



Preliminary Ecological Assessment
Land at Binstead Farm South,
Yapton Road, Arundel, West Sussex.

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LIABILITIES:

Whilst every effort has been made to guarantee the accuracy of this report, it should be noted that living animals and plants are capable of migration/establishing and whilst such species may not have been located during the survey duration, their presence may be found on a site at a later date.

This report provides a snap shot of the species that were present at the time of the survey only and does not consider seasonal variation. Furthermore, where access is limited or the site supports habitats which are densely vegetated only dominant species may be recorded.

The recommendations contained within this document are based on a reasonable timeframe between the completion of the survey and the commencement of any works. If there is any delay between the commencement of works that may conflict with timeframes laid out within this document, or have the potential to allow the ingress of protected species, a suitably qualified ecologist should be consulted.

It is the duty of care of the landowner/developer to act responsibly and comply with current environmental legislation if protected species are suspected or found prior to or during works.

1.0 Introduction

Background

- 1.1 The Ecology Partnership was commissioned by John Hall Consulting to undertake a preliminary ecological assessment (PEA) of land at Binsted Farm South, Walberton, Arundel, West Sussex.
- 1.2 The key objectives of a PEA (CIEEM, 2017) are to:
- Identify the likely ecological constraints associated with a project;
 - Identify any mitigation measures likely to be required, following the 'Mitigation Hierarchy' (CIEEM, 2016; BSI 2013, Clause 5.2);
 - Identify any additional surveys that may be required to inform an Ecological Impact Assessment (EcIA); and
 - Identify the opportunities offered by a project to deliver ecological enhancement.
- 1.3 This report comprises the:
- Legislative and planning context (Section 1);
 - Assessment methodologies (Section 2);
 - Results (Section 3);
 - Implications for development (Section 4);
 - An impact assessment (Section 5); and
 - Conclusions (Section 6).

Site Context and Status

- 1.4 The site is situated on Yapton Lane; the connecting road between Walberton and Yapton, south-west of Arundel, West Sussex (SU 98124 04611) and covers c. 8.8ha. The surrounding area is made up of arable fields to the north and south, agricultural buildings to the west, and a solar farm to the east. A woodland classified as 'young trees' on the National Forest Inventory is adjacent to the southern boundary of the site, and a small farm directly adjacent to the north. The site itself is dominated by an arable field, with horse paddocks across the northern section, bordering the farm.

- 1.5 The site, its immediate surroundings and approximate red line boundary are shown in the Figure 1 below.



Figure 1: Approximate red line boundary of the site and immediate surroundings. Taken from Google Earth Pro, August 2020

Description of the Proposed Development

- 1.6 Current plans involve the construction of a 44,200m² glasshouse on the existing arable field/horse paddocks and construction of an adjoining reservoir in the south-east corner of the site. Parking allocation for 21 cars and an access road are also proposed for the area between the existing farm access road and the horse paddocks. Figure 2 overleaf is a map of the current site plans.

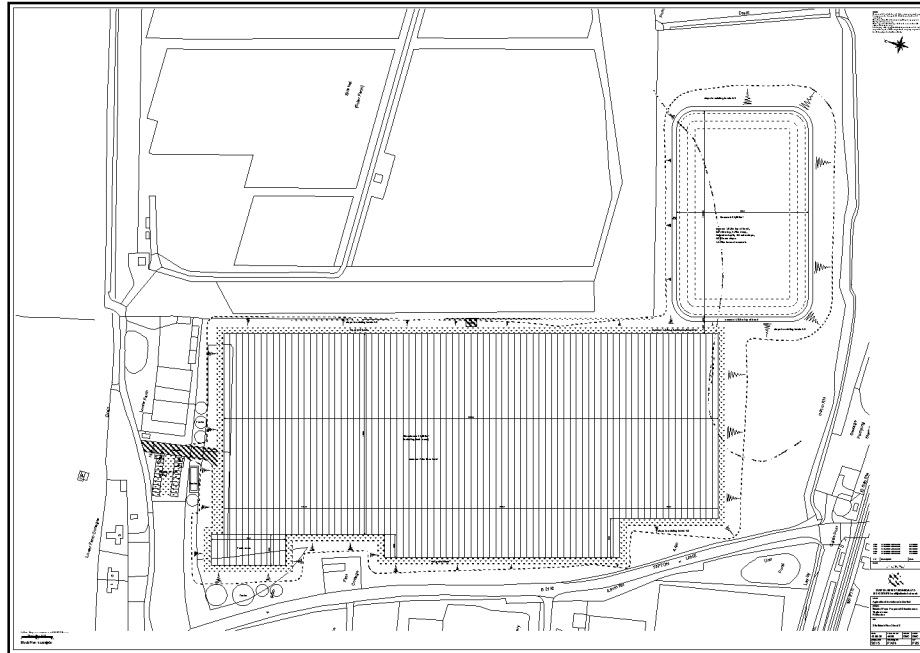


Figure 2: The current site block plan of the proposed site developments

Planning Policies

- 1.7 The proposals were assessed against policy guidance provided by the National Planning Policy Framework (NPPF, 2019) as well as relevant planning policies from the Arun District Council. The 2011-2031 Local Plan was adopted in July 2018 the following policies have been identified as being relevant to development of the site and conservation of protected species:

- *Policy GI SP1: Green Infrastructure and development*
- *Policy ENV SP1: Natural Environment*
- *Policy ENV DM1: Designated Sites of biodiversity or geological importance*
- *Policy ENV DM3: Biodiversity Opportunity Areas*
- *Policy ENV DM4: Protection of trees*
- *Policy ENV DM5: Development and biodiversity*

- 1.8 This report addresses the site in relation to nature conservation and wildlife and indeed to the local planning requirements as well as national planning and nature conservation legislation.

- 1.9 The site was surveyed to assess its ecological value and to ensure compliance with national and local plan policies. The report has been produced with reference to current guidelines for preliminary ecological appraisal (CIEEM, 2017) and in accordance with BS 42020:2013 Biodiversity – Code of Practice for Planning and Development.

2.0 Methodology

Desktop Study

- 2.1 A desktop study search was completed using an internet-based mapping service (www.magic.gov.uk) for statutory designated sites and an internet-based aerial mapping service (www.maps.google.co.uk) was used to understand the habitats present in and around the survey area and habitat linkages and features (such as ponds, woodlands etc.) within the wider landscape. Biological records (up to 2km) were acquired from Sussex Biodiversity Record Centre (SxBRC).

Preliminary Ecological Appraisal

- 2.2 An extended preliminary ecological appraisal was undertaken on the 13th July 2020 by Chris Jennings BSc (Hons) MSc MCIEEM. The surveyor identified the habitats present, following the standard 'Phase 1 habitat survey' auditing method developed by the Joint Nature Conservancy Council (JNCC). The site was surveyed on foot and the existing habitats and land uses were recorded on an appropriately scaled map (JNCC 2010). In addition, the dominant plant species in each habitat were recorded. The potential for the site to support protected species was also assessed.
- 2.3 Plant species abundance was recorded using the DAFOR scale. Species abundance was assigned to one of the following categories; Dominant, Abundant, Frequent, Occasional or Rare.

Protected Species Assessments

- 2.4 Any evidence of protected species was recorded. Standard methods of search and measures of presence, or likely presence based on habitat suitability were used for bats in trees and buildings (Collins 2016), breeding birds¹, dormouse (Bright *et al.* 2006), great crested newt (ARG 2010), reptiles (Froglife 2015), badgers (Creswell *et al.* 1990) and water vole (Strachan *et al.* 2011).

