



Hallam Land Management Ltd

Land West of Pagham Road, Pagham

ECOLOGICAL APPRAISAL

December 2021

FPCR Environment and Design Ltd

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1.0 NON-TECHNICAL SUMMARY

Report Scope and Methodology
<ul style="list-style-type: none"> • FPCR were commissioned by Hallam Land Management Ltd to undertake an Ecological Appraisal of Land west of Pagham Road, Pagham to identify any potential ecological constraints and opportunities regarding proposals for a residential development. • An extended Phase 1 habitat survey and desktop study were completed by FPCR in May 2021 followed by further protected species surveys in 2021.
Key Findings
<ul style="list-style-type: none"> • The site lies within 5km of the Pagham Harbour SPA, Ramsar, SSSI and LNR and must therefore pay £871 per new dwelling towards strategic access management measures (SAMMs). • The site was dominated by an arable field with limited habitats along the boundaries, including hedgerows, ditches, poor semi-improved grassland, scrub and tall ruderal vegetation. • The six boundary hedgerows provided moderate conservation value under the Hedgerow Evaluation and Grading System (HEGS) and were not considered important under the wildlife and landscape criteria within the Hedgerow Regulations 1997 (REGS). • The site provided some suitable habitat for a range of protected/notable species including bats, badger, nesting birds, reptiles, hedgehog and brown hare.
Constraints and Opportunities
<ul style="list-style-type: none"> • All hedgerows, trees and scrub should be retained and protected where possible. Any small losses to allow access onto site must be compensated for with additional planting elsewhere on site to ensure wildlife corridors are maintained and enhanced. • The site boundaries will be maintained as dark corridors using a sensitive lighting scheme and with sufficient green buffers between the boundaries and the development. This will benefit bats, including barbastelle, and a range of other species. • The ditches on site can be improved so that they hold water for a greater portion of the year, thereby providing habitat for wetland plants, water voles, birds and other species. • The proposals should seek to provide a net gain in biodiversity by creating new habitats, such as species-rich tussocky grassland, hedgerow and scrub planting and SUDS creation. • A range of additional enhancements targeted to wildlife should be introduced including bat and bird boxes, hedgehog highways, invertebrate banks and hibernacula. • With the recommended habitats, the scheme will result in biodiversity net gain of 10.93% for habitats, 53.28% for hedgerows and 25% for rivers/ditches.

2.0 INTRODUCTION

2.1 The following Preliminary Ecological Appraisal has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management for a proposed residential development on land to the west of Pagham Road, Pagham, West Sussex (central OS grid reference SZ891698).

2.2 The initial survey in May 2021 comprised an extended Phase 1 habitat survey including initial observations of any suitable habitats for, or evidence of, protected/notable species. Following this, a suite of further surveys were undertaken and the following reports should be read in conjunction with this Ecological Appraisal:

- Bat Survey Report (FPCR 2021)
- Breeding Bird Survey Report (FPCR 2021)
- Wintering Bird Survey Report (FPCR 2021)
- Great Crested Newt Survey Report (FPCR 2021)
- Reptile Survey Report (FPCR 2021)
- Riparian Mammal Survey Report (FPCR 2021)

Site Context

2.3 The application site is approximately 4.9ha and is hereafter referred to as 'the site'. It was dominated by an arable field with hedgerows and ditches along the boundaries. There is a single pocket of tall ruderal vegetation near the south-east boundary.

2.4 The site is situated to the north of Pagham in the Arun District of West Sussex. The surrounding area consists of residential dwellings to the south, scrub to the west and agricultural land to the north and west. The wider landscape is dominated by the town of Pagham and agricultural fields.

Development Proposals

2.5 A residential development is proposed within the red line boundary of the site, with up to 106 dwellings and associated infrastructure.

3.0 LEGISLATION

3.1 Details on the relevant national and local policy and legislation for ecology in relation to development are provided in Appendix A and include:

- The Conservation of Habitats and Species Regulations (CHSR) 2017 (as amended) in relation to the European Protected Species (EPS) great crested newt *Triturus cristatus* (GCN), bats (all species) and hazel dormouse *Muscardinus avellanarius*; and European protected sites i.e. Special Areas of Conservation (SAC), Special Protection Areas (SPAs) and Internationally protected “Ramsar Sites” (collectively known as “Natura 2000 sites”). Annex II bat species of particular relevance in relation to SACs designated for bats.
- The Wildlife and Countryside Act 1981 (WCA) (as amended) in relation to all wild birds (including Schedule 1 species), other animals (notably Schedule 5 species), flora (those listed in Schedules 8 and 9) and Sites of Special Scientific Interest (SSSI).
- The Environment Act 2021
- Protection of Badgers Act 1992
- Natural Environmental and Rural Communities (NERC) Act 2006 in relation to various priority species and habitats.
- Hedgerow Regulations 1997 made under Section 97 of the Environment Act 1995.
- National Planning Policy Framework (NPPF) 2021
- Local Planning Policy contained within the Arun Local Plan 2011-2031 and associated Supplementary Planning Documents (SPD).
- Local Nature Reserves (LNR) as designated most recently by the NERC Act 2006;
- Non-statutory protected local sites including County Wildlife Sites (CWS), Sites of Importance for Nature Conservation (SINC), Local Wildlife Sites (LWS) and Ancient Woodland Inventory (AWI) sites.
- Local Biodiversity Action Plans (LBAP)
- Birds of Conservation Concern (BoCC)

4.0 METHODOLOGY

Desk Study

4.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Sussex Biodiversity Record Centre (SxBRC)
- Multi Agency Geographic Information for the Countryside (MAGIC)¹
- Arun District Council planning portal²

4.2 The search area for biodiversity information was related to the significance of sites and species and potential zones of influence, as follows:

- 10km around the application area for sites of International Importance (e.g. SACs, SPAs and Ramsar sites).
- 2km around the application area for sites of National or Regional Importance (e.g. SSSIs) and protected/notable species records.
- 1km around the application site for sites of Local Importance (e.g. LWS).

Extended Phase 1 Habitat Survey

4.3 The initial habitat survey was undertaken on 29th May 2021 following the Phase 1 survey technique³. This involved a systematic walk over of the site to classify the broad habitat types and identify any habitats of principal importance for the conservation of biodiversity as listed under Section 41 (S41) of the NERC Act 2006.

4.4 Where feasible, target notes and species lists were compiled, and assessments of abundance were made using the DAFOR scale. Whilst the species lists were not exhaustive, sufficient information was gained during the survey to enable classification and assessment of broad habitat types and identify features of interest.

4.5 Hedgerows were surveyed using the Hedgerow Evaluation and Grading System (HEGS)⁴ and against the wildlife and landscape criteria within the Hedgerow Regulations 1997 (REGS)⁵. Both involve recording various hedgerow features, such as species, structure, standards and diversity. Each hedgerow is then graded from low-high value under HEGS and whether it is 'important' under the REGS.

4.6 The habitat survey was extended to include an assessment of the site's potential to support protected or notable species (listed under the relevant legislation and policies in section 3.0 above). This included looking for evidence of or suitable habitat for badgers, bats, breeding birds, GCN, hazel dormouse, hedgehogs, reptiles and invertebrates.

¹ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

² Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

³ JNCC. (1990). Handbook for Phase 1 habitat survey – a technique for environmental audit. Peterborough: JNCC

⁴ Clements, D. & Toft, R. (1992). Hedgerow Evaluation and Grading System (HEGS) – a methodology for the ecological survey, evaluation and grading of hedgerows. Countryside Planning and Management

⁵ Defra (1997) *The Hedgerow Regulations 1997 – A guide to the Law and Good Practice*. Department of Environment, Food & Rural Affairs, London.

Faunal Surveys

4.7 Following the initial assessment of the site for protected/notable species potential, further surveys were completed in 2021. Detailed methods are contained within the appended reports.

Survey Conditions and Personnel

4.8 All ecology surveys were undertaken during favourable weather conditions by experienced ecologists. Full details of survey conditions are contained within the appended reports. Details of personnel and relevant qualifications are outlined in Appendix B.

Biodiversity Net Gain Calculation

4.9 Defra has developed a metric, version 3.0, based on evaluating each individual habitat's value. All habitats/habitat compartments on site have been assessed using the Defra technical guidance⁶. The guidance provides a list of criteria for a range of broad habitat types, which are used to determine whether habitat fall into a 'poor', 'moderate' or 'good' condition score.

Limitations

4.10 There were considered to be no limitations to the habitat assessment (any limitations specific to faunal surveys are detailed within the appended reports).

⁶ Natural England (2021) *Biodiversity Metric 3.0 Auditing and accounting for Biodiversity User Guide*. Worcester, Natural England.

5.0 RESULTS

Desk Study

Designated Sites

5.1 There are three international designations within 10km of the site. The Pagham Harbour SPA, Ramsar, SSSI, LNR lies approximately 1.35km south-west. This is an important site due to its extensive area of saltmarsh and tidal mudflats with surrounding lagoons, shingle, open water, reed swamp and wet permanent grassland. These habitats support a wide array of species including internationally important populations numbers of wintering pintail *Anas acuta* and nationally important numbers of dark-bellied brent goose *Branta bernicla bernicla*, grey plover *Pluvialis squatarola* and black-tailed godwit *Limosa limosa*.

5.2 The Solent & Dorset Coast SPA lies approximately 1.6km south of site. It was designated in 2020 for regularly supporting breeding populations of sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sternula albifrons*.

5.3 Further afield, Chichester and Langstone Harbours SPA is located approximately 6.5km north-west. It supports an important population of wintering and migratory birds and breeding populations of three tern species.

5.4 In addition, the Bognor Reef SSSI is situated approximately 1.3km south of site. It includes an extensive area of vegetated shingle, a rare habitat, and an old sand dune which supports the nationally endangered chidling pink *Petrorhagia nanteuilii*.

Protected and Notable Species

5.5 Detailed protected species records in relation to bats, birds, GCN and reptiles are outlined in the appended reports. Those from the last 10 years within 2km of the site are shown in Figure 1.

5.6 In addition, there are numerous invertebrate records in the local area; however, the majority of these are historical (i.e. older than 10 years old). More recent notable records within 2km include some nationally scarce moth species: toadflax brocade *Calophasia lunula*, Brussels lace *Cleorodes lichenaria*, and striped lychnis *Shargacucullia lychnitis*.

