Land at Tortington, Arundel:

Ecological Assessment Report

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ABBREVIATIONS

BOA	Biodiversity Opportunity Area
BS	British Standard
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
EU	European Union
LEMP	Landscape and Ecological Management Plan
EPS	European Protected Species
ha	Hectare
HSI	Habitat Suitability Index
km	Kilometre
LNR	Local Nature Reserve
LWS	Local Wildlife Site
m	Metre
MAGIC	Multi-Agency Geographic Information for the Countryside
NPPF	National Planning Policy Framework
OS	Ordnance Survey
RPZ	Root Protection Zone
SAC	Special Area of Conservation
SBRC	Sussex Biodiversity Records Centre
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SUDS	Sustainable Urban Drainage System
TN	Target Note
UK	United Kingdom

EXECUTIVE SUMMARY

Representatives of the Norfolk Estate have prepared an Outline application for a residential development on a plot of land south of the town of Arundel, at Tortington in West Sussex.

Engain were first engaged to provide ecological advice on the application in 2018 and have completed various surveys and assessments since then to inform the application and planning decision.

This report presents a comprehensive account of the surveys and results completed to date. It evaluates the potential ecological impacts of the proposed development and describes the measures that have been designed to avoid and mitigate them.

No direct or indirect impacts upon areas designated for wildlife interest have been identified.

The habitats that will be lost as a result of the development have been found to be of low value to ecology, with the most valuable ecological features retained and enhanced for the benefit of wildlife.

The site has been found to support the following protected species and species of conservation interest:

- badgers;
- bats;
- birds;
- dormice; and
- reptiles and amphibians.

Mitigation, avoidance and enhancement measures have been proposed to ensure that the risk of impact upon these species as result of the development is removed. A detailed CEMP and LEMP will be secured via planning condition to formalise these measures.

In summary the proposed development, if completed in accordance with the recommendations of this report, will provide net gains for biodiversity.

1 INTRODUCTION

1.1 Representatives of the Norfolk Estate have prepared an Outline application for a residential development on a plot of land south of the town of Arundel, at Tortington in West Sussex.

1.2 The detailed design and layout of the residential area is outside of the scope of the application.

1.3 Engain were first engaged to provide ecological advice on the application in 2018 and have completed various surveys and assessments since then to inform the application and planning decision.

1.4 This report presents a comprehensive account of the surveys and results completed to date. It evaluates the potential ecological impacts of the proposed development and describes the measures that have been designed to avoid and mitigate them.

1.5 The proposed development is set out within the following plans that have been provided by the project team:

- Illustrative Masterplan, Land at Ford Road, Arundel drawing no: IM003 dated 20th November 2020.

1.6 This report and the proposed mitigation measures have been based upon these plans with the findings set out below. Should the development plans change then it may be necessary to amend the findings of this report.

2 LEGISLATION AND POLICY

Legislation

2.1 The two principal European Union Directives relating to nature conservation are the *Habitats Directive (1992)* and the *Birds Directive (amended 2009)*. Both directives are transposed into national legislation through the *Conservation of Habitats and Species (Amendment) Regulations 2017*.

2.2 *The Habitats Directive (1992)* protects certain species that are threatened across Europe and makes provision for the designation of wildlife conservation areas as Special Areas of Conservation (SACs). *The Birds Directive (1979)* makes provision for the designation of conservation areas for rare and vulnerable birds as Special Protection Areas (SPAs).

2.3 European Protected Species are protected under the *Habitats Regulations*. It is an offence to:

- Deliberately capture or kill a European Protected Species;
- Damage or destroy a breeding site or resting place of a European Protected Species; or
- Deliberately disturb a European Protected Species in such a way as to be likely to significantly affect:

  i) The ability of any significant group of animals of that species to survive, breed, rear or nurture their young; or

  ii) The local distribution of that species.

2.4 *The Wildlife and Countryside Act 1981* (as amended) provides protection to common reptiles at a UK national level. Additionally, all wild birds, their nests and young are protected through the *Wildlife and Countryside Act 1981 (as amended)* and it is illegal to kill, injure or take any wild bird, or damage or destroy the nest or eggs of breeding birds.

2.5 Badgers and their setts are protected under the *Protection of Badgers Act 1992* and by *The Hunting Act 2004.*

2.6 The *Natural Environment and Rural Communities Act 2006* extends the biodiversity duty set out in the *Countryside and Rights of Way Act 2000* to public

bodies and statutory undertakers to take due regard to the conservation of biodiversity. Local planning authorities should ensure that there is no net loss of biodiversity on a site, no net loss in habitat connectivity and should always aim to enhance biodiversity.

Relevant National Policy

2.7 The *National Planning Policy Framework* (NPPF) sets out the government's policies for the protection and enhancement of biodiversity through the planning system. The *National Planning Policy Framework* encourages the planning system to contribute to and enhance natural and local environments, through minimising the impacts on biodiversity and providing net gains in biodiversity where possible.

2.8 Local planning authorities are required to follow key principles in their consideration of potential impacts of planning decisions on biodiversity conservation. *Circular 06/05: Biodiversity and Geological Conservation* provides administrative guidance on the application of the law relating to planning and nature conservation and complements the *National Planning Policy Framework*.

2.9 The presence of species protected under UK and European legislation are a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat. Ecological assessments are required by planning authorities to inform the planning application.

2.10 *Biodiversity 2020: A strategy for England's wildlife and ecosystem services* provides national and local biodiversity strategies for England, based on the habitats and species listed under the *Natural Environment and Rural Communities Act*. Local biodiversity action plans give valuable information on local conservation priorities.

Local Planning Policy

2.11 The local planning policy relating to this site is the *Arun District Local Plan 2011-2031*, this was adopted in 2018, the plan is used to guide decisions on planning, development and regeneration activity within Arun District.

2.12 The Local Plan contains the following policies of particular relevance to this site.

2.13 **Policy ENV SP1: Natural Environment.** This policy states that the District Council will *"encourage and promote the conservation 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".*

2.14 **Policy ENV DM2: Pagham Harbour.** Relates to development proposals within or close to a buffer of 5km from this SPA. This proposed development is outside of this buffer zone. This policy also states that an Appropriate Assessment shall be carried out for any proposals likely to adversely affect European designated sites, with specific reference to Pagham Harbour and Arun Valley SAC.

2.15 **Policy ENV DM3: Non Designated Sites.** This includes the designations of Biodiversity Opportunity Areas (BOA), within which development shall:

- *Retain and sympathetically incorporate locally valued and important habitats including wildlife corridors and stepping stones;*
- *Be designed in order to minimise disturbance to habitats;*
- *Be supported by surveys for the presence of protected species or habitats;*
- *Include mitigation for habitat loss*.

2.16 Land along Ford Road at the east boundary of the site falls within a BOA.

2.17 **Policy ENV DM4: Protection of Trees.** relates to tree Preservation Orders, Ancient Woodland and Conservation Areas.

2.18 **Policy ENV DM5:** Development Biodiversity. This reiterates the NPPF requirement for development to seek to achieve net gain in biodiversity.

3 SITE LOCATION AND GENERAL DESCRIPTION

3.1 The site consists of three agricultural fields at the southern urban boundary of Arundel, the centre of the settlement of Tortington is approx. 770m to the south of the site. The site is shown in the context of its surroundings within the Site Location Plan appended to this report at Appendix 1.

3.2 The site is split across two areas separated by a row of mature trees running in a north south direction. To the west of these trees is a single arable field and to the east of these trees are two pasture fields.