Limitations

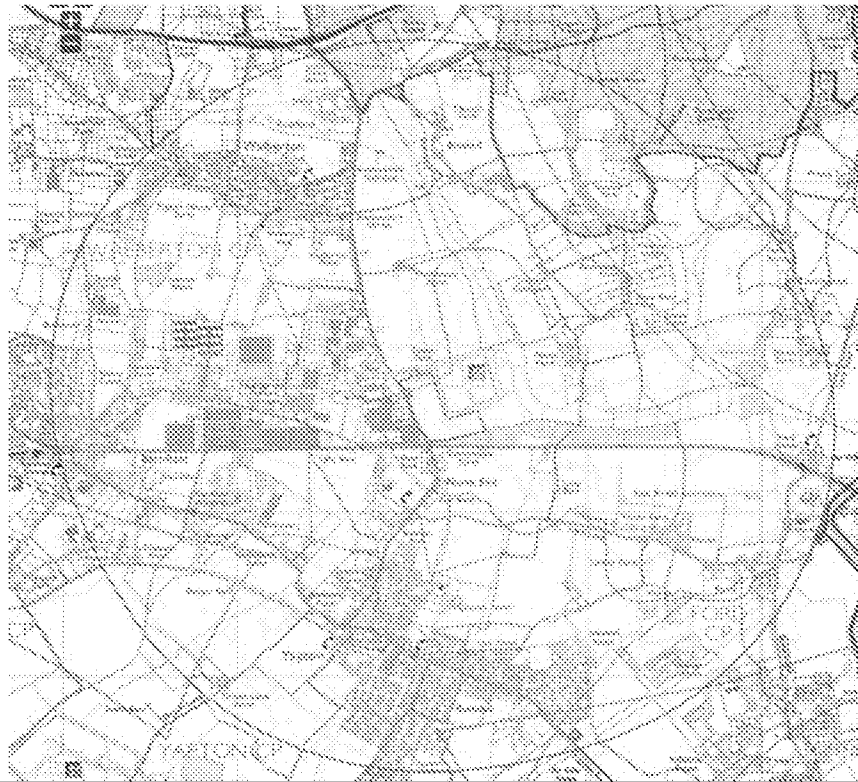
- 2.5 It should be noted that whilst every effort has been made to provide a comprehensive description of the site, no single investigation could ensure the complete characterisation and prediction of the natural environment. The site was visited over the period of one site visit, as such seasonal variations cannot be observed and potentially only a selection of all species that potentially occur within the site have been recorded. Therefore, the survey provides a general assessment of potential nature conservation value of the site and does not include a definitive plant species list.
- 2.6 The protected species assessment provides a preliminary view of the likelihood of protected species occurring on site, based on the suitability of the habitat and any direct evidence on site. It should not be taken as providing a full and definitive survey of any protected species group. The assessment is only valid for the time when the survey was carried out. Additional surveys may be recommended if, on the basis of this assessment it is considered reasonably likely that protected species may be present.

¹<https://www.bto.org/our-science/projects/birdatlas/methods/breeding-evidence>

3.0 Results

Desktop Study

- 3.1 The site itself is not designated for its nature conservation value, however it is within a SSSI Impact Risk Zone, although it is not clear which statutory site the zone relates to. Of the listed development descriptions to be considered, it is thought that the proposed development would come under 'large non-residential development outside existing settlements/urban areas where footprint exceeds 1ha.'
- 3.2 The site is not situated within 2km of any designated sites although it does fall 1.2km south west of South Downs National Park. The nearest designated sites are Arundel Park SSSI approximately 4.1km to the north east and Climping Beach SSSI and West Park LNR located approximately 4.5km to the south east.



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Figure 3: No designated sites within 2km of the red line boundary; Although the site does lie within a SSSI impact zone (light lilac line) and The South Downs National Park lies approximately 1.2km north of site (green line)

3.3 There are a number of Priority Habitats within 2km of the red line boundary, with the majority located to the north of the red line boundary (Figure 3):

- Coastal and floodplain grazing marsh (closest c. 180m east);
- Traditional orchard (closest c. 1.07km north-east);
- Deciduous woodland (closest c. 526m east);
- Wood-pasture and parkland (closest c. 580m north);
- Ancient semi-natural woodland (closest is Lake Copse c. 1.1km north-east);
- Ancient replanted woodland (closest is Tottington Common c. 1.87km north-east).



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Figure 4: Priority habitats within 2km of the red line boundary; coastal and floodplain grazing marsh (blue), traditional orchard (bright green), deciduous woodland (dull green), ancient semi-natural woodland (vertical hatchings), ancient replanted woodland (horizontal hatchings), wood-pasture and parkland (pale green with symbols).

- 3.4 A 2km data search was requested from Sussex Biodiversity Records Centre. This is yet to be received, however an update report will be issued once these have been obtained.
- 3.5 Mapping and the site visit revealed 8 ponds located within 250m of the site. These are numbered 1-7 & 9 in Figure 5 below, as well as an additional pond (Pond 8) which was located just outside the 250m radius.

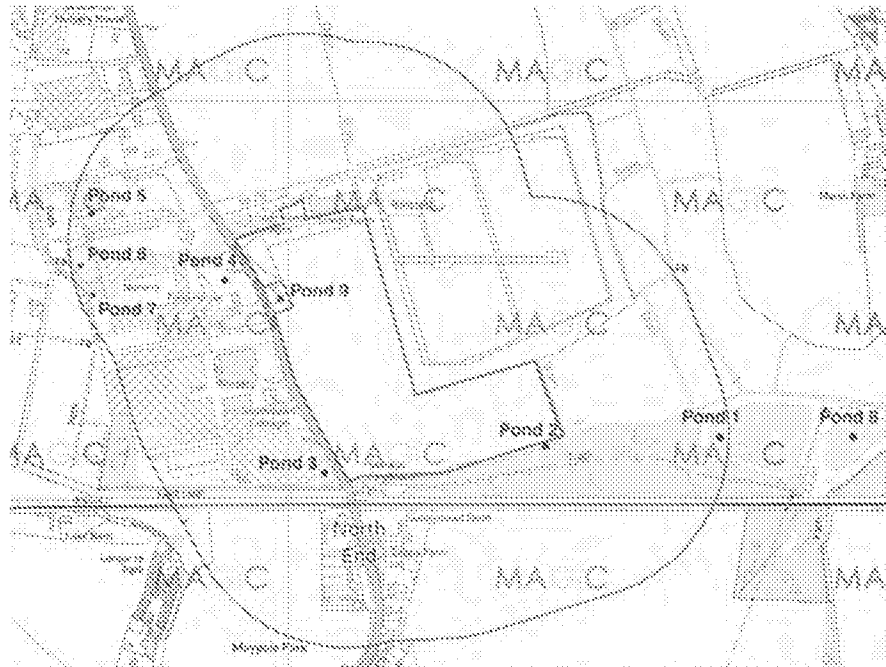


Figure 5: Ponds within, and just outside of, a 250m radius (yellow area) of the red line boundary, labelled Pond 1-9 for ease of reference

- 3.6 There were no European Protected Species licences granted, great crested newt licence returns, or eDNA survey records within 2km of the red line boundary, according to MAGIC mapping.

Phase 1 Habitat Survey

- 3.7 The site was predominantly an arable field, with sections of heavily grazed horse paddocks to the north, as seen in Figure 1 above. A detailed Phase 1 Habitat Map is attached in Appendix 1, and a full species list is provided in Appendix 2.

Arable

- 3.8 The site was dominated by arable land with much of the site planted with the remnants of an agricultural crop interspersed with occasional tall ruderal species such as common ragwort and creeping thistle.

Semi-improved grassland

- 3.9 To the north of the site were areas of heavily grazed horse paddocks containing species such as Yorkshire fog, soft brome, perennial rye grass, common ragwort and creeping thistle. As this area had been heavily grazed the sward height was very low.

Semi-improved / tall ruderal mosaic habitat

- 3.10 Around much of the site boundary which was largely marked by field boundaries with associated hedgerows and woodland edge habitat a mix of largely unmanaged grassland was present. This was a mix of grassland and tall ruderal plant species.

Marshy Grassland

- 3.11 Marshy grassland was present in the form of a wide field margin to the south east corner of the site which appears to have been left fallow. The area was adjacent to the reed bed and stream that ran along the southern border and was dominated by false oat grass, hard rush and creeping bent.

Dense Scrub

- 3.12 A patch of dense scrub was present along the western part of the southern boundary on the field margin. This contained bramble and scattered elder.

Hedgerows / tree lines

- 3.13 Native hedgerows were present around the site boundaries, with mature hedgerow present in particular on the western boundary of the site and along the eastern section of the very northern boundary, this was largely intact, with the section around . A newly planted hedge was present on much of the eastern boundary. A defunct blackthorn, hawthorn and willow hedgerow was present along the eastern boundary at the southern end of the site.
- 3.14 Hedgerow regulation assessments were undertaken at three points around the site.
- 3.15 A mature tree line ran along the southern boundary developing into a woodland block further to the east, to the south of the stream consisting of ash, oak and willow.