Data from Nearby Applications

5.7 There are five planning application sites in close proximity to the site which included ecology surveys in the application (Figure 1). The results relevant to this site are detailed within the appended reports. The sites are:

- Sefton Farm, Pagham Road, PO21 3PX (P/68/15/PL; P/76/16/PL; P/117/21/PL)
- Land at Summer Lane, Pagham (P/58/15/OUT; P/140/16/OUT; P/70/19/RES)
- 251 Pagham Road, PO21 3QB (P/125/14/PL)
- 253-255 Pagham Road, PO21 3QB (P/58/19/PL)
- Hook Lane, PO21 3PD (P/30/19/OUT)

Habitats

5.8 The habitats described below are illustrated in Figure 2. Site photographs are provided in Appendix C and a botanical species list is provided in Appendix D.

Arable

5.9 The site was dominated by a large arable field which had recently been ploughed and seeded, as such, no vegetation was present.

Poor Semi-Improved Grassland

5.10 Arable margins were present in the north-east corner of the field, approximately 20m wide, and along the south-east boundary, approximately 13m wide. These areas consisted of poor semi-improved grassland, with grass species dominant including perennial rye-grass *Lolium perenne*, Yorkshire-fog *Holcus lanatus*, cock's-foot *Dactylis glomerata* and barren brome *Bromus sterilis*. Herb species included frequent creeping thistle *Cirsium arvense* and occasional cut-leaved crane's-bill *Geranium dissectum*, ragwort *Jacobaea vulgaris* and ground ivy *Glechoma hederacea*.

Hedgerows

5.11 Six mixed species hedgerows were present along field boundaries on site (Table 1). All six provided moderate conservation value in accordance with HEGS.

5.12 None of the hedgerows were found to be 'important' under the REGS when assessed against the Wildlife and Landscape criteria. This was due to the low average species per 30m and/or a lack of associated features. Hedgerows H1, H2 and H4 formed residential boundaries and were therefore not considered under the REGS criteria.

5.13 All hedgerows on site contained over 80% native woody species and were therefore identified as Habitats of Principal Importance under Section 41 of the NERC Act (2006).

Table 1: Summary of Hedgerow Survey Results

Ref	Species composition	Length (m)	REGS Average species	HEGS Score
H1	Bramble <i>Rubus fruticosus</i> , blackthorn <i>Prunus spinosa</i> , hawthorn <i>Crataegus monogyna</i> , elm <i>Ulmus sp.</i> , butterfly-bush <i>Buddleja davidii</i> , cherry <i>Prunus sp.</i> , cherry laurel <i>Prunus laurocerasus</i>	55	N/A	-3 Moderate
H2	Bramble, blackthorn, hawthorn, rose <i>Rosa sp.</i> , <i>Rhododendron sp.</i>	105	N/A	-3 Moderate
H3	English oak <i>Quercus robur</i> , blackthorn, bramble, hawthorn, rose, willow <i>Salix sp.</i>	40	5 sp. / 30m	3+ Moderate
H4	Bramble, hawthorn, blackthorn, sycamore <i>Acer pseudoplatanus</i> , elm, <i>Poplar sp.</i>	270	N/A	3 Moderate
H5	Blackthorn, hawthorn, whitebeam <i>Sorbus sp.</i> , sycamore, cherry <i>Prunus sp.</i> , dogwood <i>Cornus sanguinea</i>	104	4 sp. / 30m	3+ Moderate
H6	Bramble, sycamore, rose., blackthorn, hawthorn	70	3 sp. / 30m	3+ Moderate

Trees

5.14 There are four semi-mature trees on site. Tree T1, an English oak, and tree T2, an ash, were identified along the south-west boundary and considered to have roosting bat potential (further information provided in the appended bat report).

5.15 Two neighbouring trees along the southern boundary were identified as an ornamental palm and a white poplar *Populus alba*.

5.16 Additional trees lie directly west of the site as part of a deciduous woodland and include alder, willow, ash, English oak, dogwood, wild cherry, hawthorn and sycamore.

Tall Ruderal

5.17 An area of tall ruderal vegetation was present in the south-east corner of the site. This was dominated by common nettle *Urtica dioica*, with occasional creeping thistle *Cirsium arvense*.

Scrub

5.18 Patches of scrub were scattered along the western and southern boundaries of the site. These were dominated by bramble *Rubus fruticosus* agg. but also included occasional hawthorn *Crataegus monogyna*, blackthorn *Sambucus nigra* and butterfly-bush *Buddleja* sp.

Ditches

5.19 There are two ditches on site. Ditch D1 was present along the northern boundary of the site and flowed westward. The banks were steep and heavily vegetated with a bank height of approximately 1.5m. Bank-side vegetation included common hogweed *Heracleum sphondylium*, barren brome, broad-leaved dock *Rumex obtusifolius* and common ragwort *Jacobaea vulgaris*. D1 was ephemerally wet with occasional pools of water along its course, between 5-10cm deep. The channel vegetation included hemlock water-dropwort *Oenanthe crocata*, great willowherb *Epilobium hirsutum* and rough meadow-grass *Poa trivialis*.

5.20 Ditch D2 formed the western boundary of the site and was dry at the time of the survey. It had steep banks, was 1.5-2m in height, and was heavily vegetated. Species included celery-leaved buttercup *Ranunculus sceleratus*, yellow flag iris *Iris pseudacorus* and sedge species. This ditch was considered ephemerally wet but drier than D1.

Protected and Notable Species

5.21 Following the desk study and the extended Phase 1 habitat survey, the site was considered to have the potential to support the following species/groups:

- Bats
- Breeding birds
- Wintering birds
- Brown hare *Lepus europaeus*
- Eurasian badger *Meles meles*
- European water vole *Arvicola amphibius*

- Great crested newt (GCN) *Triturus cristatus*
- Reptiles
- Western European hedgehog *Erinaceus europaeus*
- Invertebrates

5.22 Further faunal surveys were undertaken for the above in 2021, with the exception of badgers, hedgehogs and invertebrates, since they were not considered to be a constraint to development due to a lack of evidence and/or suitable habitat.

5.23 Full details of the further surveys are provided in the appended reports and species/group assessments are summarised in Table 2.

Table 2: Protected/Notable Species Surveys Summary

Species/ Group	Site suitability and survey results	Conclusion
Bats	<p>Trees – Two trees were identified as having roosting bat potential. T1, an English oak, was assessed as low potential. T2, an ash, had moderate potential due to the presence of three knot holes.</p> <p>Habitats – The hedgerows, trees and scrub provide suitable foraging and commuting habitats. The grassland and arable field offered limited value for bats. Seasonal transect and automated static surveys identified moderate numbers of common and widespread species throughout the site, particularly along the north and east boundaries. In addition, low numbers of barbastelle were identified on site.</p>	Two bat potential trees present on site
Birds	<p>hedgerows, trees and scrub on site. Low numbers of notable species were recording including stock dove <i>Columba oenas</i>, Cetti's warbler <i>Cettia cetti</i>, starling <i>Sturnus vulgaris</i>, dunnock <i>Prunella modularis</i> and house sparrow <i>Passer domesticus</i>.</p> <p>Wintering – Four surveys identified no SPA designated species on site. A low number of notable species included linnet <i>Linaria cannabina</i>, house sparrow, dunnock, meadow pipit <i>Anthus pratensis</i> and starling.</p>	A largely common and widespread breeding bird assemblage on site
Brown Hare	Records indicate their presence in the local area but no evidence was found during surveys. There is some suitable habitat on site including grassland patches and hedgerows.	Potential for brown hare to forage on and commute through site
Water Vole	Records exist in the local area and a water vole was spotted in ditch D5 200m north of site on 29 th April 2021. However, the ditches on site (D1, D2) did not hold water all year round and there were limited opportunities for burrowing or foraging. Ditches D1 and D2 are also dead ends in terms of the ditch and river network to the north and west, therefore water vole are likely absent.	Water vole likely absent from site
GCN	Breeding habitat – Ditches D1, D3, D4 and D5 and Ponds P1 and P3, located on or within 250m of site, were sampled for GCN	GCN likely absent from site

Species/ Group	Site suitability and survey results	Conclusion
	eDNA in April 2021. All returned a negative result indicating likely absence. Ditch D2 could not be sampled as it was dry at the time of the survey. Access was not granted to survey pond P2 although historical surveys confirmed their likely absence.	
	Foraging and shelter habitat – The arable field is sub-optimal terrestrial habitat for GCN. Whilst the hedgerows, grassland and ditches might offer some commuting and foraging habitat, it is considered unlikely that GCN would be present on site given their likely absence from nearby waterbodies and the fact that GCN tend not to travel long distances from suitable breeding habitat ^{7,8} .	
Reptiles	Surveys undertaken between May-June 2021 identified a low population of grass snake <i>Natrix helvetica</i> . On two separate occasions, one adult was observed: first in the north-east corner of the site and then along the south-west boundary.	Low population of grass snake present on site
Invertebrates	Habitats on site would likely support a range of common and widespread invertebrate species, as were seen during various surveys in 2021. However, there was a limited mosaic of habitats on site with fewer niches than would be expected for an important invertebrate assemblage. The species and structural diversity on site were limited and not considered diverse enough to have significant value to invertebrates.	An important invertebrate assemblage is likely absent from site
Hedgehog	Hedgerows, scrub and grassland on site provide foraging and commuting opportunities with connectivity to the wider landscape. No evidence was identified during surveys in 2021 but they are known to be present in the area.	Potential for low numbers to use the site

⁷ Jehle, R. & Arntzen, J.W. (2000) Post-breeding migrations of newts with contrasting ecological requirements. *Journal of Zoology*, 251: 297-306.

⁸ Cresswell, W. & Whitworth, R. (2004) Report no. 576 – *An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt *Triturus cristatus**. English Nature, Peterborough.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 The proposals are expected to result in the loss of the arable field, a small area of poor semi-improved grassland and a small section of hedgerow H6 to provide access. However, the more ecologically valuable habitats concentrated along the boundaries, including the ditches, hedgerows, boundary trees and scrub, are expected to be retained. Proposals also include the creation of an attenuation basin, species-rich grassland and other new habitat creation (discussed further below).