3.3 To the north the site is bounded by the southern urban areas of Arundel, in the middle of this boundary there is a large area of allotments. To the east the site is bounded by Ford Road, this is the main route south out of Arundel leading to the settlement of Ford. To the south the site is bounded by the minor road Priory Lane. To the west the site is bounded by a triangular agricultural field.

3.4 The OS grid reference at the centre of the site is GR: TQ01100571 and the total site area is approx. 9.8ha.

3.5 The site sits within the South Coast Plain National Character Area (NE525), although it is at the northern edge of this area close to the boundary with the South Downs (NE125). Its ecological character at a landscape scale is largely defined by the floodplain of the River Arun, with connections to the wooded lower slopes of the South Downs on its north-western boundaries.

3.6 The River Arun is tidal at this point, and the section closest to the site's eastern boundary flows in a constructed channel with high earth bank. The land to the west of the river is largely low-lying and flat, and traditionally would have been designed and managed as floodplain meadow. This environment is generally managed by constructing and maintaining drainage ditches and allowing the land to periodically flood, which introduces nutrients in the alluvium and maintains agricultural quality for grazing and hay cropping. These habitats are ecologically very valuable where they are still traditionally managed: the ditches support a great diversity of plants and invertebrates, and the meadows can be botanically rich and highly valuable to nesting waders and wildfowl. Floodplain meadows have largely been agriculturally improved over the centuries and the richest habitats are now very rare in the UK.

3.7 To the west of the site is a large area of ancient, semi-natural woodland (some of which has been replanted with conifers) including Tortington Common and Binstead Wood.

4 METHODS

Desk Study

4.1 Desktop data was obtained from Sussex Biodiversity Records Centre (SBRC) in 2020. The search parameters were set at 2 km from the site for non-statutory designated wildlife sites and notable species records. The search was extended to 4km for bat records.

4.2 Online resources were also used, including the UK government's online resource for geographic information about the natural environment (MAGIC Map).

4.3 A review of publicly available ecological surveys undertaken both in support and in objection to the proposed A27 Arundel Bypass was undertaken during 2017.

4.4 A copy of an Ecological Survey undertaken in 2012 at Tortington Priory Ponds was kindly provided to the project team by Dr Catherine Watts, this document has been reviewed and where relevant its findings are included within this report.

Extended Phase 1 Habitat Survey

4.5 The extended Phase 1 Habitat Survey was conducted on the 13th September 2017 with a visit to verify on 25th August 2020. The field survey methods were based on the Phase 1 Habitat Survey methodology (Joint Nature Conservancy Council, 2010). The main habitat types were mapped using standard habitat colours as shown within the Phase 1 Habitat Plan appended to this report at Appendix 2. The additional (extended) aspect of the survey method involves the identification of habitats that may support notable species and searching for evidence of such species.

4.6 Considering the site location, context and habitats it contains, the following protected species are considered in this report:

- badgers (*Meles meles*);
- bats (all species);
- breeding and overwintering birds;
- dormice (*Muscardinus avellenarius*);

- great crested newts (*Triturus cristatus*); and
- reptiles.

4.7 The ecological appraisal completed in 2012 at Tortington Priory Ponds indicates that at that time water voles were present on that site. However, there is no suitable habitat on this proposed development site for water voles and the development is some way from these ponds, as such this species is not considered further in this report.

4.8 The site is not suitable for otter (*Lutra lutra*) or white-clawed crayfish (*Austropotamobius pallipes*) due to the habitats contained within and adjacent to it. These species are not considered further in this report.

Assessment of Ecological Value

4.9 The habitats and species of principal importance for biodiversity in the UK are listed on *Section 41* of *The Natural Environment and Rural Communities Act 2006*. Additional importance may be attached to species for which there are the greatest levels of legal protection.

4.10 The assessment of the relative nature conservation value of the features at this site is also assessed against published criteria wherever possible. The value of habitats in the UK is covered in a wide variety of literature, including Usher (1986) and Ratcliffe (1977).

4.11 The main criteria against which the value of habitats is assessed are rarity, diversity, naturalness and extent. High importance is also attached to habitats that have not been subject to agricultural intensification, and which often depend on traditional forms of management, such as ancient semi-natural woodland, species-rich meadows and traditionally managed grasslands and moorlands.

Badger survey

4.12 A systematic search for signs of badgers was originally conducted on 13th September 2017, and this was repeated during the numerous site visits during 2019 and 2020. The surveys followed standard guidelines (Harris, Cresswell & Jeffries, 1989) and included a thorough search for setts or for signs of badger activity, including tracks, latrines, hairs and snuffle holes.

Bat Surveys

Bat Activity Surveys

4.13 All bat surveys were carried out according to standard guidance (Collins, 2016; Mitchell-Jones, 2004; and Mitchell Jones & McLeish, 2004).

4.14 Bat surveys were first carried out between September and October 2019. An additional survey was completed in August 2020. The dates of the transect surveys are given in Table 4-1.

Table 4-1 Bat Activity Transect Survey Details

Date	Start-End Time	Start Temp. (°C)	End Temp. (°C)	Weather Conditions
17/09/19	19:12-22:12	16	11	W2-R0-C2
15/10/19	18:10-20:10	16	9	W0-R0-C6
25/08/20	20:00-22:00	18	16	W8-R0-C8

4.15 Dusk transect surveys began at sunset and continued for two hours. The route of the transect is shown in The Bat Transect Route Plan appended to this report at Appendix 4. The transects were walked by one surveyor.

4.16 Visual observations were supported by the use of ultra-sonic bat detectors. A variety of hand-held detectors (Anabat SD2, EM3+, and EMTouch) were used.

Automated Static Surveys

4.17 Static detectors (Anabat Express, Anabat SD2 and SM2) were installed at various locations within and adjacent to the site between September 2019 and August 2020, locations are shown in the Static Detector Location Plan appended to this report at Appendix 5.

Table 4-2 Static Detector Deployments

Year	Month	Start Date	End Date	Number of Nights
2019	Sept	17/09/19	25/09/19	7
	Oct	08/10/19	14/10/19	5
2020	Aug	25/08/20	03/09/20	9
Total Number of Nights				21

Data Analysis

4.18 Species were identified from EMTouch recordings using the in-built auto-ID based on Kaleidoscope (Wildlife Acoustics Version 4.0.1) classifiers (verified by the experienced ecologist using the bat detector in the field). Heterodyne recordings were identified by an experienced ecologist in the field at the time of the survey and confirmed afterward via playback of recordings and analysis with Bat Scan (Bat Box Ltd Version 9). EM3+ WAC files were converted to ZC files using Kaleidoscope.

4.19 Static detector data was analysed using Kaleidoscope Pro software. Myotis species identification was accepted but is treated with caution when analysing the results, and where in doubt all Myotis species are lumped together and it is assumed that some of the calls may be Bechstein's bats (*Myotis bechsteinii*).

Bird Surveys

4.20 The site was surveyed on three occasions through the winter period 2019-2020: 30th November 2019, 22nd December 2019 and 12th Jan 2020. Weather conditions were suitable for surveying during each site visit.

4.21 Birds were identified by sight and sound, using 8 x 32 binoculars as required. On each occasion, a fixed route was walked that enabled all of the habitats of the site to be surveyed this included all large open fields as well as the hedgerows dividing the fields and around the periphery of the site. The route involved walking alongside the hedgerows and allowed close observations to be made.

4.22 Additional survey effort outside of the site boundary was undertaken in order to try to ascertain if Bewick's swans (*Cygnus columbianus bewickii*) use areas close to the development during winter months.

Dormice Surveys

4.23 The methodology followed during nest tube surveys is outlined in The Dormouse Conservation Handbook (Bright, Morris & Mitchel-Jones, 2006) and comprised setting out tubes in suitable habitat within the site. The survey guidelines provide an index score for each month that nest tubes are left out. A minimum survey

effort index score of 20 is required to assume absence where suitable habitat is present.