Hedgerows / tree lines

- 3.16 An area of dense scrub was present on the western half of the southern boundary. This was dominated by bramble.

Stream / Marginal Vegetation

- 3.17 A stream is present running along the southern boundary it also is present along the eastern boundary at the south eastern section of the site. This waterbody is lined with common reed, making a small reed bed.

*Target Notes ²**Target Note 1: High bat roost potential tree*

- 3.18 Two ash trees with high bat roosting potential were present to the north and south of the site

Target Note 1: Low bat roost potential tree

- 3.19 A mature oak considered to have low potential for roosting bats was present on the site boundary to the north within the small section of offsite woodland.

² The location of the Target Notes can be seen within the habitat map in Appendix 1.

Target Note 2: Mammal hole

- 3.20 Several mammal holes were present within the dry ditch to the north of the site these were considered to be created by rabbits.

Hedgerow Assessment

- 3.21 Hedgerows 1, 2 and 3 have been assessed against the Hedgerow Regulations (1997) criteria in Table 1 below.

Table 1: Hedgerow Regulations assessment of the qualifying on-site hedgerows

Hedge number	Number of lengths sampled	Mean number of woody species	Adjacent to public right of way	≥ 1 standard tree/50m	Rare trees	Bank	Ditch	≥ 3 woodland field layer species	Gaps <10%	Connectivity score	Parallel hedge	IMPORTANT
1	2	3	✓	×	×	×	✓	×	✓	6	✓	NO
2	1	3	×	✓	×	×	✓	×	×	3	×	NO
3	1	4	×	✓	×	×	✓	×	✓	2	×	NO

- 3.22 The three hedges were considered not to be important under the regulations as they did not contain the diversity of wooded species in a 30m length to qualify as such. Much of the hedgerow along the eastern boundary of the site was newly planted and as such was not assessed due to its immaturity.

Protected Species**Bats***Tree Survey*

- 3.23 With no buildings on site gauging potential bat roost potential was restricted to trees. Two high bat roost potential trees were present, both ash, one on the northern and one on the southern boundaries. These trees contained features such as woodpecker holes which may provide roosting habitat.
- 3.24 In addition, an oak tree on the northern boundary was identified as having low bat roost potential due to its maturity and size although no obvious features were observed from ground level.

Foraging and commuting habitats

- 3.25 The managed poor semi-improved grassland and arable land which dominated the site were considered to provide poor opportunities for foraging and commuting bats. However, the boundary hedgerows, as linear features, could act as commuting corridors for bats present within the wider landscape. Therefore, the site overall is deemed to be sub-optimal for foraging and commuting bats.

Badgers

- 3.26 No setts or any other field signs of badgers, such as latrines, mammal trails or snuffle holes were found during the survey. It is understood that badgers are present within the local landscape and a badger sett is present on the far side of the field adjacent to the south eastern part of the site. It is therefore considered likely that badgers use the site for commuting and foraging purposes. It should be noted that areas of dense vegetation were present particularly to the south west of the site so a full scoping exercise could not be undertaken.

Reptiles

- 3.27 Any potential for reptiles is restricted to the site boundaries the unmanaged field margins, with grassland, tall ruderal vegetation, scrub, reed bed and its associated stream all provide suitable habitat for common reptile species such as slow worm, common lizard and grass snake. The arable land contained sparse vegetation at ground height and did not offer the structure typical of habitat used by reptile species, due to a lack of cover from predators and a lack of basking opportunities due to the long length of the vegetation present.

Hazel Dormice

- 3.28 Potential habitat for dormice is limited to habitat on the site boundaries in the form of hedgerows, scrub and the offsite woodland blocks. There is some potential for the presence of dormice around the northern, western and southern boundaries in particular. The eastern boundary was largely made up of newly planted hedgerow and defunct existing hedgerow which limited the likelihood of the presence of dormice in this area of the site.

Water Vole

- 3.29 A stream runs along the southern boundary and also along the southern section of the eastern boundary. The marginal vegetation included common reed, which is a typical food source for water voles. It is considered possible that the species are present along the watercourse as they are known to be present in the area.

Great Crested Newts (GCN)

- 3.30 Eight ponds and waterbodies were present within 250metres of the site boundary. Access to survey ponds 1, 2 & 3 along the southern stretch of the site were granted. Although labelled pond 2, this waterbody was in fact a slow flowing stream. Pond 1, although access was granted to survey could not be reached due to thick vegetation and a blocked pathway after some tree maintenance, pond 8, which lies adjacent to pond 1 and lies just outside 250m of the boundary was surveyed instead. Pond 3 was present

the other side of Yapton Lane adjacent to the south western corner of site. The ponds were surveyed using eDNA water collection techniques. Collected water samples were then sent off to a laboratory to test to see whether great crested newts were present within the water column. All samples were collected by a Chris Jennings BSc (Hons) MSc MCIEEM, Natural England Great Crested Newt class licence holder on 29th June 2020.

- 3.31 All samples were analysed by SureScreen Scientifics and were submitted for eDNA analysis to the protocol stated in DEFRA WC1067 (latest amendments). Full results and methods can be found in Appendix 5.
- 3.32 The habitats on site were considered to be sub-optimal for GCN. The highly managed nature of the site, with arable land and heavily grazed horse paddocks made much of the site sub-optimal for great crested newts, with any suitable habitat limited to the site boundaries within the hedgerow, woodland, scrub and strips of unmanaged grassland.

Other Species

- 3.33 Birds are likely to use the hedgerows and tree lines for foraging and breeding. Ground nesting birds may also use the arable field for nesting, refuge and foraging.
- 3.34 The site was not considered suitable to support species such as otter and the ditch networks were not considered to be of sufficient size to support such a species.

4.0 Discussion

- 4.1 The following paragraphs consider the effects of the development on designated sites, priority habitats and protected and priority species. Where the desk study and Phase 1 survey provide sufficient evidence for an assessment of effects on any of these groups to be taken through planning, these are detailed below, the need for additional surveys and when and how these should be completed are summarised, if required.

Effects on designated sites and priority habitats

- 4.2 The site does not fall within 2km of any statutory designated sites, so development is not considered to be constrained by any such sites. Although there are no direct or indirect impacts on designated sites predicted as part of the development as the site has been highlighted as being within a SSSI impact zone Natural England should be consulted to establish whether the final proposals are predicted to impact on designated sites within the local area and establish whether any required mitigation can be resolved.
- 4.3 At this stage it is not considered that there would be any adverse impacts on designated sites within the local area. This would meet the requirements of *Policy ENV DM1: Designated Site of biodiversity or geological importance*. It is recommended that if any abstraction limits are agreed with the Environment Agency that they are set so that water is left flowing within target waterbodies therefore protecting freshwater habitats and associated wildlife.
- 4.4 There are parcels of Priority Habitat within 2km of the red line boundary: Traditional Orchard Priority Habitat, Deciduous Woodland Priority Habitat and Coastal and Floodplain Grazing Marsh Priority Habitat. It is not predicted that there will be any negative direct or indirect impacts on these habitats as well as ancient woodland due to the distance of these habitats from the red line boundary. Boundary treelines and hedgerows with added enhancements to retain and improve existing green links with the wider landscape should be designed into the scheme to ensure that connectivity remains across the local landscape. This would also satisfy *Policy ENV DM4: Protection of trees* laid out in the Arun District Council 2011-2031 Local Plan.

Effect on on-site habitats

- 4.5 The habitats present on site are largely common and widespread throughout the local area and the UK and are considered to be of site value only. The dominant habitat on site was recorded as arable land and as such had limited scope for wildlife species due to its heavily managed nature.