6.2 The following ecological features are not considered to pose a constraint to the proposals:

- **Habitats of low conservation importance** – The arable field and areas of poor semi-improved grassland and ruderal vegetation are considered to be of limited conservation value, especially when considering the habitats present in the local area. All species recorded are common and widespread in the wider landscape and characteristic of their habitat types. As such, the loss of these habitats is not considered to be a constraint to proposals.
- **Wintering birds** – There were no SPA-designated species identified using the habitats on site. Given the availability of more suitable habitats in the surrounding area, including the SPAs, important wintering birds were not considered a constraint to development on-site.
- **GCN** – Surveys did not reveal GCN presence on or within 250m of site and the ditches on-site were largely dry or shallow and therefore not suitable for breeding. Furthermore, the terrestrial habitat on site is sub-optimal and GCN are unlikely to travel to site over long distances when more suitable habitats are present around ponds further afield. As such, GCN are highly unlikely to be on site and are not considered a constraint.
- **Brown hare** – Whilst associated with open agricultural habitats, the small size of the site and extent of taller grass means that this would likely only form a small proportion of a hare's home range. As such, this species is not considered a constraint but should be considered when enhancing the site.
- **Water vole** – Whilst known to be in the local watercourses, the ditches on site are of poor quality and represent dead ends with little foraging resources. As such, they are considered likely absent from site but should be considered with enhancements.
- **Notable invertebrates** – The habitat diversity, structure and management on site was not considered suitable to support an important assemblage of invertebrates. Species identified during the desktop survey in the local area are likely to persist post-development given the retention of the boundary habitats and the creation of new green infrastructure. As such, this group is not considered a constraint on proposals but should be considered when enhancing the site for wildlife.
- **Hedgehog** – Whilst low numbers could use the site, hedgehogs are not considered a constraint to development since the hedgerows and other boundary habitats will be retained along with connectivity into the wider area. However, they should be considered when enhancing the site.

6.3 An overview of the potential ecological constraints associated with the site along with recommendations for avoidance, protection, mitigation and/or compensation measures are discussed below.

Designated Sites

6.4 The site lies within the 5km buffer around Pagham Harbour SPA, Ramsar, SSSI and LNR. Since the proposals are likely to lead to increased recreational pressure on the designation, Arun District Council requires a payment of £871 per new dwelling to contribute towards strategic access management measures (SAMMs)⁹, in line with local plan policy ENV DM2.

6.5 In addition, the scheme design includes SuDS along the northern and eastern boundaries to reduce impacts on the local watercourses and the boundaries include green corridors for recreational purposes as well as enhancements for wildlife.

6.6 Solent and Dorset Coast SPA protects the open water feeding grounds for internationally important populations of common, sandwich and little terns. The proposals would not impact the provision of fish resources for feeding terns given the intervening distances and the drainage measures on site. Therefore, the development would not significantly impact this designation.

6.7 In addition, the proposals are not expected to have significant effects on other nearby designations, including the Chichester and Langstone Harbours SPA and the Bognor Reef SSSI, due to the intervening distances, the provision of open green space and recreation on site and the SuDS measures.

Bats

Trees

6.8 Two trees along the south-west boundary of the site were identified as having roosting bat potential: a low potential oak and a moderate potential ash. These trees are to be retained within the design of the scheme, buffered and protected from any potential lighting impacts with a sensitive lighting scheme (detailed below).

6.9 If any changes to the scheme require the removal of these trees, then further surveys will be needed for the moderate potential tree. Soft felling techniques should be used on the low potential tree, taking care to inspect any potential roosting features during felling.

Habitats

6.10 The boundary habitats provide opportunities for low numbers of foraging and commuting bats. These habitats will be retained and enhanced but will need to be adequately buffered from lighting measures outlined in best practice guidance^{10,11}, including:

- The avoidance of direct lighting and light spillage on nearby habitats using directional lighting;
- The use of low-pressure sodium lights, which emit one light wavelength and attract fewer insects;
- Restricting the height of light columns to reduce horizontal spill;
- Installing low wattage LED security lighting on timers during construction to avoid future homeowners installing unsuitable lighting for bats.

⁹ Arun District Council Planning Obligations - <https://www.arun.gov.uk/planning-obligations/> [Accessed 26.11.2021]

¹⁰ Bat Conservation Trust (2011) *Statement of the impact and design of artificial lights on bats*. BCT, London.

¹¹ Institute of Lighting Professionals (2021) *Guidance Note 01/21 - The Reduction of Obtrusive Light*. ILP, Warwickshire.

6.11 Maintaining dark corridors and vegetated buffers between the boundary habitats and the development is particularly important for light-sensitive species such as barbastelle and brown long-eared bat.

6.12 The main access onto site will result in the loss of a small section of H6. Since surveys indicated that H6 along the eastern boundary was an important foraging resource for bats on site, it has been recommended that the access be as narrow as feasibly possible and that a 'hop-over' be created to allow bats to continue to use this boundary and maintain connectivity around the site. This includes planting tall-growing trees either side of the access with little understorey vegetation and directional lighting on the road. Both should encourage bats to follow the vegetation and avoid the light to safely cross the road.

Badger

6.13 The site provides some suitable foraging and commuting habitat for badgers. Whilst no evidence was found, this species is highly mobile and setts can be created in a short space of time.

6.14 An update survey is recommended prior to works commencing on site to ensure that no setts have become established. If any setts are found, appropriate mitigation would be implemented where required.

6.15 During construction, the following precautionary measures are recommended:

- Any excavations left open overnight should be covered or provided with a means of escape, such as a plank of wood, to allow badgers and other animals to escape.
- Any piping should be covered and inspected before use to ensure badgers and other animals do not become trapped.

Breeding Birds

6.16 The hedgerows, trees and scrub have the potential to be used by nesting birds. Any vegetation removal should be undertaken outside of the breeding bird season (March-September) or immediately following a check by a suitably qualified ecologist. If active nests are found, the vegetation must remain and be buffered from disturbance until the young have fledged.

6.17 Among the species typical of edge-of-settlement farmland identified on site, notable breeders (confirmed, probable and possible) included Cetti's warbler, willow warbler *Phylloscopus trochilus*, song thrush *Turdus philomelos*, greenfinch *Chloris chloris*, starling *Sturnus vulgaris*, dunnock, house sparrow and linnet *Carduelis cannabina*. The habitats used by these species, including the hedgerows, scrub and ditches, will be retained and enhanced. This means that these species should persist on site post-development. However, enhancements to improve opportunities for these species should include native planting along SuDs basins and swales.

Reptiles

6.18 Due to the low number of grass snake restricted to the boundaries, it is recommended that the arable field is maintained as unsuitable habitat for reptiles, either through continued arable farming or ensuring that vegetation does not encroach on the field if farming activities cease.

6.19 In addition, passive displacement measures should be carried out along the field margins where grassland, ruderal vegetation and scrub require removal as part of the construction process. This

will encourage individual reptiles to move away from the construction area and into the surrounding area. Full mitigation details are provided in the appended reptile report.

6.20 If prior to works commencing, the site becomes more suitable for reptiles i.e. the vegetation is left to grow, then further surveys and a reptile translocation may be required.

Enhancements

6.21 New and enhanced habitats within the design of the scheme will include:

- New native hedgerow and scrub planting to fill in gaps along the boundaries and improve connectivity around the site.
- The ditches can be improved by widening and deepening the channels so that they hold more water and provide opportunities for wetland plants and associated species, such as water voles and birds.
- Areas of rough grassland and wildflower meadows with reduced managed should be created along the boundaries to provide cover for brown hare and opportunities for a wide range of species.
- A new woodland belt along the northern boundary and tree planting around the site to improve habitat connectivity.
- New tree and shrub planting will utilise native species where possible, particularly those which provide fruit and berries for birds and other wildlife such as rowan *Sorbus aucuparia*, wild privet *Ligustrum vulgare*, yew *Taxus baccata*, holly *Ilex aquifolium*, wild cherry *Prunus avium* and apple *Malus* sp.
- Herb planting around the site should include species which provide nectar and pollen opportunities for invertebrates throughout the year as well as amenity value. Recommended species include foxglove *Digitalis purpurea*, *Crocus* sp., hellebores *Helleborus* sp., lavender *Lavandula angustifolia*, marjoram *Origanum vulgare*, knapweed *Centaurea nigra*, California lilac *Ceanothus* sp., lamb's ear *Stachys byzantine* and bee bush *Abelia* sp.

6.22 Opportunities for a range of wildlife can also be incorporated by implementing the following:

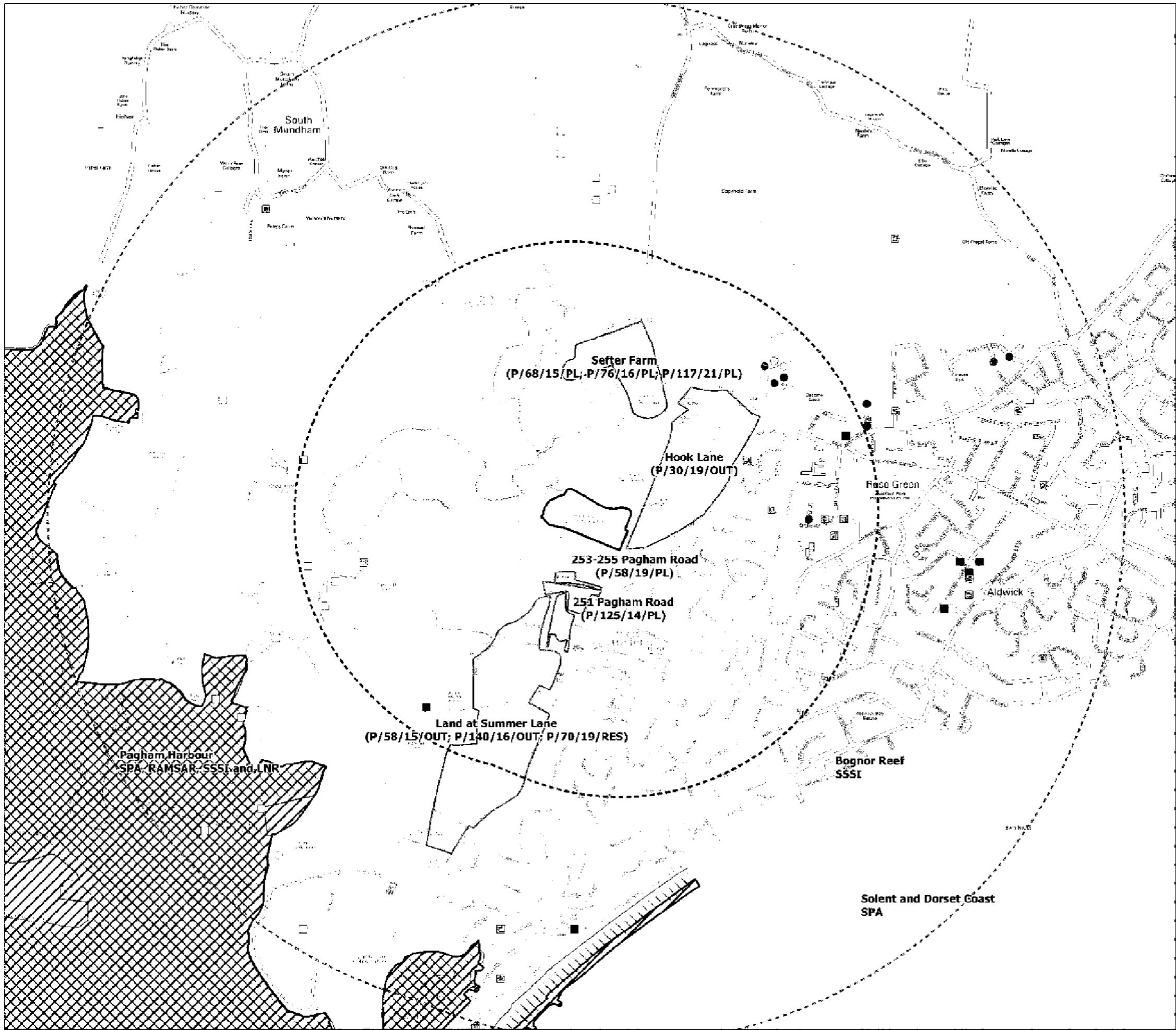
- Any new fences are to be installed will feature 'hedgehog highways' formed by a 13cm x 13cm hole along the base. This will ensure connectivity is maintained through the site.
- Log and/or rubble piles positioned in close proximity to SuDs and/or areas of grassland and scrub will benefit a range of species, including reptiles, amphibians, hedgehogs and invertebrates.
- Bat boxes will be installed on mature trees around the site and/or within the structure of new buildings to enhance roosting opportunities. These will be woodcrete boxes, such as Schwegler 1F, 2FN or similar designs for trees and Habitat 001 built-in bat boxes or similar for buildings.
- Bird boxes will be installed on suitable trees and shrubs around the site provide additional nesting opportunities. These should include a mixture of boxes, such as the 1B and 1N Schwegler nest boxes or similar woodcrete design to provide predator protection for various species.