4.24 A total of 100 nest tubes were installed in potential habitat throughout the site on 7th of August 2019 (See Dormouse Nest Tube Location Plan at Appendix 6 for reference). Tubes were installed at appropriate intervals depending on the habitat (approximately 10m for the majority of the site), however in places tube density was higher than 1 per 10m.

Table 4-3 Nest Tube Index Score

Month	Index (50 tubes)	Index (100 tubes)
April	1	2
May	4	8
June	2	4
July	2	4
August	5	10
September	7	14
October	2	4
November	2	4
Total	**25**	**50**

4.25 Nest tubes were checked on the 12th September 2019, 8th October 2019, 20th November 2019 and 25th August 2020 giving an overall survey index of 32. Survey findings are shown within the Dormouse Evidence Plan appended to this report at Appendix 7. Dates times and weather conditions during each survey visit are detailed within the table below.

Table 4-4 Dormouse Nest Tube Survey Schedule

Date	Time	Air Temp (°C)	Weather Conditions
12.09.19	10:30 – 12:30	18	W1-R0-C2
08.10.19	13:00 – 15:30	19	W3-R0-C3
20.11.19	10:50 – 11:40	8	W2-R0-C7
25.08.20	14:30 – 16:15	20	W8-R1-C8

4.26 Data recorded during nest tube inspection included the presence of nests and assessment of their type (dormice, wood mouse, bird, etc), whether nests were occupied and the nest tube location.

Great Crested Newt Surveys

Habitat Suitability Index Assessment

4.27 A Habitat Suitability Index (HSI) assessment for great crested newts was conducted at accessible ponds within 500m of the site on the 25th of August 2020. These water bodies are shown on the figure included at Appendix 8. The survey was conducted in good weather conditions (clear, good visibility and low wind).

4.28 The HSI assessment followed guidelines outlined in Advice Note 5 (ARG UK) and is based on methodology developed by Oldham et al. (2000). The HSI is a numerical index, between 0 and 1. Values close to 0 indicate unsuitable habitat, whilst 1 represents optimal habitat. The HSI for great crested newts incorporates ten suitability indices, all of which are factors known to affect this species. These comprise geographical location, pond area, permanence, water quality, shade, the presence of fish, pond count, terrestrial habitat and macrophytes.

eDNA Survey

4.29 Water samples were collected from waterbodies in August 2020 and sent off for eDNA analysis by Surescreen Scientifics.

Reptile Surveys

4.30 Reptile surveys were carried out in accordance with standard guidance and methodologies outlined in Herpetofauna Worker's Manual (Gent & Gibson, 2003) and Froglife Advice Sheet 10 (Froglife, 1999).

4.31 A total of 100 reptile mats (sections of roofing felt approximately 1m x 0.5m) were distributed throughout the site on the 7th of August 2019. See the Reptile Mat Location Plan at Appendix 9 for reference, mats were positioned at suitable reptile habitat along the site margins.

4.32 After installation, the reptile mats were left for one week before surveys began. Seven checks were conducted periodically between the 12th of September 2019

and the 22nd of October 2019. Survey findings are shown with the Reptile Location Plan at Appendix 10.

4.33 Surveys were conducted at appropriate periods of the day and when conditions were favourable (generally calm and sunny and never during heavy rain). Details of the survey conditions are provided in the table below.

Table 4-5 Reptile Survey Schedule

Date	Time	Air Temp. (°C)	Weather Conditions
12.09.19	10:30 – 12:30	18	W1-R0-C2
17/09/19	12:30 - 14:00	20	W2-R0-C0
18/09/19	08:00 - 09:00	15	W1-R0-C0
26.08.19	11:20 – 13:00	18	W3-R0-C7
08.10.19	13:00 – 15:30	19	W3-R0-C3
15.10.19	13:30 – 15:40	16	W3-R0-C4
22.10.19	11:00 – 12:45	16	W1-R0-C1

Limitations

4.34 Engain cannot verify the accuracy of third-party information.

4.35 Some bat species are difficult to detect with bat detectors because they produce quiet (low amplitude) echolocation calls, have very directional echolocation calls, or sometimes do not use constant echolocation whilst hunting (especially in or close to roosts or when gleaning prey).

4.36 It is widely accepted that identification of *Myotis* bat calls (to species level) is difficult. The various characteristics of a *Myotis* species can be analysed however, and an informed assumption can be made as to the likely species. In other cases, characteristics can be used to rule out particular species.

4.37 All of the ponds recorded on the OS map within 500m of the site are located within residential properties and no public access is possible. Land registry searches have been undertaken to ascertain the ownership of the inaccessible ponds. Where an owner's details were available a letter was sent requesting access to the ponds to facilitate the HSI assessment and eDNA sampling.

4.38 Best practice dictates that the optimal survey period for collecting great crested newt eDNA water samples is between mid-April and late-June. With months outside of this period recognised as sub optimal survey times. The surveys referenced above were undertaken during August 2020 as such a negative eDNA result cannot be relied upon solely to confirm absence of this species.

5 RESULTS

European Designated Sites

5.1 There are two European designated sites within 10km of the site (detailed in Table 5-1 and show in relation to the site at the Designated Site Plan at Appendix 3).

Table 5-1 European Designated Sites within 10km of the Development Site

Site Name	Designation	Distance and Direction from Site	Qualifying Features
Duncton to Bignor Escarpment	SAC	7km NW	It is designated as an example of the Habitats Directive Annex I habitat *Asperulo-Fagetum* beech forests. It contains chalk grassland, scrub and woodland, on the steep scarp face of the north downs.
The Arun Valley	Ramsar, SAC, SPA and SSSI (Amberley Wild Brooks)	7km NE	An example of an extensive area of floodplain grazing marsh dissected by drainage ditches. It is designated at a European level due to the presence of the rare snail (*Anisus vorticulus*). The Ramsar designation relates to the site's outstanding ornithological importance for wintering wildfowl and breeding waders, the presence of seven British Red Data Book invertebrates, and the rich botanical interest of the ditches.

Nationally Designated Sites

5.2 There are three nationally designated sites within 5km of the development site (detailed in Table 5-2 and show in relation to the site at the Designated Site Plan at Appendix 3).

Table 5-2 Nationally Designated Sites within 10km of the Site

Site name	Designation	Distance and direction from site	Reason for designation.
Arundel Park	SSSI	1.2 km NE	An old deer park with chalk grassland and veteran trees. It is one of the most important sites in the country for invertebrates including a number of rare and notable species.
Fiarmile Bottom	SSSI and LNR	3.4 km NW	Designated for its yew woodland and scrub as well as its chalk grassland. The site is rich in invertebrates including an outstanding assemblage of beetles.
The Arun Banks	SSSI	3.9 km NE	An old meander of the tidal stretch of the River Arun. It is designated for its rich assemblage of wetland plant communities and associated fauna.

Non-Statutory Designated Sites

5.3 There are three non-statutory designated Local Wildlife Sites (LWS) and two Designated Road Verges sites within 2km of the site.

5.4 Binsted Wood Complex LWS is approx. 200m to the west of the site. This is a mixture of ancient woodland, recent woodland, conifer plantation, species rich pasture and old tracks and shaws. Supporting a very rich array of flora.

5.5 Rewell Wood Complex LWS is approx. 1.5km to the north of the site. This is a large ancient woodland complex. It has a diversity of habitats including ancient semi-natural woodland, worked Sweet Chestnut coppice, conifer plantation, beech plantation and species rich chalk grassland. Wide rides and glades within the woodland support a rich array of flora and butterfly fauna. The disused gravel pits are of entomological importance.