-
- 4.6 The habitats on the site boundaries including hedgerow, woodland edges as well as the rough ruderal and marshy grassland habitats, are of greatest interest and are of local value. They are considered to have ecological potential for several protected species, namely bats, reptiles and nesting birds.
- 4.7 The ditch and stream network on the site boundaries, in particular the stream along the southern border are also considered to be important habitat. These habitats should be retained where possible and adequately buffered and enhanced to ensure habitat linkages across the local system are maintained on site. As part of Policy G1 SP1 Green Infrastructure should be considered at an early stage of design. The southern and south eastern section of the site has been identified as being a biodiversity opportunity area, see Figure 6 taken from the Green Infrastructure Network Map for the area of Walberton Parish.
- 4.8 Currently, the proposals show much of the southern section of the site is available post development for ecological enhancement. The area to the south of the greenhouse and to the west of the reservoir should be enhanced through planting of wildflower and grassland mixes. The area of marshy grassland can be extended in this area as a buffer for the stream to the south. This will ensure that the requirements of *Policy G1 SP1 Green Infrastructure and Development* and *Policy ENV DM3: Biodiversity Opportunity Areas* are met.

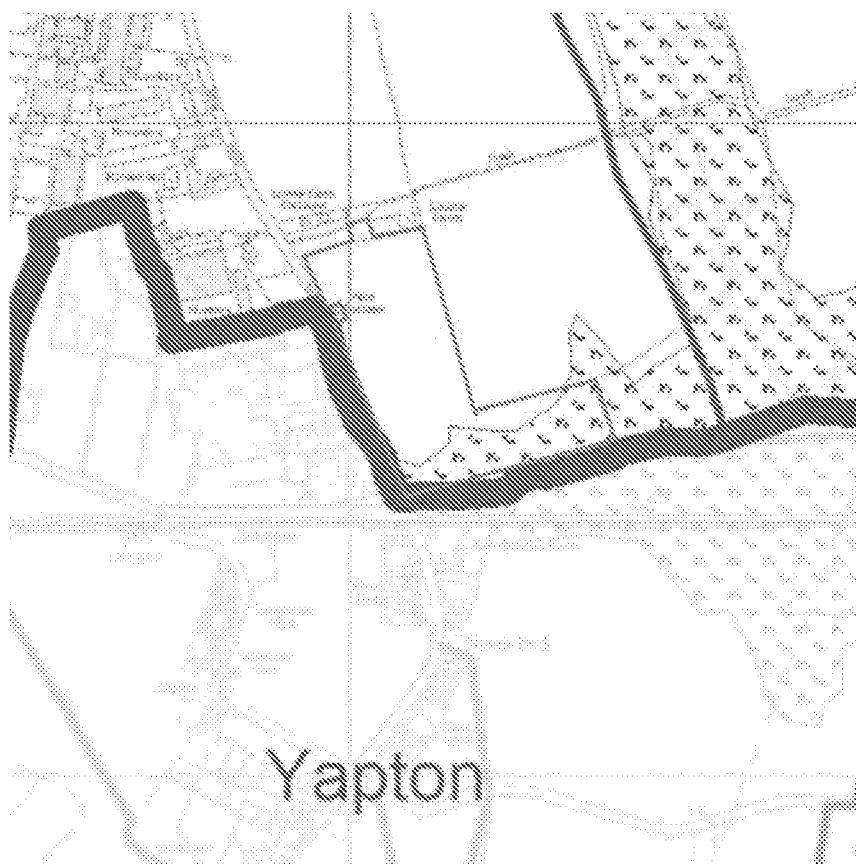


Figure 6 Extract from Walberton Parish Green Infrastructure Network Map – Area in green symbols is highlighted as areas that are suitable for ecological enhancement.

- 4.9 The development should aim to achieve an overall biodiversity gain and enhancement recommendations are laid out in section 4. The site was assessed for its potential to support a range of protected species and these are discussed individually below. Recommendations for further survey work, mitigation and suitable ecological enhancements are in line with the points laid out in Policy ENV DM5: Development and biodiversity.

Protected Species

Badgers

- 4.10 No evidence of use of the site by badgers were recorded on site such as setts, latrines or potential snuffle holes and signs of foraging. It should be noted that it is understood that badgers are present in an active sett at the far side of an adjacent field (c.170m from the

- site boundary) although this has not been fully established. The adjacent field is separated from site by a wet ditch, which would provide a suitable barrier to badger tunnels. It should be noted that some areas of thick vegetation particularly in the south western corner were not fully access to assess the presence of badgers, although as this is likely to fall within the flood zone of the adjacent stream it is considered unlikely that badgers would use this habitat to create a sett.
- 4.11 As no setts or other signs of badgers were found, the site is not considered to be constrained by badgers. The local landscape provides good opportunities for commuting and foraging badgers.
- 4.12 It is recommended that any excavations and trenches associated with construction are either covered at night or supplemented with a means of escape for any badgers that may fall into the excavation whilst foraging. Any open pipes or conduits laid should be blocked off each night to prevent badgers from entering them. If possible, construction work should only take place between dawn and dusk with no late evening work to reduce possible disturbance.
- 4.13 It is always recommended that badger update surveys are undertaken across the site prior to any development works or if there is a lapse in time between the survey and development as badgers may move onto the site in the intervening period.

Bats

Tree Survey

- 4.14 In total three potential bat roost trees were identified on the site boundaries, mapped in Appendix 1. Further surveys are recommended on the trees highlighted as having high potential to the north and south of site if this is to be impacted by works. The following survey work should be undertaken (Table 2). Survey work should ideally be undertaken May – August within the optimal survey season. With regards to moderate and high potential trees one of the required surveys maybe undertaken in September. Low potential trees do not need further activity survey work, however they should be felled sensitively using soft felling techniques, if a bat roost feature or a confirmed bat roost is

discovered during works, works should stop immediately and a suitably qualified ecologist contacted to advise on how to proceed.

Table 2: BCT guidelines, demonstrating the number and type of surveys required depending on the classification of the tree for bat roost potential

Bat Roost Potential	Recommended surveys
Low	No further surveys required
Moderate	Two separate survey visits.
High	Three separate survey visits.

Foraging and Commuting Bats

4.15 Using The Bat Conservation Trusts document *Bat Surveys Good Practice Guidelines 3rd Edition*, Table 4.1 ‘Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement’ and Table 8.3 ‘Guidelines on the number of bat activity surveys recommended to achieve a reasonable survey effort in relation to habitat suitability’ the recommended survey effort is as follows. As stated within section 8.2.7 of the latest survey guidelines (2016), the following points need to be taken into account with regard to planning activity surveys:

- Likelihood of bats being present;
- Likely species concerned;
- Numbers of individuals;
- Type of habitat affected;
- Predicted impacts of the proposed development on bats;
- Type and scale of proposed development.

4.16 With regards to the impact on foraging and commuting bats, the construction of a green house and associated reservoir are considered likely to have minimal impact on foraging and commuting bats as the vast majority of suitable habitat is to be retained allowing connectivity for bats across the landscape. Additional planting as part of the application could improve connectivity for bats across the local landscape. It is however

considered that if artificial light is to be used to grow plants during the night resulting in significant light spill onto adjacent habitats in use by bats such as hedgerows and woodland blocks then further activity survey and additional mitigation through planting and or shielding light spill maybe required.

4.17 Any proposed lighting scheme as part of the development will have to consider bats in the surrounding area as well as site. All bat species are nocturnal, resting in dark conditions in the day and emerging at night to feed. Many species of bats are known to sample the light levels before emerging from their roost; only emerging for their night's hunting when the light intensity outside reaches a critical level after sunset. Artificial lighting can restrict and alter this natural behaviour, and if a roost site is illuminated it can restrict and shorten the time bats spend foraging at night or completely discourage bats from using an area at all. This needs to be considered, with a sympathetic lighting scheme for the development. Recommendations include:

- No potential bat roost should be illuminated by artificial lighting, lighting should be positioned to point away from any roosting site, leaving the entrance and exit points in darkness, this should consider the bat potential trees identified;
- Lighting should only be installed if there is a significant need;
- Light levels should be kept low where possible;
- Lighting should be avoided near treelines or hedgerows, with light angled away from these areas, bats use linear features such as treelines to commute across the landscape to forage; and
- Lights should have focussed luminance on their target area, preventing light spill and pollution into other areas of the site and local area.
- Additional shielding such as use of blinds should be used to restrict light spill from any artificial night time light used within the greenhouse.

4.18 The tree lines, hedgerows and areas of scrub, which have been identified surrounding the fields on-site, and fields within the adjacent land should be retained and enhanced to maintain linkages between the two sites for foraging and commuting bats.