- A range of insect houses are available, tailored for specific groups. These should be sited within or adjacent to species-rich grassland and scrub.
- Rock piles and banks of chalk/bare ground can be used to create invertebrate mounds and should be south-facing.

Biodiversity Net Gain

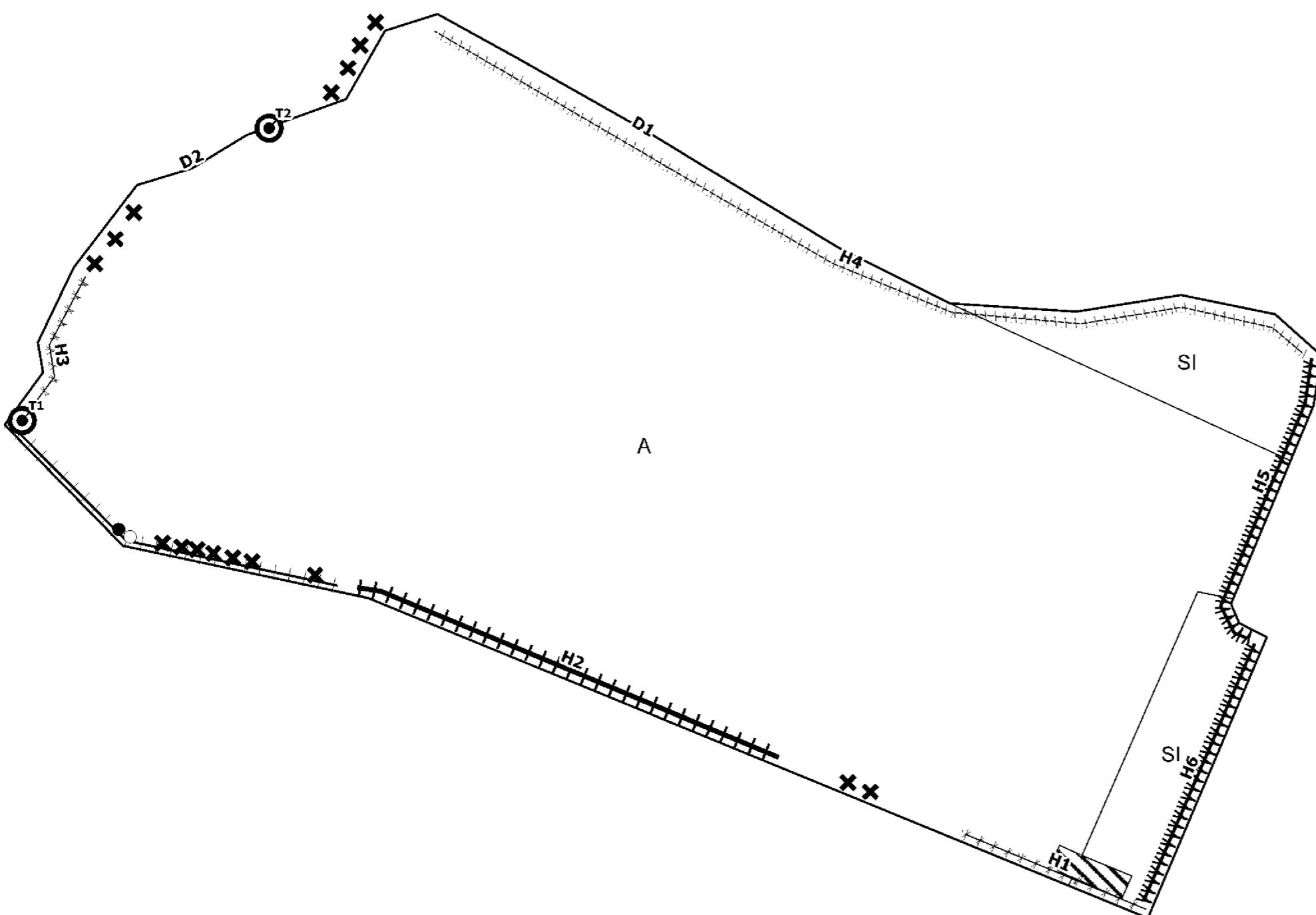
6.23 Taking the above into consideration, the proposals have been assessed using the Defra 3.0 Biodiversity Metric. This has indicated that the proposals will lead to a habitat net gain score of +10.93%, a hedgerow net gain score of +53.28% and a river net gain score of +25%. Appendix L shows the extent of habitats created on which the calculation is based.

6.24 Please note, the metric is intended to provide an indication of the potential net gains that can be achieved; the figures should not be regarded as absolute. Furthermore, the figures are likely to change as plans develop at Reserved Matters stage. However, for the purpose of an outline application, the calculation illustrates a positive outcome for biodiversity can be achieved with the current site design.



Key

- Site Boundary
- Ruderal vegetation
- Arable land
- Poor semi-improved grassland
- Dry ditch
- Running water
- Fence
- Hedge with trees - native species-rich
- Hedge with trees - species-poor
- Native species hedgerow
- Defunct hedge - native species-rich
- Scattered scrub
- Tree with bat potential
- Coniferous tree
- Broadleaved tree



Hallam Land Management

Land West of Pagham Road
Pagham

PHASE 1 HABITAT PLAN



scale 1:1400
drawing / figure number
LC
6/12/2021

Figure 2

APPENDIX A: RELEVANT LEGISLATION, POLICY AND GUIDANCE

Legislative Framework

1.1 The applicable legislative framework is summarised as follows:

- Natural Environment and Rural Communities Act 2006 (NERC);
- Wildlife and Countryside Act (1981) (as amended) (WCA);
- The EC Birds Directive (Directive 79/409/EEC) as translated into UK law by The Conservation of Habitats and Species Regulations 2017 (as amended);
- The EC Habitats Directive (Directive 92/43/EEC) as translated into UK law by The Conservation of Habitats and Species Regulations 2017 (as amended); and
- The Protection of Badgers Act (1992).

1.2 Section 41 (S41) of the Natural Environment and Rural Communities Act (2006) places a duty on the Secretary of State to publish, review and revise lists of living organisms and types of habitat in England that are of principal importance for the purpose of conserving English biodiversity, and to consult Natural England before doing so.

1.3 The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

Habitats

1.4 The degree to which habitats and species receive consideration within the planning system relies on many mechanisms, including:

- Inclusion within a specific policy, for example veteran trees, ancient woodland and linear habitats within the National Planning Policy Framework (NPPF), or local planning policies;
- A non-statutory site designation (e.g. Local Wildlife Site);
- Habitats considered as Habitats of Principal Importance for the conservation of biodiversity and species considered as Species of Principal Importance for the conservation of biodiversity as listed within Section 41 of the NERC Act (2006); and
- Habitats identified as being a Priority Habitat and species identified as being a Priority Species within the local Biodiversity Action Plan.

Protected/Notable Species

1.5 Principal pieces of legislation protecting wild species are Part 1 of the Wildlife and Countryside Act 1981 (as amended) (WCA) and the Conservation of Habitats and Species Regulations 2017 (as amended). Some species, for example badgers, also have their own protective legislation (Protection of Badger Act 1992). The impact that this legislation has on the Planning system is outlined in ODPM 06/2005 Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System.

1.6 This guidance states that as the presence of protected species is a material consideration in any planning decision and it is therefore essential that the presence or otherwise of protected species,

and the extent to which they are affected by proposals, is established prior to planning permission being granted. Furthermore, where protected species are present and proposals may result in harm to the species or its habitat, steps should be taken to ensure the long-term protection of the species, such as through attaching appropriate planning conditions for example.

1.7 In addition to protected species, there are those that are otherwise of conservation merit, such as those listed as species of principal importance for the purpose of conserving biodiversity under the Natural Environment and Rural Communities (NERC) Act 2006. These are recognised in the NPPF which advises that when determining planning applications, LPA's should aim to conserve and enhance biodiversity by applying a set of principles including:

- If significant harm resulting from a development cannot be avoided, adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- Development proposals where the primary objective is to conserve or enhance biodiversity should be encouraged.

Bats

1.8 Bats and their habitats are protected under the Wildlife and Countryside Act 1981 (as amended) and by the Conservation of Habitats and Species Regulations 2018 (as amended). In summary this makes it an offence to damage, destroy or obstruct any place used by bats for breeding and shelter, disturb a bat, or kill, injure or take a bat. Seven bat species are listed as Species of Principal Importance under the provisions of the NERC Act 2006 of which three were recorded on site; soprano pipistrelle, noctule and brown long-eared.

Birds

1.9 The Wildlife and Countryside Act 1981 (as amended) is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions to recklessly or intentionally:

- Kill, injure or take any wild bird;
- Take, damage or destroy the nest of any wild bird while in use or being built;
- Take or destroy the egg of any wild bird.

Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are specially protected at all times.

Great Crested Newts

1.10 Great crested newts and the places they use for shelter or protection are protected under European law through Annexes 2 and 4 of the EU Habitats and Species Directive, the Bern Convention and the Conservation of Habitats & Species Regulations 2017; and in the UK through Schedule 2 of the Wildlife and Countryside Act 1981 (as amended). In summary it is an offence to deliberately or recklessly to take, injure or kill a great crested newt; to intentionally or recklessly damage, destroy or obstruct access to any structure or place used for breeding, shelter or protection by the species; intentionally or recklessly disturb while it is occupying a structure or place which it uses for such purpose; or intentionally take or destroy the eggs of a great crested newt.

Reptiles

1.11 All common reptile species, including grass snake, slow worm, common lizard and adder are partially protected under the Wildlife and Countryside Act 1981. In summary this legislation protects the species from intentional killing, injury or sale, offering for sale, or possessing, transporting or publishing advertisements for the purposes of sale.

Relevant Planning Policy

National Planning Policy Framework (NPPF)

1.12 The latest version of the NPPF was published in February 2021 and replaces the first NPPF published in March 2012 and minor clarifications to the revised version published in July 2019.

1.13 The premise of '*presumption in favour of sustainable development*' embedded within the previous versions of the NPPF has been carried forward to the current version. The NPPF considers that to achieve this, the planning system has three overarching objectives: economic, social and environmental. It considers these to be inter-dependent with a need for them to be mutually supportive of one another. For specific development proposals the NPPF considers applying a presumption in favour of sustainable development means:

"...c) approving development proposals that accord with an up-to-date development plan without delay..." [para.11].

"They [decision makers] should use the full range of planning tools available, including brownfield registers and permission in principle, and work proactively with applicants to secure developments that will improve the economic, social and environmental conditions of the area". [para. 38.]

"When determining planning applications, local planning authorities should apply the following principles:

...d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate biodiversity." [para. 180].

1.14 In terms of 'environmental objects' (one of the three core planning objectives), the NPPF states that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by:

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*
- c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate". [para 174].

Relevant Local Planning Policy

1.15 The Arun District Local Plan (2018) includes the following policies of relevance:

Policy ENV SP1 – Natural Environment

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

Policy ENV DM1 – Designated sites of biodiversity or geological importance

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

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

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

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

- i. *The European, National or Local status and designation of the site;*
- ii. *The nature and quality of the site's features, including its rarity value;*
- iii. *The extent of any adverse impacts on the notified features of interest;*

- iv. *The need for compensatory measures in order to re-create remaining features of habitats on or off site.*
- c. *Where appropriate the Council will ensure the effective management of designated sites through the imposition of planning conditions or Section 106 agreements as appropriate.”*

Policy ENV DM2 – Pagham Harbour

- “a. *Within Zone A (0-400m from the boundary) as identified on the Policies Map, development will only be permitted in exceptional circumstances where the developer is able to demonstrate there will be no detrimental effects on Pagham Harbour, including non-native species and the water environment. Regard shall also be had to tests 1-4 as set out in Policy DM1...*
- b. *Within Zone B (0-5km) for all new residential development and development which is likely to have an impact on Pagham Harbour will be required to:*
 - i. *Make developer contributions toward the agreed strategic approach to access management at Pagham Harbour.*
 - ii. *Create easily accessible new green spaces for recreation within or adjacent to the development site. These shall be capable of accommodating the predicted increases in demand for local walking, including dog walking. Good pedestrian links shall be provided between housing areas and new and existing green space in order to discourage car use.*
- c. *Major developments (as defined in the GDPO 1995 as amended) taking place outside Zone B and close to its boundary will be considered on a case by case basis to determine any potential effects on Pagham Harbour, and the need for any avoidance and mitigation measures.”*

Policy ENV DM5 – Development and biodiversity

“Development schemes shall, in the first instance, seek to achieve a net gain in biodiversity and protect existing habitats on site. They shall also however incorporate elements of biodiversity including green walls, roofs, bat and bird boxes as well as landscape features minimising adverse impacts on existing habitats (whether designated or not). Development schemes shall also be appropriately designed to facilitate the emergence of new habitats through the creation of links between habitat areas and open spaces. Together, these provide a network of green spaces which serve to reconnect isolated sites and facilitate species movement.

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

All developments shall have regard to Natural England’s standing advice for protected species.”

APPENDIX B: SURVEY PERSONNEL

Surveyor Details				
Initials	Name and Position	Qualifications & Memberships	Class Licences	Years of Relevant Experience
EM	Emily Mustafa – Assistant Ecologist	BSc (Hons)	-	2
FM	Fiona Miller – Assistant Ecologist	DipHE (current 3 rd year Bsc (Hons) student) CIEEM (student)	-	1
JW	James Warren - Ecologist	BSc (Hons), MSc FISC Level 5 MCIEEM	GCN	6
LC	Lindsay Clark – Senior Ecologist	BSc (Hons) FISC Level 4 ACIEEM	GCN, Hazel Dormice	7
LV	Laura Vint - Ecologist	BSc (Hons), MSc FISC Level 3 QCIEEM	GCN	4.5
OGJ	Oliver Grice-Jackson – Senior Ecologist	BSc (Hons) FISC Level 4	GCN, Barn Owl	7
OMS	Oly Sayers - Ecologist	BSc (Hons) FISC Level 3	GCN	4
PJP	Paul Perrins - Ecologist	BSc (Hons), MSc FISC Level 3	GCN, Hazel Dormice, Schedule 1	6
RB	Rowena Bailey – Seasonal Ecologist	BSc (Hons)a	-	1
RM	Rosie Murfitt – Assistant Ecologist	BSc (Hons), MSc	-	1

Surveys and Personnel		
Survey	Date(s)	Personnel
Extended Phase 1 Habitat Survey	May 2021	LC
Breeding Bird Surveys	Apr-June 2021	LC, OMS, RM
Wintering Bird Surveys	Dec 2020 – Feb 2021	LC, OMS
Bat Transect Surveys	Apr, Jun, Sept 2021	EM, JW, LC, LV, OMS, PJP, RB
GCN eDNA Surveys	April 2021	EM, LC, OGJ, OMS
Reptile Surveys	May-Jun 2021	EM, FM, LC, OMS, PJP, RM
Riparian Mammal Surveys	May, Sept 2021	JW, LC, LV, RB

APPENDIX C: SITE PHOTOGRAPHS



Photo 1: Arable field



Photo 2: Grassland in south-east corner



Photo 3: Grassland in north-east corner



Photo 4: Scrub along southern boundary



Photo 5: Ditch 1



Photo 6: Ditch 2

APPENDIX D: BOTANICAL SPECIES LIST

DAFOR Scale: Dominant, Abundant, Frequent, Occasional, Rare

Common name	Scientific name	Poor SI grassland	Tall ruderal	Scrub	Ditches
Sycamore	<i>Acer pseudoplatanus</i>	R		R	
Yarrow	<i>Achillea millefolium</i>	O			O
Greater burdock	<i>Arctium lappa</i>	O			
False oat grass	<i>Arrhenatherum elatius</i>	O			O
Hart's-tongue fern	<i>Asplenium scolopendrium</i>				R
Daisy	<i>Bellis perennis</i>				O
Soft brome	<i>Bromus hordeaceus</i>	O			
Barren brome	<i>Bromus sterilis</i>	F			O
Butterfly bush	<i>Buddleja</i> sp.	R		O	
Common mouse-ear	<i>Cerastium fontanum</i>				O
Creeping thistle	<i>Cirsium arvense</i>	O	F		
Spear thistle	<i>Cirsium vulgare</i>	O			
Dogwood	<i>Cornus sanguinea</i>	R		R	
Hawthorn	<i>Crataegus monogyna</i>	R		O	
Cocksfoot	<i>Dactylis glomerata</i>	F			O
Great willowherb	<i>Epilobium hirsutum</i>	O			A
Horsetail	<i>Equisetum arvense</i>	R			O
Tall fescue	<i>Festuca arundinacea</i>	A			
Red fescue	<i>Festuca rubra</i>	O			
Cleavers	<i>Galium aparine</i>	O			O
Cut-leaved cranesbill	<i>Geranium dissectum</i>	O			O
Herb Robert	<i>Geranium robertianum</i>	R			
Ground ivy	<i>Glechoma hederacea</i>	O			O
Bristly oxtongue	<i>Helminthotheca echinoides</i>	O			O
Common hogweed	<i>Heracleum spondylium</i>	F			F
Yorkshire fog	<i>Holcus lanatus</i>	F			
Spanish bluebell	<i>Hyacinthoides hispanica</i>	R			
Stinking iris	<i>Iris foetidissima</i>	R			
Yellow flag iris	<i>Iris pseudacorus</i>				R
Common ragwort	<i>Jacobaea vulgaris</i>	O			O
Hard rush	<i>Juncus inflexus</i>	R			
White dead nettle	<i>Lamium album</i>	O			R
Perennial ryegrass	<i>Lolium perenne</i>	F			
Birds-foot trefoil	<i>Lotus corniculatus</i>	R			R
Hemlock water dropwort	<i>Oenanthe crocata</i>	A		A	A

Common name	Scientific name	Poor SI grassland	Tall ruderal	Scrub	Ditches
Green alkanet	<i>Pentaglottis sempervirens</i>	A			
Smooth meadow grass	<i>Poa pratensis</i>	F			
Rough meadow grass	<i>Poa trivialis</i>				A
Blackthorn	<i>Prunus spinosa</i>	R			
Creeping buttercup	<i>Ranunculus repens</i>	O			O
Celery-leaved buttercup	<i>Ranunculus sceleratus</i>				R
Bramble	<i>Rubus fruticosus</i> agg.	R		F	
Broad-leaved dock	<i>Rumex obtusifolius</i>	O			O
Curled dock	<i>Rumex crispus</i>	O			O
Groundsel	<i>Senecio vulgaris</i>	R			
Red campion	<i>Silene dioica</i>	A			
White campion	<i>Silene latifolia</i>	O			
Greater stitchwort	<i>Stellaria holostea</i>	R			R
Dandelion	<i>Taraxacum</i> agg.	O			
Upright hedge parsley	<i>Torilis japonica</i>	O			
White clover	<i>Trifolium repens</i>	O			
Common nettle	<i>Urtica dioica</i>	F	A		F
Germander speedwell	<i>Veronica chamaedrys</i>				O
Common vetch	<i>Vicia sativa</i>	O			O
Bindweed sp.		R			
Mayweed sp.		R			



Hallam Land Management

Land West of Pagham Road, Pagham

APPENDIX E – BAT SURVEYS

December 2021

FPCR Environment and Design Ltd

Registered Office: Lockington Hall, Lockington, Derby DE74 2RH
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APPENDIX

- Appendix E-1: Static Bat Detector Data

1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management to present the results of bat surveys completed on the site at Land West of Pagham Road, Pagham, West Sussex (central OS grid reference SZ891698).
- 1.2 The scope and objectives of the report are to:
 - present the findings of the reptile surveys undertaken in 2021;
 - assess the relative importance of the survey area for bats;
 - review the site proposals and provide recommendations for mitigation, compensation and enhancement.