5.6 Arun Valley, Watersfield to Arundel LWS is approx. 1.7km to the north of the site this section of the River Arun and its floodplain forms an extensive tract of wetland, a nationally declining habitat.

5.7 No information is provided with the data provided by SBRC regarding the Designated Road Verges however these are both over 1km to the north of the site at the northern boundary of Arundel.

Habitats

5.8 The site consists of grassland and arable fields (Approximately 9.5ha within the site) surrounded by mature hedgerows. The western most field is under arable cultivation. Its southern boundary with Priory Lane has patchy scrub but lacks a continuous hedgerow. The eastern boundary hedge is a mature hedge with a dry ditch. This hedge has a row of mature oaks on its eastern face.

5.9 The easternmost field is largely dominated by a species-poor sward of creeping bent (*Agrostis stolonifera*) and tussocks of cock's-foot (*Dactylis glomerata*). It has a hedge running through the middle of it, which does not connect to the

boundaries at either end. It consists of hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) with large amounts of bramble (*Rubus fruiticosus*) and occasional gorse (*Ulex europaeus*). The eastern edge of this field, along its boundary with Ford Road, includes a seasonally inundated area of low-lying ground dominated by soft rush (*Juncus effusus*).

Badgers

5.10 The data provided by SBRC contains no records of badgers, the local badger groups in the area have requested that all badger records remain confidential due to the persecution that this species has suffered in the past.

5.11 There is an excavation at the base of a mature oak tree (shown as a target note within the Phase 1 Habitat Plan) that may have been dug by a badger. This consist of a single hole with fresh spoil at its entrance.

5.12 During the bat survey on the 17th of September 2019 an individual badger was observed close to this excavation.

5.13 It is possible that this excavation is an outlying sett used infrequently by individual badgers from a nearby clan.

Bats

5.14 The data provided by SBRC contains records of the following bat species:

- alcathoe bat (*Myotis alcathoe*);
- barbastelle bat (*Barbastella barbastellus*)
- Bechstein's bat;
- Brandt's bat (*Myotis brandtii*);
- brown long-eared bat (*Plecotus auritus*);
- common pipistrelle (*Pipistrellus pipistrellus*);
- Daubenton's bat (*Myotis daubentonii*);

- greater horseshoe bat (*Rhinolophus ferrumequinum*);
- Leisler's bat (*Nyctalus leisleri*);
- Nathusius' pipistrelle (*Pipistrellus nathusii*);
- Natterer's bat (*Myotis nattereri*);
- noctule (*Nyctalis noctule*);
- serotine (*Eptesicus serotinus*);
- soprano pipistrelle (*Pipistrellus pygmaeus*); and
- Whiskered bat (*Myotis mystacinus*).

5.15 From these records the only known roosts within the immediate vicinity (<1km) of the site are two unspecified common pipistrelle roosts found within separate buildings during 2005. One of these contained 55 individuals and is likely to be an important roost.

5.16 Within the publicly available information assessed relating to the A27 bypass upgrade works there are records of Bechstein's bat and barbastelle bat from the western edge of Binstead Woods, approximately 2km west of the site. Those surveys also identified the very rare, although perhaps under-recorded, alcathoe bat. In addition to these rarer species, the surveys also recorded Brandt's bat, Daubenton's bat, Natterer's bat, Whiskered bat, brown long-eared bat, the three pipistrelle species (common, soprano and nathusius'), noctule and serotine.

5.17 The range of bats recorded reflects the diversity and quality of the habitats in the landscape around the site. The above list includes species that take advantage of various habitat types including open grassland, woodland, trees and buildings for roosting, and linear features for navigation.

5.18 The site's boundary hedges are functionally very suitable as navigational routes for bats and as foraging areas. The mature oaks dotted around the site all have features such as standing dead wood, flaking bark and broken-off branches where bats could roost.

5.19 The western field has limited value for foraging bats being in arable rotation and likely to be subjected to regular applications of pesticides to control populations of invertebrates.

5.20 The eastern field provides slightly better, foraging habitat, it has a species poor and uniform sward but is not regularly grazed and as such is unlikely to support varied populations of invertebrates that bats feed upon.

Activity Surveys

5.21 The following bat species were recorded during the transect surveys:

- Common pipistrelle;
- Soprano pipistrelle;
- Noctule;

5.22 Most bat activity was recorded around the edges of the site, where bats foraged and flew alongside hedges and under trees. Very little activity was observed over the open fields. Noctules were sometimes seen hunting high over the grassland, but little other bat activity was observed in the open.

5.23 The most commonly recorded species during the transect surveys were common and soprano pipistrelles.

Automated Static Surveys

5.24 The following twelve species were recorded during the static detector surveys:

- Barbastelle;
- Serotine;
- Brandt's bat;
- Daubenton's bat;
- Whiskered bat;
- Natterer's bat;

- Leisler's bat;
- Noctule;
- Nathusius' pipistrelle;
- Common pipistrelle;
- Soprano pipistrelle; and
- Brown long-eared bat;

5.25 This list closely matches the list of species recorded in the data search within a 4km radius of the site, with the only species not recorded on the site being greater horseshoe, alcathoe and Bechstein's bats.

5.26 The vast majority (75%) of all registrations were of common pipistrelles. The next most frequently recorded species was soprano pipistrelles, which accounted for 17% of all registrations. The other ten species made up the remaining 8% of the registrations on the static detectors, with noctule calls being the most numerous.

5.27 The recordings are split across three separate locations as per the Static Detector Location Plan shown at Appendix 5. A summary of the recordings at each location is provided below.

5.28 **Location 1:** This location is at the western end of the site approximately halfway along the hedgerow that runs north to south at the western boundary of the site. Ten bat species were recorded at this location.

Table 5-3 Summary of Static Bat Surveys at Location 1.

September 2019		October 2019		August 2020	
Species	**No of Records**	**Species**	**No of Records**	**Species**	**No of Records**
Barbastelle	0	Barbastelle	4	Barbastelle	5
Serotine	0	Serotine	0	Serotine	1
Brandt's bat	0	Brandt's bat	2	Brandt's bat	7

September 2019		October 2019		August 2020	
Whiskered bat	0	Whiskered bat	5	Whiskered bat	5
Natterer's bat	0	Natterer's bat	5	Natterer's bat	1
Leisler's bat	1	Leisler's bat	0	Leisler's bat	1
Noctule	8	Noctule	0	Noctule	28
Common pipistrelle	945	Common pipistrelle	1678	Common pipistrelle	976
Soprano pipistrelle	57	Soprano pipistrelle	293	Soprano pipistrelle	426
Brown long-eared bat	28	Brown long-eared bat	11	Brown long-eared bat	23
Total no of recordings	1,039	**Total no of recordings**	1,998	**Total no of recordings**	1,473
Total no of recordings at Location 1			4,510		

5.29 **Location 2**: This location is in the middle of the site approximately halfway along the hedgerow that runs north to south dividing the site in two. Seven bat species were recorded at this location.

Table 5-4 Summary of Static Bat Surveys at Location 2.

September 2019		October 2019		August 2020	
Species	**No of Records**	**Species**	**No of Records**	**Species**	**No of Records**
Whiskered bat	0	Whiskered bat	2	No survey at this location during Aug 2020.	
Natterer's bat	0	Natterer's bat	2		
Leisler's bat	1	Leisler's bat	1		
Noctule	10	Noctule	19		

September 2019		October 2019		August 2020
	243	Common pipistrelle	11	
Soprano pipistrelle	60	Soprano pipistrelle	24	
Brown long-eared bat	0	Brown long-eared bat	1	
Total no of recordings	314	**Total no of recordings**	60	
Total no of recordings at Location 2		374		

5.30 **Location 3**: This location is in the east of the site approximately halfway along the hedgerow that runs east to west dividing the eastern field. Nine bat species were recorded at this location.