- 4.19 To enhance the local bat population and provide roosting opportunities, it is recommended that boxes should be hung on mature trees or buildings around the site. Recommended boxes should be constructed of woodcrete or a similar material to ensure the long life of bat boxes installed onsite.
- 4.20 Further enhancements for bats in the local area can be achieved through the use of native tree planting and landscaping within the development (see general enhancements below).

Reptiles

- 4.21 The majority of suitable habitat for reptiles is to be retained as part of proposals. The majority of the site is dominated by managed arable land with heavily grazed horse paddocks to the north of the site which offer little in the way of suitable habitat for reptiles. It is noted that a section of marshy grassland will be impacted to the south of the site although a large section of this habitat will be retained. In addition, the boundary to the north of the site will be broken to for a new access road, here a very thin strip of suitable reptile vegetation will be removed. There will be no additional negative impact during operational phase on reptile species, such as increased predation from domestic pets that would be associated with a residential development
- 4.22 It is recommended that habitat manipulation techniques are used to encourage reptiles away from development areas. This will be achieved by use of a two phased cut. Prior to development the footprint of development and any additional works areas will need to be cut in a sensitive manner using a two-phase cut undertaken under ecological watching brief. Vegetation removal works will follow the following specification:
- Vegetation removal works are to be carried out using hand tools only or a raised fixed flail on the rear of a non-tracked vehicle;
 - Works will proceed in a linear progression, beginning in the north of the site and working towards the south east, to encourage reptiles to disperse into retained habitat
 - Any trees and shrubs are to be checked thoroughly for the presence of birds' nests, observing the tree from within the canopy where possible.

- Vegetation will be strimmed down using the following method in suitable weather conditions (avoiding rain/wet conditions) under ecological supervision:

- 1 Day 1: Strim to 200mm
- 2 Day 2: No works to vegetation to allow any reptiles present to vacate the site
- 3 Day 3: Strim to ground level
- 4 Day 4: No works to vegetation to allow any remaining reptiles present to vacate the site
- 5 Day 5: End of sensitive clearance process

4.23 Once cut it is recommended that habitat is maintained at a short sward.

4.24 It is considered that if this process is undertaken then reptile species will not be harmed as part of works and any population present on site will persist post development. The scheme has scope to increase the habitat available for reptiles including the creation of banks around the reservoir and green house access road. Banked habitat are used by reptiles for maximising basking, especially if south facing.

Hazel Dormice

4.25 It is considered possible that hazel dormice are present within the local area. With suitable habitat present on the site boundaries although suitable core habitat is limited to the small section of woodland adjacent to site running along the railway line to the south of site. It is not considered that the proposals will have a significant direct impact on potential habitat present.

4.26 A new access road will be built to the existing farmyard at the north of the site. This small section of habitat is considered the only potential habitat removal on site and is not considered to be significant in terms of the favourable conservation status of the species. The estimated length of habitat removal is 7m. However, it is recommended that this habitat is removed in a sensitive manner under ecological watching brief. If a

dormouse nest is discovered then works should stop immediately and Natural England contacted by a suitably qualified ecologist to advise on how to proceed.

4.27 With scope for additional planting to enhance the site for wildlife it is recommended that additional opportunities for dormice as well as other wildlife is planted within the retained greenspace areas to the south of the site, with an area small area of woodland planted that provides a mix of food sources for dormice.

4.28 It is recommended that the following species are planted to establish new hedgerow and scrub habitats on site:

- Hazel
- Rowan
- Silver Birch
- Ash
- Hawthorn
- Oak
- Wayfaring Tree; and
- Sycamore

4.29 It is considered that artificial light may impact nocturnal activity of dormice potentially present. As such additional planting should be undertaken along the site boundaries to strengthen and thicken up the boundary hedgerows, to lessen the impact of artificial light on the species and other wildlife. Light spill should be limited at night.

Water Vole

4.30 It is considered that the stream and associated ditches present to the south of the site may provide some suitable habitat for water voles. Although relatively heavily shaded the marginal vegetation contained suitable food sources such as common reed. It is recommended that a buffer zone of 5m is left between the waterbody and proposed development.

- 4.31 If suitable water vole habitat is to be directly impacted through development the it is recommended that a water vole survey is undertaken to establish whether the species are present and to inform any specific mitigation. If water abstraction is to be undertaken to stock the new reservoir, the amount of water taken should be limited to ensure that water levels within the stream and ditch network are sufficient to support water voles and other wildlife species.

Great Crested Newt (GCN)

- 4.32 Ponds 2, 3 and 8 were tested for the presence of great crested newts using approved eDNA techniques. All three ponds tested negative for great crested newts. Access to Pond 1 was given, however, due to dense vegetation present on site, access was not possible. Pond 8 was surveyed instead which lies very close to pond 1 and would support a metapopulation of any newt population located within pond 1. In addition, pond 1 was of a very large size and it is thought is stocked with fish which would reduce the likelihood of great crested newts being present. Pond 3 was considered to be a good quality great crested newt breeding pond, surrounded by suitable habitat with an absent fish population. Pond 3 tested negative for great crested newts.
- 4.33 Although there were several other ponds situated within the local area these were situated on private land and were not accessed at the time of survey. The survey was carried out across waterbodies both east and west of the site indicating the likely absence of great crested newts within the local landscape. Of the ponds not surveyed Pond 9 was located on the western boundary of the site within the residential garden of the adjacent house and was understood to have been newly constructed as part of garden renovation works. Pond 4, 5, 6, and 7 were located on the opposite side of Yapton Lane to the west and were associated with residential properties and dispersed around agricultural greenhouse sites.
- 4.34 With the three waterbodies tested all tested negative for great crested newts, it is not considered that they are present within the immediate surrounds of the site. Furthermore there are no records of great crested newts within 2km on magic maps, such as recent licence applications. Most of the site was not considered to be optimal

habitat for great crested newts and as such it is considered unlikely that the site is in active use by the species. No further survey work is recommended, however if a great crested newt is recorded during works, works must stop and a suitably qualified ecologist consulted on how to proceed.

Other Species

- 4.35 Breeding birds are likely to use the hedgerows on site as nesting habitat. The long sward within the semi-improved grassland and arable field provides suitable conditions for ground nesting birds. The UK breeding season for most bird species takes place between March and September. Although the recommendation is for the hedgerows and trees to be maintained, it is recommended that if any works affecting the hedgerows and associated scrub on site, as well as the grassland habitat and arable habitat are to be carried out, these are completed outside of this period or immediately after a nesting bird check by a suitably qualified ecologist. If an active nest is identified, works in the vicinity of the nest must cease until the birds have fledged the nest.
- 4.36 With much of the nesting bird habitat on site to be retained and the opportunity to enhance retained areas of greenspace to provide better quality habitat for ground nesting birds, the requirement of a breeding bird survey is not considered necessary.

General Ecological Enhancements

- 4.37 A number of enhancements can be made to the final development to help reduce potential ecological impacts. It is important to utilise native species of local provenance in landscaping schemes to enhance the ecological value of a development. These enhancements will also help the development to fall in line with *Policy ENV DM5: Development and biodiversity* in the Arun District Council local plan.
- 4.38 The hedgerows and mature trees should be maintained and incorporated into the design of the potential development as these provide valuable habitat for species such as birds, invertebrates and some mammals including bats.

-
- 4.39 It is recommended that additional native species are planted within the hedgerow, in particular in any sparse areas and gaps as is present on the eastern boundaries. Species of benefit to the site would be hazel, beech, sweet chestnut, wild cherry, field rose, hornbeam, field maple and dogwood. These native species will enhance the existing hedgerows and add food sources at various times of year for local wildlife. In order to boost berry crops within existing hedgerows and ensure thick nesting cover is available, it is recommended that where permissions allow, hedgerows be trimmed on a two- or three-year rotation, rather than annually. Flailing of hedgerows should be avoided, as this practice can damage woody material. For heavy hedges, a circular saw is preferable.
- 4.40 The hedgerows have a relatively good understorey and edge species composition of vascular plants and this should be maintained. To this end, a buffer of around 1 metre either side of the hedgerow is recommended to be maintained and bramble control should be exercised between September and March.
- 4.41 Provision for reptiles should be made in the form of a marshy grassland area or wildflower meadow within the development. This meadow should be located near the boundaries so that it is not isolated from the wider landscape, the area to the south of the proposed greenhouse and east of the proposed reservoir should be used for this purpose. An amenity grassland area will not be able to fulfil this function, as an area for reptiles must be managed to be of long sward, particularly in the summer months, which means no mowing during May – September. Log and rubble piles should be added to provide hibernacula for species such as common amphibian species and reptile species. It is recommended that the Emorsgate EM8 – Meadow Mixture For Wetlands is used to seed the southern grassland areas of site including the reservoir embankment.
- 4.42 In addition, the grassland areas should be supplemented with a small section of woodland planting within the south eastern corner of the site to provide additional cover and the mosaic of habitats required for reptiles and also provide additional habitat for mammal species.
- 4.43 If tree and shrub removal is to be carried out, this should be done outside the nesting bird season or immediately after a nesting bird check by a suitably qualified ecologist.