Site Context

- 1.3 The application site is approximately 4.9ha and is hereafter referred to as 'the site'. The site lies to the west of Pagham road and north of Pagham.
- 1.4 An extended Phase 1 habitat survey was carried out in May 2021. The site is dominated by an arable field with hedgerows and ditches (dry and wet) along the boundaries. There is a single pocket of tall ruderal vegetation near the south-eastern boundary.
- 1.5 The site is bordered by residential dwellings to the south, scrub to the west and agricultural land to the north and east. The wider landscape is dominated by Pagham to the east and south and agricultural land to the north and west.
- 1.6 The proposals are for the creation of a residential development with up to 106 new homes and associated infrastructure.

2.0 LEGISLATION AND POLICY

2.1 Bats are afforded full protection under the Wildlife & Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2017 (as amended). All UK species are European Protected Species (EPS).

2.2 In summary, it is illegal to:

- deliberately or recklessly capture, injure or kill any bats;
- deliberately disturb bats and impair their ability to survive, to breed/reproduce or to rear/nurture their young;
- deliberately disturb bats and impair their ability to hibernate or migrate;
- deliberately disturb bats and significantly affect the local distribution or abundance of the species to which they belong;
- intentionally or recklessly disturb any bat while it is occupying a structure or place which it uses for shelter or protection;
- intentionally or recklessly obstruct access to any structure or place which a bat uses for shelter or protection;
- damage or destroy a breeding site or resting place of a bat.

2.3 If impacts to bats or their roosts cannot be avoided, an appropriate licence is required from Natural England to derogate from the relevant legislation.

3.0 METHODOLOGY

Desk Study

- 3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:
 - Sussex Biodiversity Record Centre (SxBRC)
 - Multi Agency Geographic Information for the Countryside (MAGIC)¹
 - Arun District Council planning portal²
- 3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Tree Roost Assessment

- 3.3 Trees within the survey area were assessed for their potential to support roosting bats by suitably experienced ecologists on 1st June 2021.
- 3.4 The trees were searched for potential roosting features (PRFs) from ground level with the aid of a torch and binoculars, where appropriate. Features³ include:
 - Natural holes e.g. knot holes arising from naturally shed branches or branches previously pruned back to a branch collar
 - Man-made holes e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems
 - Woodpecker holes
 - Cracks/splits in stems or branches (horizontal and vertical)
 - Lifted or partially detached bark
 - Other hollows or cavities, including butt rot and canker cavities
 - Crossing stems or branches with suitable roosting space between
 - Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk)
 - Bat, bird or dormouse boxes
- 3.5 Trees were then placed into bat roost potential categories as per current guidance⁴ and summarised in Table 1.

¹ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

² Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

³ BS 8596:2015 Surveying for bats in trees and woodland – Guide. British Standards Institute.

⁴ Collins, J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn)*. The Bat Conservation Trust, London.

Table 1: Bat roost potential categories for trees

Tree Categories	Description
Confirmed Roost	Evidence of roosting bats in the form of live/dead bats, droppings, urine staining, fur oil staining etc.
High Potential	A tree with one or more PRFs that are obviously suitable for large numbers of bats on a more regular basis and/or longer duration due to their size, shelter, suitable conditions (height above ground, light levels, etc), and surrounding habitat. Examples include, but are not limited to, woodpecker holes, large cavities, hollow trunks, hazards beams.
Moderate Potential	A tree with PRFs which could support one or more potential roost sites due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status e.g. large roost or maternity roost. Examples include, but are not limited to, rot holes, branch socket cavities, canker cavities, etc.
Low Potential	A tree of sufficient size and age to contain PRFs but with none seen from the ground or features that offer very limited potential. Examples include, but are not limited to, shallow splits, upward facing holes, etc.
Negligible Potential	No features present likely to be used by roosting bats.

Nocturnal Activity Surveys

3.6 The site was assessed as having low habitat suitability for bats as per BCT guidelines. Proposals indicated that the majority of valuable habitats for bats, e.g. hedgerows and trees, would be retained. As such, seasonal bat activity surveys were undertaken to assess which bat species were using the site, which features were used for foraging and commuting and the level of use.

3.7 A transect route was designed to cover all habitats, where possible, within the survey area with a particular focus on those considered to provide higher bat suitability. The transect was walked by a pair of suitably experienced ecologists with a Wildlife Acoustic Inc. Echo Meter Touch bat detector and Apple Inc. iPad. Surveys were only carried out in suitable weather conditions (Table 2). The surveys commenced at dusk and continued for 2-3 hours with surveyors walking at a steady pace and recording all bat activity encountered. The transect route also included five-minute point counts where surveyors would stop and record all bat activity at these specific points.

3.8 Post-survey, the bat calls recorded on the transect were then analysed by experienced ecologists using Kaleidoscope software (Wildlife Acoustics Inc.) to verify the bat species and activity levels.

Table 2: Activity survey timings and weather conditions

Date	Start/Sunset Time	Finish Time	Weather Conditions
22 nd April 2021	20:04	21:58	11°C, dry, 5% cloud cover, light breeze
10 th June 2021	21:15	23:15	16°C, dry, 100% cloud cover, light breeze
20 th September 2021	19:07	21:07	17°C, dry, 20% cloud cover, light breeze

Static Bat Detector Surveys

3.9 Wildlife Acoustics Inc. Song Meter SM4BAT FS detectors (hereafter referred to as 'SM4BAT detectors') were deployed within the survey area prior to seasonal activity survey. Detectors were

deployed in habitats likely to be impacted by the development and/or habitats suitable for navigational/foraging routes (Figure 1).

- 3.10 The SM4BAT detectors were left to record for a minimum of five nights of suitable weather conditions each season. They are programmed to activate 30 minutes before dusk and record continuously until 30 minutes after sunrise.
- 3.11 Following collection, the recordings are analysed using Kaleidoscope software by experienced ecologists. Each sound file (15 seconds in length) is counted as a single bat pass or registration for each species visible in the sound file. The total number of registrations provides an indication of the relative importance of the site/detector location for bats.

Limitations

- 3.12 Due to the high level of variation in echolocation calls and the properties of zero-crossed frequency division recordings, it is not always possible to identify calls down to species level. These calls are therefore identified to genus level, which is sufficient for a suitable assessment of potential impacts.
- 3.13 The lower amplitude calls made by brown long-eared bat *Plecotus auritus* and barbastelle *Barbastella barbastellus* are more difficult to detect and may not be picked up by the directional microphones. Therefore, these species may have been under-recorded during these surveys.
- 3.14 The SM4BAT detectors do not discern between individual bats or a single bat passing the microphone several times. Therefore, the number of registrations can only provide an indication of bat activity.

4.0 RESULTS

Desk Study

4.1 Numerous bat records within 2km of the survey area and within the last 10 years were provided by SxBRC in 2021 (Table 3).

Table 3: Bat records within 2km of the site

Bat Species	Date	Approximate distance from site
Pipistrelle species <i>Pipistrellus spp.</i>	2012	1.6km north-east
	2014	1.3km north-east
	2015	1.3km north-east
Common pipistrelle <i>Pipistrellus pipistrellus</i>	2015	1.4km east
	2018	0.8km north-east
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	2018	0.8km north-east
Nathusius' Pipistrelle <i>Pipistrellus nathusii</i>	2018	0.8km north-east
Long-eared bat species <i>Plecotus spp.</i>	2011	1.7km south-west
	2018	0.8km north-east
Barbastelle <i>Barbastella barbastellus</i>	2018	0.8km north-east
Serotine <i>Eptesicus serotinus</i>	2018	0.8km north-east

4.2 A search of the Arun District Council planning portal revealed bat surveys completed for three planning applications surrounding the site, summarised in Table 4.

Table 4: Summary of bat survey results for surrounding planning applications

Application site name	Application reference	Distance from site	Dates	Results
Hook Lane	P/30/19/OUT	25m east	Aug 2015 – Sept 2016	Activity surveys indicated relatively low levels of common and widespread bat species. Barbastelle were also recorded on site in low numbers.
251 Pagham Road	P/125/14/PL	200m south	Sept-Oct 2013	A bat roost was confirmed in the main building on site, thought to be brown long-eared bat.
Land at Summer Lane	P/58/15/OUT	280m south	Apr-Sept 2014	Activity surveys indicated relatively low levels of common and widespread bat species, with the majority recorded being soprano and common pipistrelle.

Tree Roost Assessment

4.3 A total of 2 trees were identified within the survey area as having roosting bat potential during assessments in June 2021 (Figure 1). Details are summarised in Tables 5.

Table 5: Bat potential trees on site

Tree	Bat potential	Species	Features
T1	Low	Pedunculate oak	Platey bark from 6m to 9m on eastern aspect
T2	Moderate	Ash	3 natural knot holes all on south-eastern aspect 5m high

Nocturnal Transect Surveys

4.4 Activity in April 2021 was concentrated along the northern boundary of the site and dominated by common pipistrelle, with the occasional soprano pipistrelle and a single *Myotis* species.

4.5 Surveys in June and September 2021 recorded similar activity levels with 31 and 32 contacts respectively. The most frequently recorded species, again, was common pipistrelle in June (51.6% of contacts) but soprano pipistrelle in September (42.9% of contacts). Noctule and *Nyctalus* species were also recorded in June whilst *Nathusius'* pipistrelle, *Plecotus* species and one barbastelle pass were recorded in September.

4.6 Activity was concentrated along the northern and western boundaries in June, similar to April. In contrast, activity was more evenly spread across all site boundaries in September.