Table 5-3 Summary of Static Bat Surveys at Location 3.

September 2019		October 2019		August 2020	
Species	**No of Records**	**Species**	**No of Records**	**Species**	**No of Records**
Barbastelle	0	Barbastelle	0	Barbastelle	2
Serotine	0	Serotine	0	Serotine	1
Daubenton's bat	0	Daubenton's bat	0	Daubenton's bat	3
Leisler's bat	1	Leisler's bat	1	Leisler's bat	0
Noctule	11	Noctule	5	Noctule	8
Nathusius' pipistrelle	0	Nathusius' pipistrelle	0	Nathusius' pipistrelle	3
Common pipistrelle	68	Common pipistrelle	4	Common pipistrelle	13
Soprano pipistrelle	25	Soprano pipistrelle	6	Soprano pipistrelle	11
Brown long-eared bat	11	Brown long-eared bat	4	Brown long-eared bat	3

September 2019		October 2019		August 2020	
Total no of recordings	116	Total no of recordings	20	Total no of recordings	71
Total no of recordings at Location 3		207			

Birds

5.31 The data provided by SBRC contains records of the following *Schedule 1* bird species as per *The Wildlife and Countryside Act 1981* (as amended):

- avocet (*Recurvirostra avosetta*);
- barn owl (*Tyto alba*);
- bearded tit (*Panurus biarmicus*);
- Bewick's swan;
- bittern (*Botaurus stellaris*);
- black redstart (*Phoenicurus ochruros*);
- black tern (*Chlidonias niger*);
- black tailed godwit (*Limosa limosa*);
- Cetti's warbler (*Cettia cetti*);
- common crossbill (*Loxia curvirostra*);
- firecrest (*Regulus ignicapilla*);
- garganey (*Anas querquedula*);
- hobby (*Falco subbuteo*);
- hoopoe (*Upupa epops*);
- kingfisher (*Alcedo atthis*);
- little ringed plover (*Charadrius dubius*);

- Mediterranean gull (*Larus melanocephalus*);
- merlin (*Falco columbarius*);
- osprey (*Pandion haliaetus*);
- purple heron (*Ardea purpurea*);
- quail (*Coturnix coturnix*);
- red kite (*Milvus milvus*);
- red-throated diver (*Gavia stellate*);
- ruff (*Calidris pugnax*);
- scaup (*Aythya marila*);
- serin (*Serinus serinus*);
- Slavonian grebe (*Podiceps auritus*);
- whooper swan (*Cygnus cygnus*); and
- woodlark (*Lullula arborea*).

5.32 The majority of the species listed above favour wetland habitats and as such are very unlikely to use habitats found on the site. However, the assemblage of birds listed above shows that the wider area is important for birds of conservation interest.

5.33 The boundary hedges provide good foraging and nesting habitat for a range of birds. The open fields are of limited value for birds, and their value is heavily dependent on the agricultural management regime. Winter stubble in the arable could provide good winter habitat for birds if it is left over winter and not cropped or plough under.

5.34 During the November 2019 wintering bird survey, the following bird species were observed foraging on the site: jackdaw (*Corvus monedula*), pheasant (*Phasianus colchicus*), pied wagtail (*Motacilla alba*), magpie (*Pica pica*), carrion crow (*Corvus corone*), herring gull (*Larus argentatus*) and kestrel (*Falco*

tinnunculus). A handful of common garden birds were noted within the surrounding hedges including song thrush (*Turdus philomelos*) and house sparrow (*Passer domesticus*). In the wider area, three mute swans (*Cygnus olor*) were observed in a field of brassica to the south of Priory Farm, on the River Ardur and in the fields to the east of the river. Also present on the river were mallard (*Anas platyrhynchos*), herring gull, redshank (*Tringa totanus*), common sandpiper (*Actitis hypoleucos*), kingfisher, reed bunting (*Emberiza schoeniclus*) and little egret (*Egretta garzetta*). More mute swans were observed in fields to the north of Burpham. No Bewick's swans were observed, either on the site or nearby.

5.35 The December 2019 wintering bird survey recorded broadly the same species mix as the November survey, the only notable difference being two little egrets foraging within the site. During this survey three individual Bewick's swans were observed at Amberley Wildbrooks a SSSI 7.2km to the north of the site.

5.36 The January 2020 wintering bird survey recorded no further species of note onsite. The three individual Bewick's swans were observed to the north of the site at Burpham 4km to the north east of the site.

5.37 In summary, no Bewick's swans were observed on or near the site during the three surveys.

Dormice

5.38 The data provided by SBRC contains 145 records of dormice within the search area within the last ten years.

5.39 Ash Piece and Noor Wood (Part of Tortington Common) <1km to the west of the site are part of the National Dormice Monitoring Programme, which has recorded dormice and their nests from this woodland block.

5.40 The hedgerows around the field boundaries provide good habitat for dormice and they are well connected to surrounding woodlands.

5.41 During the dormouse survey visit on the 20th November 2019 three individual nests were found within nest tubes, which had the characteristics of being constructed by a dormouse. The nests were all found within the western field at the south, west and northern boundaries.

5.42 During this survey visit a nut search found two sloe stones bearing the signs of being eaten by a dormouse.

5.43 During the dormouse survey visit on the 25th of August 2020 an occupied wood mouse nest was found within the hedgerow that divides the eastern field.

Great Crested Newts

5.44 The data provided by SBRC contains no records of great crested newts within the search area. There are records of common toad (*Bufo bufo*), palmate newt (*Lissotriton helveticus*), smooth newt (*Lissotriton vulgaris*) and common frog (*Rana temporaria*). A search of the publicly available documentation relating to the proposed A27 Arundel bypass has found no records of this species within the vicinity of the site.

5.45 The open fields of the site are of little value for amphibians, but the boundary hedges and ditches provide suitable habitat for these species to move through the landscape between breeding and terrestrial habitats.

5.46 There are ponds around Tortington Priory Farm that may be suitable for amphibians, these have been remodelled since their origin and at various points in their history have been stocked with fish.

5.47 Ponds 1 and 2 are the closest ponds, being 20m and 95m to the south of the site. They are part of a wider Scheduled Ancient Monument (Tortington Augustinian Priory and Ponds, including part of priory precinct ref: 1021459).

5.48 Pond 1 previously contained an infestation of parrot's feather (*Myriophyllum* species) an invasive water plant. However, since 2012 the owners have spent

time removing this infestation and at the time of the HSI assessment this pond was clear of parrot's feather.

5.49 Pond 2 is the larger of the two ponds assessed, the owner has indicated that this pond is stocked with carp (*Cyprinus* species) thought to be a population that has been in place since the ponds were in use as fishponds in association with the priory.

5.50 The owner of both these ponds reported never having observed great crested newts within either of these ponds.

5.51 Ponds 1 and 2 were both scored as providing 'good' habitat for great crested newts.

5.52 The water samples for both ponds returned negative results for great crested newt eDNA.

Reptiles

5.53 The data provided by SBRC contains numerous records of all four common reptile species; slow worm (*Anguis fragilis*), grass snake (*Natrix helvetica*), adder (*Vipera berus*) and common lizard (*Zootoca vivipara*).

5.54 The field margins provide suitable habitat for the commoner reptiles, although it is unlikely that adders would use the site.