If an active nest is identified, works in the vicinity of the nest must cease until the birds have fledged the nest.

- 4.44 Bird boxes may be hung on retained mature trees to increase the number of breeding opportunities throughout the site. This should be made of woodcrete or similar to ensure they are long lasting and a variety of boxes should be used to attract a varied bird assemblage.
- 4.45 Creation of swales and/or SUDs as part of the development can further enhance the site and ensure the development falls in line with the local plan *Policy W DM3: Sustainable Urban Drainage Systems*. These waterbodies should be linked to the wider landscape through the protection and enhancement of tree lines and associated grassland strips. Wetlands and ponds, swales or ditches can be planted to enhance invertebrate species on the site and provide breeding opportunities for amphibian and reptile species. These should be planted with species of ecological value:
- Water mint - (*Mentha aquatica*);
 - Common reed - (*Phragmites australis*);
 - Soft rush - (*Juncus effuses*);
 - Water plantain - (*Alisma plantago-aquatica*);
 - Meadowsweet - (*Filipendula ulmaria*);
 - Yellow flag iris - (*Iris pseudacorus*).
- 4.46 The above can also be considered if possible with regards to the new reservoir. If the reservoir does not require a liner it can be enhanced for wildlife. If the reservoir does need a liner to hold water then the water features should be fenced off to prevent wildlife from becoming trapped within the waterbody and a means of escape for wildlife such as textured walkway must be installed.
- 4.47 The incorporation of the recommended enhancements to the design of the site will greatly enhance the site for local wildlife. Log piles can be incorporated into the design to encourage invertebrates, as well as hedgehogs and amphibian and reptile species.

- 4.48 It is considered that the use of wildflower edges, the creation and enhancement of hedgerows, the use of wildlife friendly planting within SUDs schemes (ponds and swales) and the creation of a marshy grassland and tree planting, that the biodiversity value of the site will be enhanced post development. Currently a large proportion of the site is of limited ecological value due its arable status, which is considered to be a monoculture of limited ecological interest.

5.0 Impact assessment

- 5.1 This section of the report forms an EcIA (Ecological Impact Assessment) and is designed to quantify and evaluate the potential impacts of the development on habitats and species present on site, or within the local area.

Methodology

- 5.2 The approach to this assessment accords with guidance presented within the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM 2018).
- 5.3 The zone of influence of the development is defined as:
- The project red line, for effects on habitats and species;
 - Adjacent habitat, considered by species, for mobile species with territories or foraging ranges that may overlap the site.
- 5.4 The types of features considered in the assessment of effects, to meet legislative and policy requirements, are:
- Designated sites (European, national and local);
 - Protected species;
 - Habitats and species of principal importance (Section 41 list);
 - Hedgerows, where not of principal importance; and
 - Habitats, where not of principal importance, that may function as wildlife corridors or stepping stones.
- 5.5 Impact assessment is required for each feature determined as important and not for other features. CIEEM (2018) advises that each impact assessment should consider if

possible the different stages of a development (construction, operation and decommissioning) and that it should be characterised by the following:

- Positive or negative - whether the impact leads to an adverse, beneficial or neutral effect;
- Extent – the spatial area over which the impact occurs;
- Magnitude – change in for example the amount of habitat or the size of population;
- Duration – both in relation to the life cycle of the ecological feature and of the life of the project;
- Frequency and timing – for example the number of disturbance incidents to birds and their timing in relation to the breeding cycle; and
- Reversibility – if and at what timescale recovery is possible.

5.6 In essence, an EcIA assesses the activities associated with a proposed scheme that are likely to generate changes, within identified zone of influences, on identified ecological features and receptors. The proposals are subsequently reviewed, and iteration undertaken to include enhancements and mitigation to reduce negative impacts.

Assessment

Baseline Ecological Conditions

5.7 The site does not lie within 2km of any statutory or non-statutory designated sites of national, European or local importance. No perceived negative impacts on designated sites have been predicted although the site does fall within a Defra SSSI impact zone. As such Natural England should be consulted with regards to the development. None of the priority habitats present locally are found within the site boundary and are only related to the proposed development site through a partial hedgerow connectivity.

5.8 There were a number of hedgerows, woodland edge habitat and a stream and marginal vegetation on site which could act as wildlife corridors, to varying extent. The remaining habitats on-site comprised a mosaic of arable land, poor semi-improved grassland and tall ruderal habitats, scrubland bare earth, which are common and widespread and of no interest above site level.

5.9 In terms of protected species, the site was considered to have **potential** to support the following:

- Roosting bats – within trees;
- Foraging and commuting bats – hedgerows;
- Nesting birds – arable land and hedgerows;
- Dormice;
- Water Voles
- Reptile species;
- Commuting and foraging badgers;

Impact Assessment and Mitigation

Table 3: Assessment of effects from the proposal after mitigation and compensation

Feature	Scale of Importance	Mitigation/Compensation Required	Residual Effect
Hedgerow (Not species rich)	Local	Retention and buffering of hedgerow on site, with existing hedgerows enhanced, only a very small loss of existing habitat.	Not significant
Dormice	Local	Dormice maybe present within the hedgerows around site which are largely to be retained and enhanced. Only a small area of suitable habitat is to be removed through a hedgerow to allow a new access to the site. This should be done in a sensitive manner under ecological supervision. If a dormouse or an active nest is discovered during works, then works must cease and Natural England contacted on how to proceed. A sensitive lighting scheme should be devised to prevent any negative impact of artificial light on dormice. Enhancement planting would enhance the site for dormice.	Not significant
Water Vole	Regional	A buffer of 5metres should be left between boundary waterbodies to the south of site which hold water. If water vole habitat is to be	Not significant

		directly impacted through the installation for example of a water abstraction point, a survey and suitable mitigation must be undertaken and designed if water voles are present. If present, water abstraction should be limited to ensure that water vole habitat is not adversely impacted and food sources remain.	
Roosting bats	To be assessed following further surveys if trees are to be impacted	High potential trees if needed to be removed would be done so after three activity surveys (undertaken May – September). Low potential tree if to be removed should be done so using soft felling techniques Trees within the boundaries of the site should be protected from artificial light from the development	Not currently known. Not significant if trees are to be retained and protected
Commuting and foraging bats	Local	Sensitive lighting scheme and the retention of the trees and hedgerows on site that may act as potential foraging and commuting routes. If significant impact from night time light is predicted additional survey work and mitigation maybe required. Enhancement of hedgerows and site boundaries. This will improve the functionality of the existing hedge as a wildlife corridor for a multitude of species including bats.	Unknown / Not Significant
Reptiles	Local	Habitat manipulation and sensitive clearance techniques to any reptiles encourage reptiles present to retained habitat. Enhancement of retained ground to provide increased reptile habitat on site post development	Not significant
Nesting Birds	Local	Mitigating direct harm to nests by removal of any hedgerow, trees or arable habitat outside of nesting bird season or after a check by a suitably qualified ecologist. Compensation in the form of the installation of bird boxes.	Not Significant

Commuting and foraging badgers	Local	Safety measures enforced on site during works to mitigate any possibility of accidental harm to badgers through interaction with open excavations and underground services.	Not Significant
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Cumulative impacts

- 5.10 It is considered that any planning application within the local area should have ecological mitigation and enhancement designed into the scheme to satisfy planning policy. Abstraction limits to any other similar planning applications should be agreed under licence with the Environment Agency to ensure that water is flowing through natural water sources within the local area and do not have a cumulative negative impact on water resources and subsequently on protected habitats and wildlife species. With the proposed development containing scope to ecologically enhance the site post development, it is considered that the site will not have negative cumulative impacts with other sites.