4.7 Activity survey results are summarised in Table 6 and illustrated in Figures 2-4.

Table 6: Transect survey summary

Month	Total Contacts (incl. point counts)	Point Count Contacts	Activity Summary
22 nd April 2021	20 13 common pipistrelle 6 soprano pipistrelle 1 <i>Myotis</i> sp.	6 3 soprano pipistrelle 3 common pipistrelle	<ul style="list-style-type: none"> Majority of activity, including point counts, occurred in the northern and north-west parts of the survey area (15 contacts) along hedgerow H4, the scrub in the north-west corner of the site and T2.
10 th June 2021	31 16 common pipistrelle 10 soprano pipistrelle 1 <i>Pipistrellus</i> sp. 1 noctule 1 <i>Nyctalus</i> sp.	12 6 common pipistrelle 4 soprano pipistrelle 1 <i>Pipistrellus</i> sp. 1 <i>Nyctalus</i> sp.	<ul style="list-style-type: none"> Similar activity levels as April; most activity occurred in the northern and north-west parts of the survey area. Some activity in the east (6 contacts) with 3 out of the 4 <i>Nyctalus</i> sp. registrations recorded there.
20 th September 2021	32 8 common pipistrelle 15 soprano pipistrelle 4 <i>Pipistrellus</i> sp. 3 <i>Nathusius'</i> pipistrelle 1 <i>Plecotus</i> sp. 1 barbastelle	7 1 common pipistrelle 5 soprano pipistrelle 1 <i>Pipistrellus</i> sp.	<ul style="list-style-type: none"> Activity was concentrated, including point counts, in the north-west of the site, near the scrub and T2, and along the eastern site boundary along H5 and H6. Soprano pipistrelle was the most frequently recorded species. A single Western barbastelle was recorded commuting along H4.

Static Bat Detector Surveys

4.8 During the automated surveys conducted a total of 18,086 registrations were recorded over the season by six statics (Table 7). Common pipistrelle (C pip) was the most frequently recorded species (approximately 75.32% of total data), with other species recorded in lower numbers:

- soprano pipistrelle (S pip) - 18.61%
- Nathusius' pipistrelle (N pip) – 2.08%
- common pipistrelle/soprano pipistrelle (Pip sp.) - 1.15%
- *Myotis* species (Myo) - 0.86%
- Serotine (Sero) – 0.59%
- Brown long-eared (BLE) – 0.5%
- Barbastelle (Barb) – 0.35%
- Noctule (Noc) – 0.28%
- *Nyctalus/Eptesicus* sp. (Nyc/Ept) – 0.16%
- *Nyctalus* sp. (Nyc) - 0.1%
- Leisler's (Leis) - >0.01%

4.9 The results are summarised in Table 7 and the complete dataset is shown in Appendix E-1.

Table 7: Static detector survey summary

Dates	Unit Reference (Figure 1)	Total Registrations	Species & Registration Count	Activity Summary
22 nd -27 th April 2021	Unit A	1446	C pip – 1075 Sero - 2 S pip – 341 Myo – 2 Pip sp. – 33 Noc - 1 N pip – 11 BLE – 1	<ul style="list-style-type: none"> Activity levels varied with a peak of 459 registrations on the 2nd night and a low of 189 on the 4th night. Common pipistrelle was most frequently recorded (73% of registrations), followed by soprano pipistrelle (23%). Nathusius' pipistrelle were recorded on 3 nights with 2-6 registrations per night. Noctule, serotine, BLE were each only recorded on one night and <i>Myotis</i> on two nights – all in very low numbers.
	Unit B	137	C pip – 82 S pip – 44 Pip sp. – 8 BLE – 2 Noc - 1	<ul style="list-style-type: none"> Lower activity levels ranged from a high of 44 registrations on the 2nd night to a low of 14 on the 4th night. Fewer species were recorded by Unit B (H5) compared with Unit A (H4 and D1). Common pipistrelle was most common (59.9% of registrations), followed by soprano pipistrelle (32%). A single noctule registration was recorded on the 5th night and two registrations of BLE on the 2nd night.
10 th -15 th June 2021	Unit C	1094	C pip – 675 Nyc – 12 S pip – 253 BLE – 7 Pip sp. – 67 N pip – 6 Noc – 36 Barb – 5 Myo – 29 Sero - 4	<ul style="list-style-type: none"> Activity ranged from a peak of 546 registrations on the 5th night to a low of 127 on the 4th night. Again, common pipistrelle was most frequent (61.7% of registrations) followed by soprano pipistrelle (23%). Nathusius' pipistrelle was also recorded in much lower numbers on the first three nights. Noctule, Nyc and Myo sp. were recorded most nights in low numbers and BLE and serotine were infrequent. A single barbastelle registration was recorded on the 3rd and 4th night and three registrations on the 5th night.
	Unit D	10078	C pip – 7966 Nyc/Ept – 28 S pip – 1835 BLE – 17 Sero – 101 Myo – 10 Pip sp. – 68 Noc – 9 N pip – 40 Barb – 2 Leis - 1	<ul style="list-style-type: none"> The most activity was recorded by this unit (H6). Levels were relatively consistent, ranging from a peak of 2348 registrations on the 3rd night to 1222 calls on the 1st night. The most species were also recorded in this location, although again dominated by common pipistrelle (79% of registrations) and soprano pipistrelle (18%) with other species at much lower numbers. Comparatively high levels of serotine activity were recorded, with the majority (89%) occurring on the 5th night. Single barbastelle registrations were recorded on the 3rd and 4th night, similar to Unit C. The only confirmed Leisler call of the survey was recorded on the 5th night.
20 th -25 th September 2021	Unit E	386	S pip – 215 Pip sp. – 6 C pip – 124 BLE – 5 Myo – 14 Noc – 2 N pip – 9 Nyc - 2 Barb – 9	<ul style="list-style-type: none"> Lower activity levels ranged from a high of 153 registrations on the 4th night to a low of 29 on the 2nd night. Again, common pipistrelle dominated (55.7% of registrations) followed by soprano pipistrelle (32%). <i>Myotis</i> sp. were recorded every night with between 2-4 registrations per night. Nathusius', BLE, noctule and Nyc sp. were recorded infrequently in low numbers. Barbastelle were recorded on 4 nights, ranging from 1-3 registrations per night.
	Unit F	4925	C pip – 3700 Barb – 48 S pip – 677 Pip sp. – 26 N pip – 310 Nyc – 3 Myo – 101 Noc - 2 BLE - 58	<ul style="list-style-type: none"> Activity varied considerably from a peak of 2033 registrations on the 4th night to a low of 311 on the 1st night. Common pipistrelle was again dominant (57% of registrations) followed by soprano pipistrelle (13%). The most Nathusius' pipistrelle, BLE and Myo sp. registrations were recorded by this unit, with relatively consistent numbers each night. The most barbastelle registrations were also recorded here, with 3-17 registrations per night.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 The hedgerows, ditches and scattered scrub on site provided foraging and commuting opportunities for bats in the local area and two trees provided roosting opportunities.

Trees

5.2 The semi-mature trees on site, including the two with roosting bat potential, have been integrated into the design of the scheme. They will be buffered from the built environment by green infrastructure along the boundaries and connectivity around the site will be maintained.

5.3 In addition, given the range of bat species identified on site, including light-sensitive species, the trees and other important habitats, including the hedgerows, will be adequately buffered from lighting through measures outlined in best practice guidance^{5,6}, including:

- The avoidance of direct lighting and light spillage on nearby GI using directional lighting;
- The use of low-pressure sodium lights, which emit one light wavelength and attract less insects;
- Restricting the height of light columns to reduce horizontal spill;
- Installing low wattage LED security lighting on properties close to GI during construction to avoid future homeowners installing unsuitable lighting for bats.

5.4 If proposals change and bat roost potential trees are to be impacted by the development, either directly or indirectly, then further surveys will be required.

Activity Surveys

5.5 Transect and static surveys have recorded common bat species on site with common and soprano pipistrelle most frequently recorded, as well as the rarer barbastelle bat. The overall bat activity levels varied considerably between locations and times of the year.

5.6 The most activity and the most species were recorded along hedgerow H6 in June 2021. Bat activity levels tend to be higher in the summer due to the metabolic requirement of breeding females. Given the relative dominance of common pipistrelle at this location, it is considered likely that most of the registrations were made by a small number of bats foraging continuously along this boundary. However, the large increase in registrations compared with other static units on site would suggest that H6 is an important foraging resources for bats on site. The grassland and ruderal vegetation adjacent may increase the invertebrate prey available compared with H5 further north. As such, H6 should be retained as a dark buffer and enhanced.

5.7 Activity was also frequent along the northern and western boundaries. This is likely due to the mosaic of habitats along these boundaries, including hedgerows, scrub, ditches and grassland, which would support a higher density of invertebrate prey.

5.8 In contrast, activity levels were relatively low along the southern boundary. This may be due to the gappy nature of the hedgerows and the absence of a ditch compared with the other boundaries.

⁵ Bat Conservation Trust (2018) *Guidance Note 08/18 – Bats and artificial lighting in the UK*. BCT, London.

⁶ Institute of Lighting Professionals (2021) *Guidance Note 01/21 - The Reduction of Obtrusive Light*. ILP, Warwickshire.

5.9 The rarer barbastelle bat was recorded on site in the summer and autumn. The overall registrations were relatively low and do not suggest that the site is an important corridor or flightline for this species. Barbastelle are known to be spread thinly over the south-east and travel over large distances, particularly females in the summer, to exploit areas of abundant prey. Flightlines can range from a few to 20km, with the average for a pregnant female in West Sussex being 8km⁷. As a woodland species, there isn't a large amount of suitable woodland close to site. The majority of ancient woodland lies approximately 10km north as part of the South Downs. As such, the site is unlikely to be a significant foraging area for this species and is not considered a constraint to development.

Mitigation, Compensation and Enhancement

5.10 The retention of boundary trees, scrub and hedgerows will ensure connectivity around the site is maintained.

5.11 The main access onto site will result in the loss of a small section of hedgerow H6. Given the high activity levels recorded along H6, it is important to ensure that this access is kept as narrow as practically possible to maintain connectivity along this boundary. Lighting should also be kept to a minimum and follow the recommendations outlined to maintain a dark corridor along the eastern boundary.

5.12 To encourage bats over the site access and avoid traffic collisions, 'hop-overs' can be created by planting taller trees either side of the access with little understorey vegetation to encourage bats to fly up and over the road following the vegetation. Lighting at the road level will also encourage light-sensitive species to use the darker areas above for commuting and foraging.

5.13 Benefits to bats and other wildlife will be achieved through enhancements to retained habitats and the creation of new habitats:

- A mosaic of tussocky species-rich grassland, shrubs, attenuation basin and ditches will increase opportunities for invertebrates and thereby increase foraging opportunities for bats.
- New hedgerow and tree planting will take place along the boundaries to close any existing gaps, both of which will improve foraging and commuting routes around the site.
- Native enhancement planting of retained boundary features will improve the structure and species diversity of these features and therefore increase opportunities for foraging and commuting.
- Bat boxes will be installed on mature trees around the site to enhance roosting opportunities. These will be woodcrete boxes, such as Schwegler 1F, 2FN or similar designs for trees.
- Bat tubes can also be incorporated into the brickwork of buildings close to known commuting habitat, such as the unrendered Habitat 001 bat box.