5.55 During the reptile surveys slow worms, grass snakes and common lizard were observed under the reptile mats and basking in the open.

5.56 The majority of the reptiles were observed in the area of the site adjoining the allotments to the north as per the Reptile Location Plan at Appendix 10.

5.57 The peak count of individuals found for the three species was as follows;

- slow worm – 3 individuals on two occasions

- common lizard – 1 individual on three occasions
- grass snake – 1 individual on one occasion

5.58 Male and female slow worms were recorded; however, no juveniles were observed. Adult male and female common lizards were observed as well as juveniles. A single large adult grass snake was observed next to the allotment.

6 EVALUATION OF POTENTIAL IMPACTS

Designated Sites

Duncton to Bignor Escarpment SAC

6.1 The nearest designated component is 7km north-west of the site. At this distance the proposed development will not lead to any direct impacts upon this SAC.

6.2 A review of the SACs Site Improvement Plan has found that currently no issues have been recorded as affecting the status of this Natura 2000 site. The proposed development will not result in increasing any recognised threats to this designated area.

The Arun Valley Ramsar, SAC and SPA

6.3 The nearest designated component is 7km north east of the site. At this distance the proposed development will not lead to any direct impacts upon this designated area.

6.4 A review of the SACs Site Improvement Plan has found that currently the following issues threaten the status of this designated site;

- Inappropriate water levels;
- Water pollution; and
- Inappropriate ditch management.

6.5 No qualifying features of this designated area are found on the site and the development in isolation is not likely to increase the impacts of the threats identified above.

6.6 Data records show that a range of bird species of conservation interest that may use this designated area have been recorded within the vicinity of the site.

However, surveys have found no evidence of these species making use of the site.

Other Designated Sites

6.7 The nearest site is Arundel Park SSSI approximately 1.2km north east of the site. The site is not functionally linked to the ecological features for which the SSSI is designated and the entire urban area of Arundel lies between the site and this designated area.

6.8 Binsted Wood Complex LWS is approx. 200m to the west of the site. The development will not result in any loss to this area of woodland.

Habitats

6.9 The proposed development would result in the loss of approximately 3.82ha of the total baseline area of 9.8ha. The remaining area will be enhanced to create a more species-rich and ecologically beneficial sward, by altering the management (removing fertiliser inputs and altering the cutting regime) and introducing new plant species through seeding and / or plug planting.

6.10 Adjacent to the development plots, new areas of habitat will be created to comprise a mix of shrubs and grassland, which will provide areas accessible to people and beneficial to wildlife. This proposed new green infrastructure area totals 4.96ha.

6.11 Two new Sustainable Urban Drainage features will be created, and these will include capacity to hold standing water over winter and early spring (though they may dry out in summer, which will prevent colonisation by fish). They will be planted with a suitable wetland grass seed mix and aquatic plant species will be allowed to colonise naturally.

6.12 The gardens and amenity areas within the development plots will also provide some ecological value for species such as birds and slow-worms. Their wildlife

value will be improved by ensuring that garden boundaries are permeable with features such as 'hedgehog highways' and hedgerows.

6.13 The approx. 0.2ha of marshy grassland adjacent to Ford Road will be retained except where it is crossed by the new road access. The retained areas will be protected during construction and later managed to maintain water levels so that they remain marshy and promote a diversity of flora and fauna.

6.14 Buffers have been incorporated into the scheme design around all individual mature trees and these are all to be retained.

6.15 The net impact of the proposed development will be an overall net gain as measured using the Defra 2.0 metric. The Outline proposed layout results in a greater than 20% net gain. There is therefore plenty of scope to achieve at least 10% net gain and greater in the development once design details are finalised through the reserved matters process.

Hedgerows

6.16 The proposed development retains 85% of the existing hedgerow network (Approximately 1.3km of hedgerow surrounding and crossing the site). The only hedgerow removal required is the breach through the road hedge to create the new access of Ford Road, and the breach through the central hedgerow to connect the two fields. This latter breach has been sited to sit between mature trees so that they can be retained, which will help to mitigate the impact on functional connectivity.

6.17 The retained sections of species-poor hedges will be enhanced with additional planting and they will be managed in the long term to create species-rich hedges similar to those on the western edge of the site. They will have a mix of native shrubs and some mature trees and managed to have a bushy structure in which the shrubs are able to flower and fruit.

6.18 The proposed development includes the creation of approximately 370m of new hedgerow. This additional hedgerow length will help to connect existing hedges and improve functional connectivity across the site.

6.19 The net effect of the development proposal would be a greater than 10% net gain in hedgerow habitat as measured using the Defra 2.0 metric.

Badgers

6.20 The entire site area is good foraging habitat for this species and a possible outlier sett has been identified.

6.21 The development proposals do not include development within 30m of this possible sett as such there is no risk at this point in time of impacting upon an active sett. However, badgers are known to expand and change their territories over time, and it remains possible that new setts could be excavated close to areas proposed to be developed.

6.22 The development will result in the loss of existing foraging habitat for badgers, however as a result of the development new habitats will be created that will offset this loss.

6.23 The risk of badgers becoming trapped within excavations during construction works will be managed through the implementation of working practices.

Bats

6.24 The 1.3km of existing hedgerows surrounding and crossing the site offering foraging and commuting opportunities for a range of bat species and individual mature trees could provide roosting opportunities.

6.25 The development proposals do not include plans to remove any of the individual mature trees. Mitigation measure will be required to ensure that these trees remain in a favourable condition so as to continue to provide roosting opportunities for bats.

6.26 There will be a loss of 15% of the existing hedgerows, the majority of this loss will be at the hedgerow that divides the eastern field with small breaks in other hedgerows to provide access for roads.

6.27 The hedgerow in the eastern field was found to be the hedgerow least used by bats during the static detector surveys. The loss of this area of hedgerow will intime be mitigated as a result of new habitats and green infrastructure created onsite.

6.28 Little bat activity was recorded over the open fields and it is possible that as a result of the development foraging opportunities over new greenspaces within the development will be provided.

6.29 New roosting opportunities can be provided for bats species by installing bat boxes on retained vegetation and new buildings throughout the site.

Birds

6.30 The 1.3km of hedgerows offer good foraging and nesting opportunities for a range of common farmland birds and rural/urban fringe birds. The removal of sections of hedgerows presents a risk of disturbing bird nests and removing foraging habitat.

6.31 As a result of the development, landscape planting and the provision of artificial nest boxes offer the potential to secure additional foraging and nesting opportunities

Dormice

6.32 The 1.3km of hedgerows have been found to support a population of dormice. The exact size of this population may be determined through further survey works.

6.33 It is likely that the hedgerows onsite provide valuable foraging and nesting habitat for dormice within the local area, especially for young dormice dispersing

from their nests. However, populations are unlikely to rely solely on this site given the extent of woodland in the local area.

6.34 Mitigation measures will be required to ensure that the removal of dormice habitat is undertaken in a sensitive manner and that pressures upon dormice during the occupation of the new development are not significant.

6.35 These measures will be formalised through a European Protected Species (EPS) Licence that will be obtained from Natural England.

6.36 The enhancement of retained hedgerows and the creation of new hedgerows and tree planting has the potential to provide additional dormouse habitat as a result of the development.

Great Crested Newts

6.37 The 1.3km of hedgerow around and through the site offer good terrestrial habitat for all amphibian species. It is, however, very unlikely that great crested newts use habitats within the site.

6.38 The hedgerows provide valuable terrestrial habitat for all amphibian species, but it is unlikely that populations of great crested newt are present in the local area.

6.39 In the construction phase it is possible that frogs and toads would be killed during clearance of any hedgerows or long vegetation. Construction in the open fields is unlikely to have any impact upon frogs or toads, as these areas are poor habitat and not likely to be used.