6.0 Conclusions

- 6.1 The site was dominated by arable land, with additional heavily grazed horse paddocks to the north. These habitats were considered to offer very limited ecological value as they are heavily managed. Overall the habitats are of limited interest, with the boundary and buffer habitats of greatest interest for biodiversity on site and in the local area.
- 6.2 The surrounding hedgerows, scrub and woodland edges, as well as stream, ditches and associated marginal vegetation and marsh grassland provide much ecological value to the local wildlife community. As such, it has been recommended to maintain and enhance these features as part of any development scheme. The grassy buffer around much of the arable land provides some value at site level to local wildlife, with particular emphasis on the reptile populations.
- 6.3 The treeline and hedgerow habitats are considered to be optimum for breeding birds. These habitats also provide landscape connectivity, which would allow bats, birds, amphibians, reptiles and mammals to move across the landscape and provide good opportunities for foraging. Any works on these habitats should be carried out as advised

above. With advice sought ahead of clearance from an ecologist with regards to breeding birds. The clearance of the small section of hedgerow to the north to allow a new access into site should be done under ecological watching brief. There is some limited potential for dormice to be present within the field margins, as such this section of hedgerow clearance should be done so in a sensitive manner with hand tools to ensure the preservation of the favourable conservation status of the species in the local area indeed if they are present. If a dormouse or dormouse nest is discovered during work then works should stop and Natural England consulted on how best to proceed. Operationally no negative impacts on dormice are perceived unless artificial light spill is to impact the boundary habitats. To limit this mitigation must be drawn up to protect nocturnal species such as dormice and foraging and commuting bats.

- 6.4 Two high potential bat roost trees have been identified on site. One low potential bat roost tree was also been identified. It is considered that these trees will be retained as part of proposals however, if they are to be removed then recommendations for further survey and soft felling should be undertaken prior to removal. As mentioned above with regards to commuting and foraging bats, the habitats of value such as hedgerow, streams and ditches are to be retained. A sensitive lighting scheme must be designed for the site to limit the impacts of artificial light. If artificial lighting within the greenhouse are to be significant further mitigation and or survey maybe required.
- 6.5 A sensitive clearance and habitat manipulation approach has been recommended within this report with regards to reptiles. This should be undertaken when reptile species are active and must tie in with any mitigation for nesting birds.
- 6.6 Water voles maybe present within the streams and ditches on site to the south. It is recommended a 5m buffer is left between development and these features. If they are to be directly impacted a water vole survey should be undertaken. Suitably mitigation should be devised if found to be present. Any abstraction from suitable water vole habitat should be limited to allow the preservation of suitable habitat and food sources.
- 6.7 No field signs of badgers currently using the site or badger setts were found. The site is not considered to be constrained by badgers.

- 6.8 Further survey work for great crested newt were undertaken on ponds 2, 3 and 8 (pond 2 was actually a stream on the southern boundary). All three tested negative for great crested newts. It is therefore considered unlikely that great crested newts are present within the local area and no further recommendations are made.
- 6.9 Nesting bird habitat has been identified on site recommendations with regards to protecting active nests must be adhered to.
- 6.10 Potential ecological enhancements that can be implemented into development plans have been recommended within the report. Recommendations include use of native species within landscaping schemes, including wildflower planting, use of wildlife friendly planting in SUDs schemes and woodland planting and the installation of bat and bird boxes on site. These enhancements would provide an increase in biodiversity interest to the site post development, and allow the site to conform to the relevant local planning policies described.

7.0 References

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Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155.

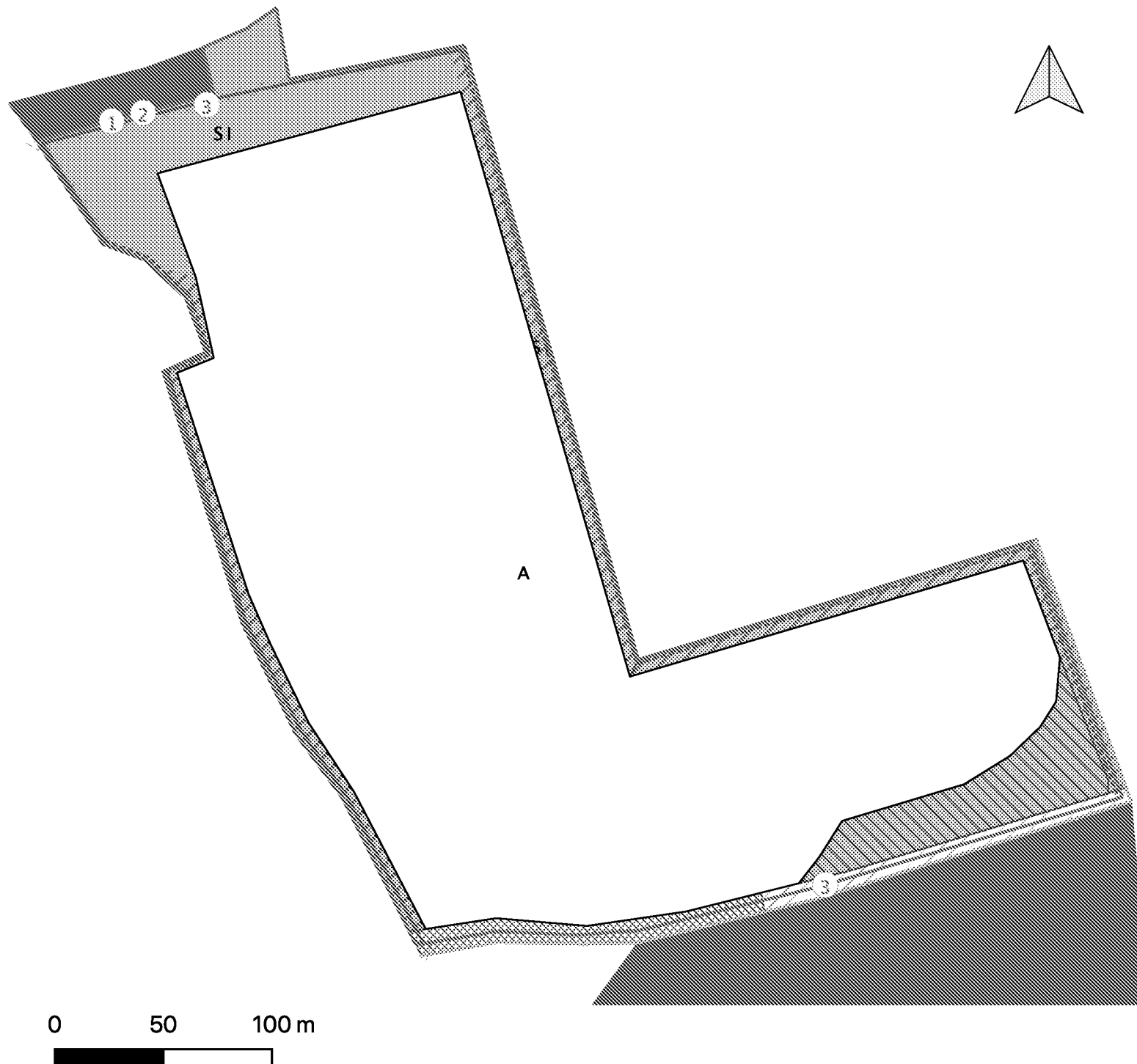
Internet resources:

Google Maps: www.google.co.uk/maps

Magic Interactive Map: www.magic.gov.uk

Arun District Council: www.arun.gov.uk

Appendix 1: Habitat Map



Key

-  Defunct hedgerow
-  Intact hedgerow
-  Stream
-  Red line boundary

-  Arable
-  Broadleaf woodland
-  Dense scrub
-  Marginal vegetation
-  Marshy grassland
-  Semi-improved grassland
-  Semi-improved grassland/tall ruderal mosaic

Target Notes

- ① Mammal holes
- ② Low bat roost potential tree
- ③ High bat roost potential tree

