sediment, white precipitate, and presence of algae.

There are three reasons as to why sediment should be avoided:

1. It is possible for DNA to persist within the sediment for longer than it would if it was floating in the water which could lead to a false positive result i.e. in this case GCN not recently present but present a long time ago
2. In some cases sediment can cause inhibition of the PCR analysis used to detect GCN eDNA within samples which could lead to an indeterminate result.
3. In some cases sediment can interfere with the DNA extraction procedure resulting in poor recovery of the eDNA which in turn can lead to an indeterminate result.

Algae can make the DNA extraction more difficult to perform so if it can be avoided then this is helpful.

Sometimes samples contain a white precipitate which we have found makes the recovery of eDNA very difficult. This precipitate can be present in such high amounts that it interferes with the eDNA extraction process meaning that we cannot recover the degradation control (nor most likely the eDNA itself) at sufficient levels for the control to be within the acceptable limits for the assay, therefore we have to classify these type of samples as indeterminate.

What do my results mean?

A positive result means that great crested newts are present in the water or have been present in the water in the recent past (eDNA degrades over around 7-21 days).

A negative result means that DNA from the great crested newt has not been detected in your sample.

On occasion an inconclusive result will be issued. This occurs where the DNA from the great crested newt has not been detected but the controls have indicated that either: the sample has been degraded and/or the eDNA was not fully extracted (poor recovery); or the PCR inhibited in some way. This may be due to the water chemistry or may be due to the presence of high levels of sediment in samples which can interfere with the DNA extraction process. A re-test could be performed but a fresh sample would need to be obtained. We have successfully performed re-tests on samples which have had high sediment content on the first collection and low sediment content (through improved sample collection) on the re-test. If water chemistry was the cause of the indeterminate then a re-test would most likely also return an inconclusive result.

The results will be recorded as indeterminate if the GCN result is negative and the degradation result is recorded as:

1. evidence of decay - meaning that the degradation control was outside of accepted limits
2. evidence of degradation or residual inhibition - meaning that the degradation control was outside of accepted limits but that this could have been due to inhibitors not being removed sufficiently by the dilution of inhibited samples (according to the technical advice note)

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