6.40 The mitigation measures proposed to remove the risk of harm to reptiles will also ensure that common amphibian species are protected during the construction works.

6.41 The enhancement of retained grassland and the creation of new SUDS features and hedgerows has the potential to have a positive impact on amphibians.

Reptiles

6.42 The 1.3km of hedgerow support populations of three reptile species. During the construction phase of the proposed development it is possible that reptiles would be killed where areas of hedgerow or tall vegetation are removed. This risk can be reduced through the imposition of mitigation measures.

6.43 Construction activity in the open fields is less likely to result in harm to reptiles as this habitat is less preferred.

6.44 During the occupation of the proposed development it is possible that an increased number of domestic cats would result in greater levels of predation on reptiles, the creation of new SUDS features and enhancement of retained grassland buffering hedgerows will lessen the severity of the potential impact. Providing reptiles more suitable habitat than the current situation.

7 AVOIDANCE, MITIGATION & ENHANCEMENT

Habitats

7.1 The loss of the arable field and the improved grassland will be mitigated by the enhancement of retained grassland. Once the land within the red line boundary has been taken out of intensive agricultural management, there will be an opportunity to reduce inputs of fertilisers, herbicides and pesticides and manage the grass to promote a more structurally and botanically diverse sward. In addition to management of the sward, the process of increasing botanical diversity can be assisted through plug planting or seeding of key species, such as yellow rattle (*Rhinanthus minor)* and perennials such as knapweed (*Centaurea nigra*).

7.2 The loss of sections of hedgerows can be mitigated by the creation of new areas of landscape planting, hedgerows and enhancing the retained hedges. The existing hedges have a good structural character. This structure can be retained and managed in the future to ensure that shrubs are able to flower and fruit. In addition, the species-richness of the hedges can be increased by introducing a greater diversity of native shrubs, where locally appropriate. The enhancement of the grassland adjacent to the hedges is an opportunity to create an ecotone from hedge to grass, with an intermediate zone in which suckering shrubs such as blackthorn are periodically allowed to grow and be cut back.

7.3 In line with British Standard 5837 retained vegetation and trees will be protected during the construction phase via the implementation of adequate Root Protection Zones (RPZs), these will ensure that the health and vigour of vegetation and trees does not deteriorate as a result of the construction works.

7.4 New areas of standing water will be created as a result of the development in the form of SUDs, the primary function of these features will be to manage additional surface water generated due to the increase in impermeable area across the site. However, these features can be managed sensitively to provide invaluable aquatic habitat for wildlife.

7.5 Boundary fences will be constructed in a manner that maintains connectivity throughout the development. Holes will be created in any hard boundaries to facilitate access for small mammal species such as hedgehogs.

7.6 Standard good practice during the construction period will be employed to ensure that there is no risk of pollutants entering the retained seasonally inundated areas. The construction of the road over this feature will have appropriately sized culverts to allow for the passage of wildlife underneath the road. Management of this area will focus on continuing to provide seasonally wet areas for the benefit of wildlife.

7.7 All of the above construction phase protection measures will need to be set out in detail in a Construction Environmental Management Plan (CEMP). This can be secured through a suitably worded planning condition.

7.8 All of the above future management measures will need to be set out in detail in a Landscape and Ecological Management Plan (LEMP). This can be secured through a suitably worded planning condition. The LEMP should set out details of the funding mechanisms for the management and the aims and goals of the long-term habitat management. The LEMP can draw upon input from key local stakeholders as necessary.

Badgers

7.9 Prior to works beginning an updated walkover badger survey will be undertaken by a suitably experienced ecologist to identify any new badger setts. Should an active sett be found close to the proposed development then it may be necessary to secure a licence from Natural England to remove or disturb it. The licence application process and the subsequent implementation of the licence would ensure no harm to badgers as a result of the development.

7.10 The potential for badgers to be harmed during development will be avoided through the implementation of measures including:

- Fencing of construction areas to exclude wildlife whilst works are ongoing
- Covering trenches and large diameter pipework overnight, or ensuring there is a means of escape
- toolbox talks for contractors;

7.11 These measures will be set out in detail in a CEMP, which can be secured via a suitably worded planning condition.

7.12 Enhancement in the form of new hedgerow and landscape planting will provide better foraging habitats in comparison to the existing arable and improved grassland. Suitable fruiting shrub species will be included within the planting plans, and they will be managed in a manner that allows flowering and fruiting to take place on an annual basis. These management methods will be set out in a detailed LEMP, which can be secured via a suitably worded planning condition.

Bats

7.13 The proposed RPZs to be implemented around retained vegetation and mature trees will ensure that roosting opportunities across the site will not be damaged during construction works. These measures will be detailed in the proposed CEMP.

7.14 It will be necessary to ensure that these areas remain unlit during the occupation of the development to ensure that individual mature trees continue to provide roosting opportunities for bats.

7.15 As a result of the proposed development new roosting opportunities in the form of bat boxes can be installed upon retained vegetation and new buildings. The exact number, type and positioning of these features will be informed by a suitably experienced ecologist prior to the start of construction.

7.16 To maintain connectivity for bats through the development, where breaks in the existing hedgerows are required they will be as small as possible and lighting in these areas will be sensitive to bats. Low level downward facing lighting could be employed to ensure that only the roads are lit and no light spills onto retained vegetation.

7.17 New and retained habitats will be managed in a manner favourable to bat foraging. Greater floral diversity within grassland and enhanced species diversity in hedgerows will support additional populations of invertebrates providing enhanced foraging opportunities for bats. This management will be set out in detail in the LEMP, which can be secured via a suitably worded planning condition.

Birds

7.18 Vegetation clearance will be timed so as not to coincide with the bird nesting season Feb-Aug. Should this not be possible then an ecologist will undertake a nesting bird check prior to the removal of any areas of vegetation.

7.19 The potential impacts of habitat loss upon birds will be mitigated by the retention and enhancement of existing habitats and the provision of new habitats. The improved management of hedges, field-edges and grassland will increase the quality of foraging habitat by providing a greater abundance of fruit and invertebrates.

7.20 The potential loss of nesting habitat will be avoided by retaining as much habitat as possible and avoiding the loss of mature trees. The methods of protection for the retained vegetation and trees will be set out in a detailed CEMP, which can be secured via a suitably worded planning condition.

7.21 New nesting habitat will be provided in the form of nest boxes on trees and features built into the new houses. These will include swift bricks, swallow cups and house sparrow terraces to cater for species known to readily make use of

artificial nest sites. The exact number, type of positioning of these features will be informed by a suitably experienced ecologist prior to the construction phase.

Dormice

7.22 An EPS licence for dormice, including a Method Statement and Work Schedule, will be sought prior to the construction of the proposed development.

7.23 The licence application process and the implementation of said licence will ensure that the risk of harm to individual dormice is removed. Enhancement for dormice as a result of the development will also be secured through the implementation of this licence.

Reptiles and Amphibians

7.24 The small risk of amphibians and reptiles being killed or injured during construction will be avoided through the application of reasonable avoidance measures. These will include:

- timing the work to avoid sensitive periods if required;
- toolbox talks for contractors;
- supervision of works by an ecologist;
- pre-works vegetation clearance in a two-stage approach to remove top-growth and allow animals to escape before clearing back to ground level.

7.25 These measures will be set out in detail in a CEMP, which can be secured via a suitably worded planning condition.

7.26 Ongoing management of the retained and new habitats for the benefit of wildlife will provide additional opportunities for all species of reptiles and amphibians. This management will be set out in detail in a LEMP, which can be secured via a suitably worded planning condition.