Client: John Hall Consulting
 Site: Binsted Farm, Walberton
 Date of Survey: 13.07.2020
 Surveyors: C. Jennings, L. Jacobs

the
 ecology
 partnership

Thorncroft Manor, Thorncroft Drive, Leatherhead, KT22 8JB
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0 50 100 m

Appendix 2: Species list for the site

Common name	Latin name	DAFOR score
Semi-improved Grassland		
Perennial rye grass	<i>Lolium perenne</i>	F
Yorkshire fog	<i>Holcus lanatus</i>	F
Soft brome	<i>Bromus hordeaceus ssp hordeaceus</i>	F
Common ragwort	<i>Senecio jacobaea</i>	O
Creeping thistle	<i>Cirsium arvense</i>	O
Common nettle	<i>Urtica dioica</i>	O
Creeping buttercup	<i>Ranunculus repens</i>	O
Daisy	<i>Bellis perennis</i>	O
Red clover	<i>Trifolium pratense</i>	R
Semi-improved grassland / Tall ruderal		
False oat grass	<i>Arrhenatherum elatius</i>	A
Yorkshire fog	<i>Holcus lanatus</i>	F
Soft brome	<i>Bromus hordeaceus ssp hordeaceus</i>	F
Creeping thistle	<i>Cirsium arvense</i>	F
Common nettle	<i>Urtica dioica</i>	F
Creeping bent	<i>Agrostis stolonifera</i>	O
Hogweed	<i>Heracleum sphondylium</i>	O
Common ragwort	<i>Senecio jacobaea</i>	O
Bramble	<i>Rubus fruticosus</i>	O
Curled dock	<i>Rumex crispus</i>	O
Creeping buttercup	<i>Ranunculus repens</i>	O
Scarlet pimpernel	<i>Anagallis arvensis ssp arvensis</i>	R
Scentless mayweed	<i>Tripleurospermum inodorum</i>	R
Poppy	<i>Papaver rhoeas</i>	R
Marshy Grassland		
False oat grass	<i>Arrhenatherum elatius</i>	D
Creeping bent	<i>Agrostis stolonifera</i>	A
Hard rush	<i>Juncus inflexus</i>	A
Yorkshire fog	<i>Holcus lanatus</i>	A
Silverweed	<i>Potentilla anserina</i>	O
Curled dock	<i>Rumex crispus</i>	O
Marginal Habitat (Reed bed)		
Common Reed	<i>Phragmites australis</i>	D
Bramble	<i>Rubus fruticosus</i>	R
Dense Scrub		
Bramble	<i>Rubus fruticosus</i>	D

Elder	<i>Sambucus nigra</i>	O
Hedgerow		
Hawthorn	<i>Crataegus monogyna</i>	D (locally)
Elm	<i>Ulmus agg</i>	D (Locally)
Blackthorn	<i>Prunus spinosa</i>	D (Locally)
Ash	<i>Fraxinus excelsior</i>	O
Elder	<i>Sambucus nigra</i>	O
Field Maple	<i>Acer campestre</i>	O
Hazel	<i>Corylus avellana</i>	O
Holly	<i>Ilex aquifolium</i>	O
Dogwood	<i>Cornus sanguinea</i>	R
Greater Burdock	<i>Arctium lappa</i>	R

Appendix 3: Photographs

Photograph 1: Western boundary	 A black and white photograph showing a field with a dense line of trees and bushes along the right side, representing the western boundary.
Photograph 2: Western boundary taken from southern boundary	 A black and white photograph showing a field with a dense line of trees and bushes along the left side, representing the western boundary taken from the southern boundary.

Photograph 3: High potential tree for roosting bats located on the southern boundary	
Photograph 4: Marshy grassland to the south east of the site	

Photograph 5: Reed bed which is present in the south east of site	
Photograph 6: Newly planted hedge which marks much of the site boundary with the adjacent solar farm to the east	
Photograph 7: Hedgerow to the north which a section will be removed to provide access to the development	

Photograph 8: Area where new car park is to be built	
Photograph 9: Pond 3, which tested negative for GCN	
Photograph 10: Pond 8, which tested negative for GCN	

Appendix 4: Biological Records

Appendix 5: Great Crested Newt eDNA results

Folio No: E8479
Report No: 1
Purchase Order: BINS101
Client: THE ECOLOGY
PARTNERSHIP
Contact: Chris Jennings

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS (TRITURUS CRISTATUS)

SUMMARY

When great crested newts (GCN), *Triturus cristatus*, inhabit a pond, they continuously release small amounts of their DNA into the environment. By collecting and analysing water samples, we can detect these small traces of environmental DNA (eDNA) to confirm GCN habitation or establish GCN absence.

RESULTS

Date sample received at Laboratory: 10/07/2020
Date Reported: 24/07/2020
Matters Affecting Results: None

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
2334	Pond 8, Binstead Farm South	SU 98853 04493	Pass	Pass	Pass	Negative	0
2347	Pond 2, Binstead Farm South	SU 98294 04445	Pass	Pass	Pass	Negative	0
2357	Pond 3, Binstead Farm South	SU 98056 04434	Pass	Pass	Pass	Negative	0

If you have any questions regarding results, please contact us: ForensicEcology@surescreen.com

Reported by: Chris Troth

Approved by: Jennifer Higginbottom



Forensic Scientists and Consultant Engineers
SureScreen Scientifics Ltd, Morley Retreat, Church Lane, Morley, Derbyshire, DE7 6DE

METHODOLOGY

The samples detailed above have been analysed for the presence of GCN eDNA following the protocol stated in DEFRA WC1067 'Analytical and methodological development for improved surveillance of the Great Crested Newt, Appendix 5.' (Biggs et al. 2014). Each of the 6 sub-sample tubes are first centrifuged and pooled together into a single sample which then undergoes DNA extraction. The extracted sample is then analysed using real time PCR (qPCR), which uses species-specific molecular markers to amplify GCN DNA within a sample. These markers are unique to GCN DNA, meaning that there should be no detection of closely related species.

If GCN DNA is present, the DNA is amplified up to a detectable level, resulting in positive species detection. If GCN DNA is not present then amplification does not occur, and a negative result is recorded.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. True positive controls, negative controls and spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared and reported. Stages of the DNA analysis are also conducted in different buildings at our premises for added security.

SureScreen Scientifics Ltd is ISO9001 accredited and participate in Natural England's proficiency testing scheme for GCN eDNA testing. We also carry out regular inter-laboratory checks on accuracy of results as part of our quality control procedures.

INTERPRETATION OF RESULTS

SIC: **Sample Integrity Check** [Pass/Fail]

When samples are received in the laboratory, they are inspected for any tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to inconclusive results.

DC: **Degradation Check** [Pass/Fail]

Analysis of the spiked DNA marker to see if there has been degradation of the kit or sample between the date it was made to the date of analysis. Degradation of the spiked DNA marker may lead indicate a risk of false negative results.

IC: **Inhibition Check** [Pass/Fail]

The presence of inhibitors within a sample are assessed using a DNA marker. If inhibition is detected, samples are purified and re-analysed. Inhibitors cannot always be removed, if the inhibition check fails, the sample should be re-collected.

Result: **Presence of GCN eDNA** [Positive/Negative/Inconclusive]

Positive: GCN DNA was identified within the sample, indicative of GCN presence within the sampling location at the time the sample was taken or within the recent past at the sampling location.

Positive Replicates: Number of positive qPCR replicates out of a series of 12. If one or more of these are found to be positive the pond is declared positive for GCN presence. It may be assumed that small fractions of positive analyses suggest low level presence, but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive. 0/12 indicates negative GCN presence.

Negative: GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as evidence of GCN absence, however, does not exclude the potential for GCN presence below the limit of detection.



Forensic Scientists and Consultant Engineers
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The Ecology Partnership Ltd

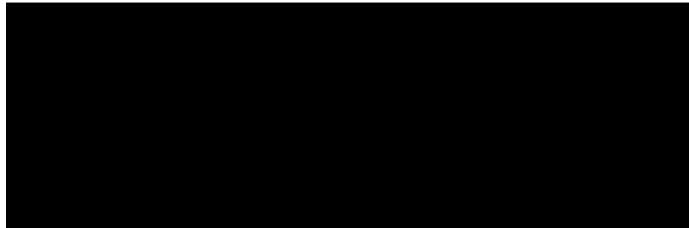
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