8 CONCLUSION

8.1 In conclusion no direct or indirect impacts upon areas designated for wildlife interest have been identified.

8.2 The habitats that will be lost as a result of the development have been found to be of low value to ecology, with the most valuable ecological features retained and enhanced for the benefit of wildlife.

8.3 The site has been found to support the following protected species and species of conservation interest:

- badgers;
- bats;
- birds;
- dormice; and
- reptiles and amphibians.

8.4 Mitigation, avoidance and enhancement measures have been proposed to ensure that the risk of impact upon these species as result of the development is removed. A detailed CEMP and LEMP will be secured via planning condition to formalise these measures.

8.5 In summary the proposed development, if completed in accordance with the recommendations of this report, will provide net gains for biodiversity.

9 APPENDICES

Appendix 1 Site Location Plan

engain

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ON BEHALF OF: The Norfolk Estate	PROJECT: Land off Ford Road, Arundel
SCALE: NTS	DATE: 09/10/20
PROJECT NO: eg17809.003	APPROVED: MD
TITLE: Site Location Plan	

Appendix 2 Phase 1 Habitat Plan

Key

Arable Land A

Improved Grassland I

Hedgerow

Individual Mature Trees

Seasonally Inundated Area

Dry Ditch

TN

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ON BEHALF OF: The Norfolk Estate

PROJECT: Land off Ford Road, Arundel

SCALE: NTS

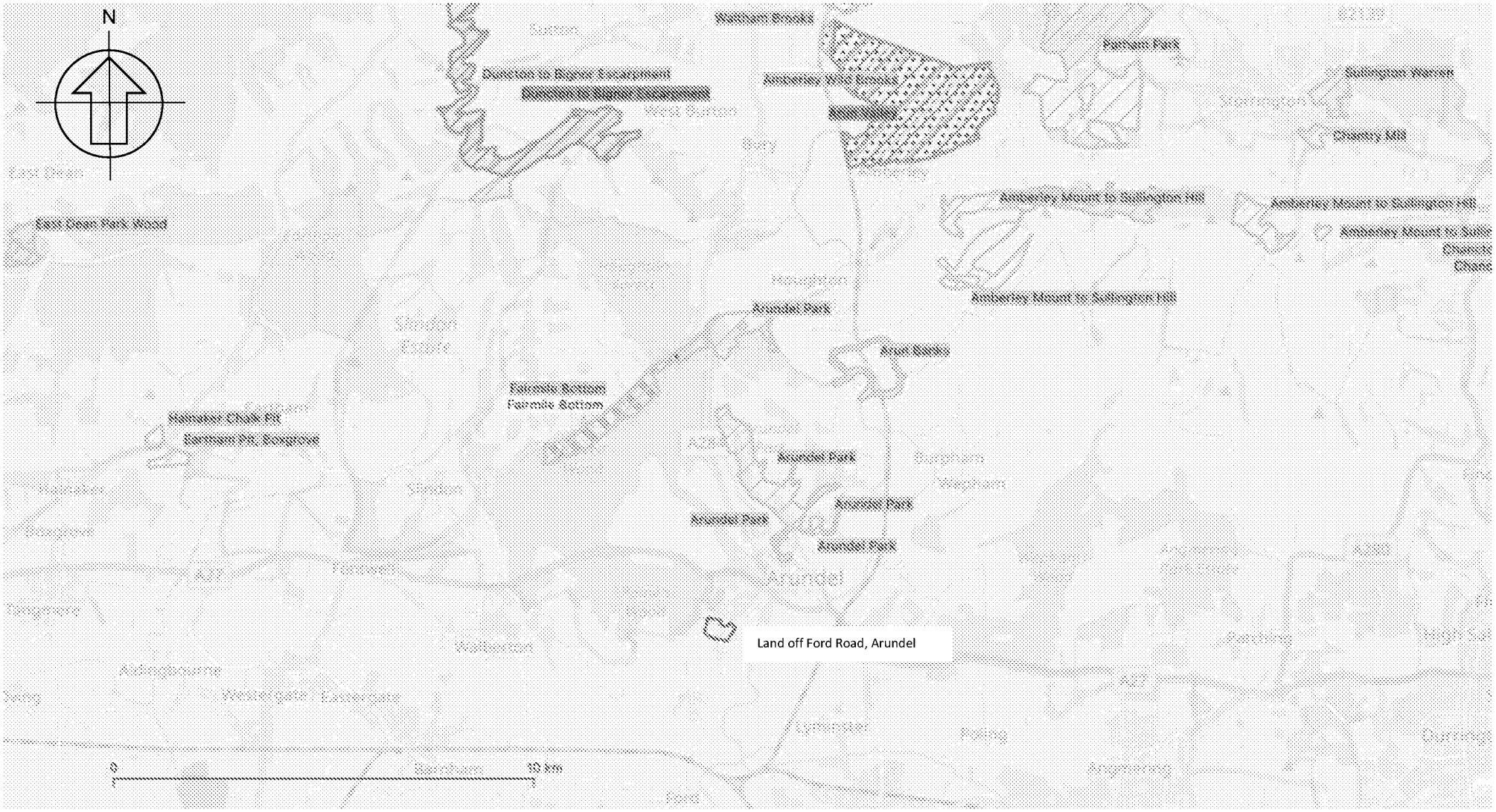
DATE: 09/10/20

PROJECT NO: eg17809.003

APPROVED: MD

TITLE: Phase 1 Habitat Map

Appendix 3 Designated Sites Plan



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Site of Special Scientific Interest (SSSI)

Special Area of Conservation (SAC)

Special Protection Area (SPA)

Local Nature Reserve (LNR)

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SCALE: NTS	DATE: 09/10/20
PROJECT NO: eg17809.003	APPROVED: MD
	TITLE: Statutory Designated Sites Plan

Appendix 4 Bat Transect Route

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TITLE
Bat Transect Route Plan

Appendix 5 Static Detector Location Plan

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TITLE
Static Bat Detector Location Plan

Appendix 6 Dormouse Nest Tube Location Plan

Dormouse nest tubes installed on 07/08/19 and 08/08/2019 at approx. 10m intervals in suitable habitat (100 in total)

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The Norfolk Estate

PROJECT
Land at Tortington, Arundel

SCALE
NTS

DATE
03.01.2020

PROJECT NO
eg17809 003

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TITLE
Dormouse Nest Tube Locations

Appendix 7 Dormouse Evidence Plan

Key:

Sloe stones found within nest tubes with teeth marks characteristic of dormouse.

Nest found in nest tubes with characteristics indicating that they were made by dormice.

All evidence observed during the November dormouse survey on the 20th of November 2019. During the Aug 25th 2020 visit the nest within a tube at the southern boundary was still present.

Wood mouse in nest tube during 25th Aug 2020 visit

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PROJECT: Land at Tortington, Arundel

SCALE: NTS

DATE: 26.10.2020

PROJECT NO: eg17809 003

APPROVED: JS

TITLE: Dormouse Evidence Location Plan

Appendix 8 Water Bodies Within 500m

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TITLE
Water Bodies Surveyed within 500m

Appendix 9 Reptile Mat Location Plan

Survey Area

Reptile mats installed on 07/08/19 at approx. 10m intervals in suitable habitat (approx. 100 in total)

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SCALE
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DATE
03.01.2020

PROJECT NO
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TITLE
Reptile Mat Locations

Appendix 10 Reptile Location Plan

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Key

- Slow worm record
- Common lizard record
- Grass snake record

The Norfolkl Estate	Land at Tortington, Arundel
NTS	03.01.2020
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	Reptile Location Plan