5.14 A sensitive lighting scheme will be designed into the proposals to protect a range of species using the GI from adverse indirect impacts, including bats.

⁷ English Nature (2005) Report 657 – Advice for the management of flightlines and foraging habitats of the barbastelle bat *Barbastella barbastellus*. English Nature, Peterborough.

Key

□ Site Boundary

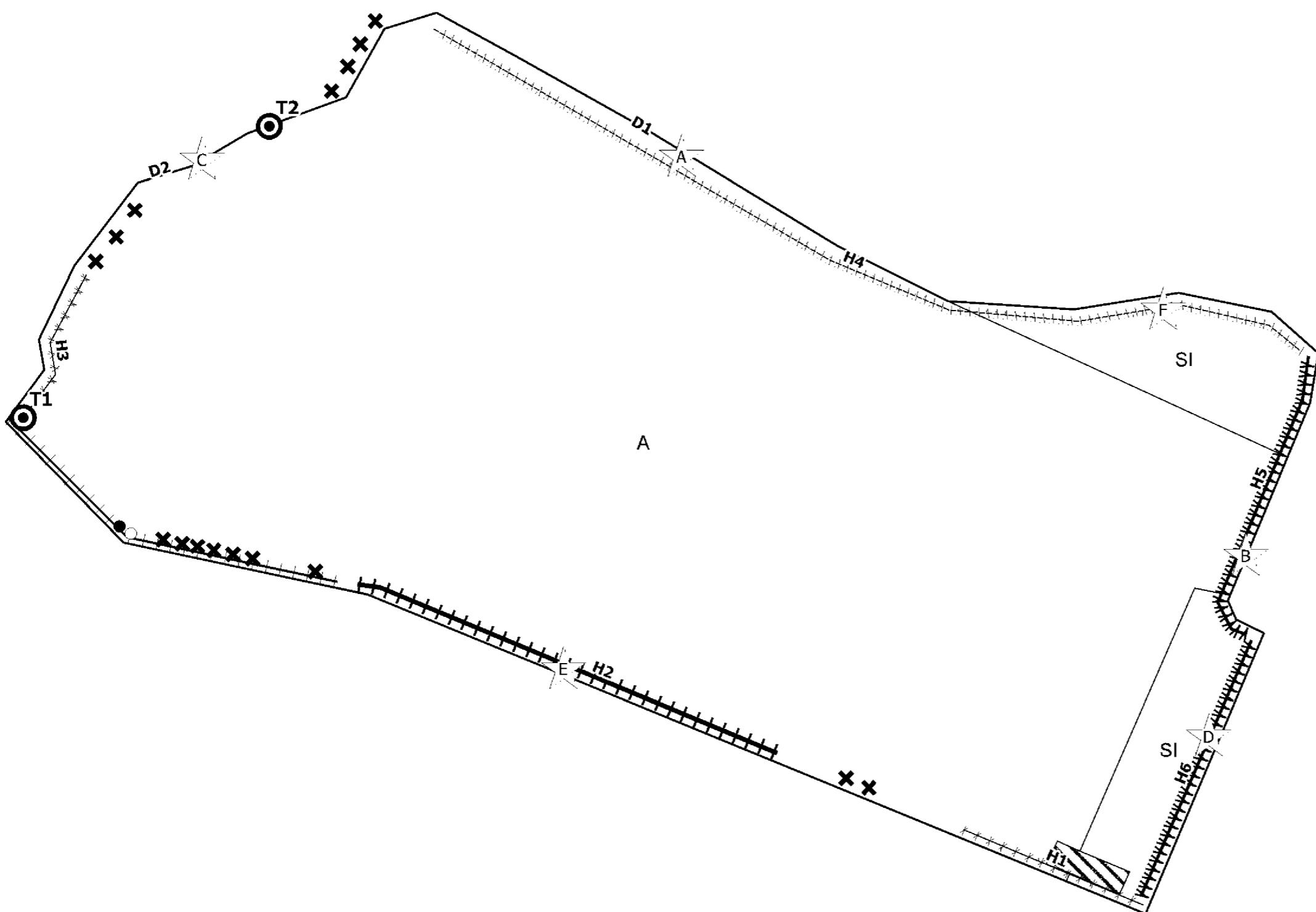
★ Static Locations

Unit A & B - April 2021

Unit C & D - June 2021

Unit E & F - September 2021

● Tree with bat potential



Hallam Land Management
Land West of Pagham Road
Pagham

STATIC & BAT POTENTIAL TREE LOCATION
PLAN

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Figure 1

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Key

-  Site Boundary
-  Start point
-  F Finish point
-  Point Count (with ref.)
-  Transect Route
-  Flight Arrow
-  Bat Contacts
-  Common Pipistrelle
-  Soprano Pipistrelle
-  Myotis Species

Plan Reference	Time	Species	Passes	Behaviour
Start	20:04			
PCA	20:04-20:09			
PCB	20:18-20:23			
1	20:33	Soprano pipistrelle	3	Foraging
2	20:35	Common pipistrelle	1	Commuting
PCC	20:36-20:41			
3	20:36	Common pipistrelle	Continual	Foraging
4	20:37	Soprano pipistrelle	Continual	Foraging
5	20:38	Common pipistrelle	2	Commuting
6	20:42	Soprano pipistrelle	Continual	Foraging
7	20:43	2x Common pipistrelle	Continual	Foraging
8	20:45	Soprano pipistrelle	1	Commuting
PCD	20:50-20:55			
PCE	21:00-21:05			
PCF	21:09-21:14			
9	21:20	Common pipistrelle	Continual	Foraging
PCG	21:22-21:27			
10	21:22	Common pipistrelle	2	Commuting
11	21:22	Soprano pipistrelle	1	Commuting
12	21:27	2x Common pipistrelle	1	Commuting
13	21:28	Soprano pipistrelle	2	Commuting
14	21:28	Myotis species	1	Commuting
PCH	21:31-21:36			
15	21:37	Common pipistrelle	1	Commuting
16	21:43	Common pipistrelle	1	Commuting
PCI	21:46-21:51			
17	21:47	2x Soprano pipistrelle	3	Foraging
18	21:51	Common pipistrelle	2	Commuting
19	21:52	Common pipistrelle	1	Commuting
20	21:53	Soprano pipistrelle	2	Commuting

Hallam Land Management

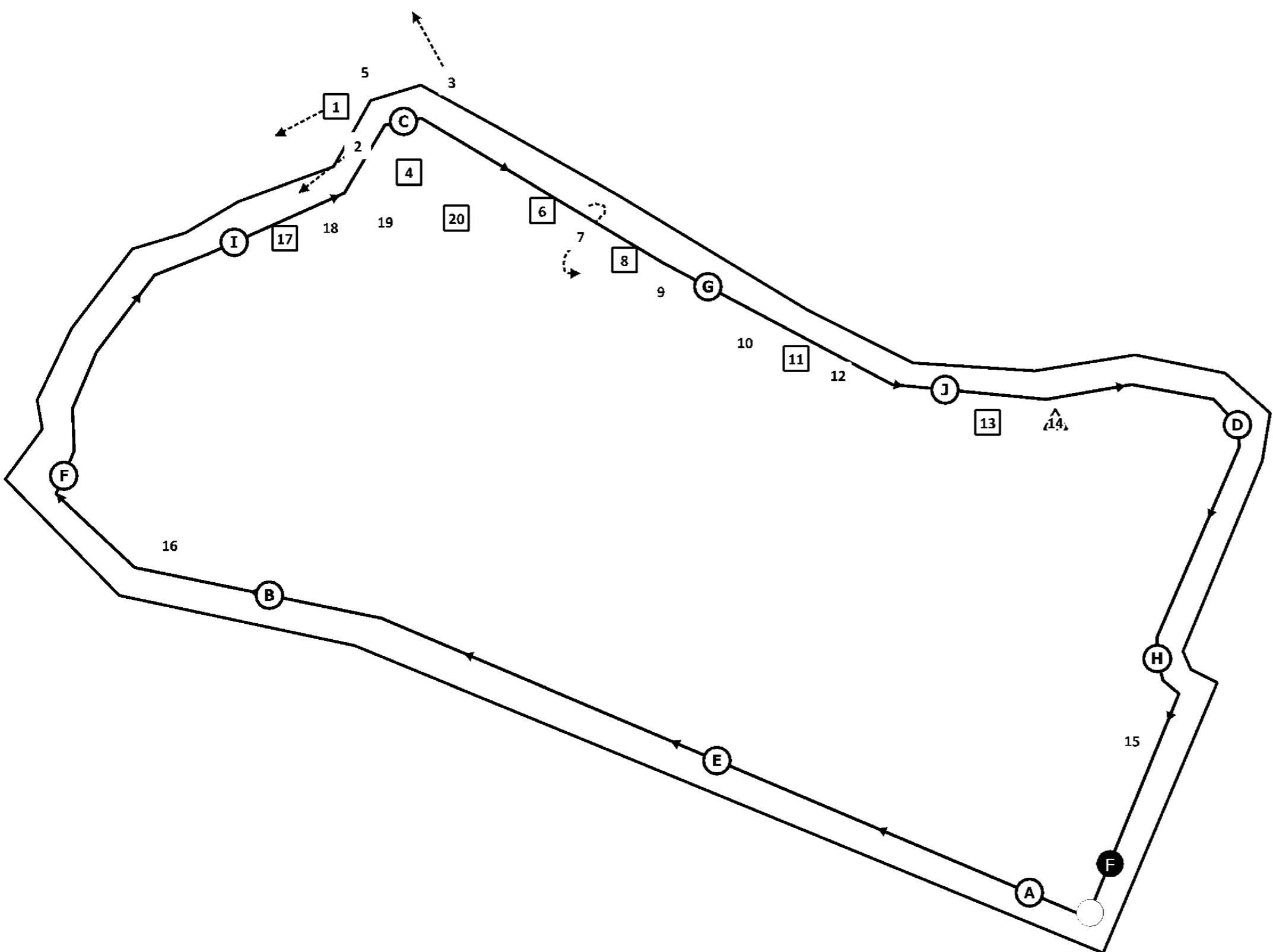
Land West of Pagham Road,
Pagham

BAT TRANSECT PLAN - 22.04.2021

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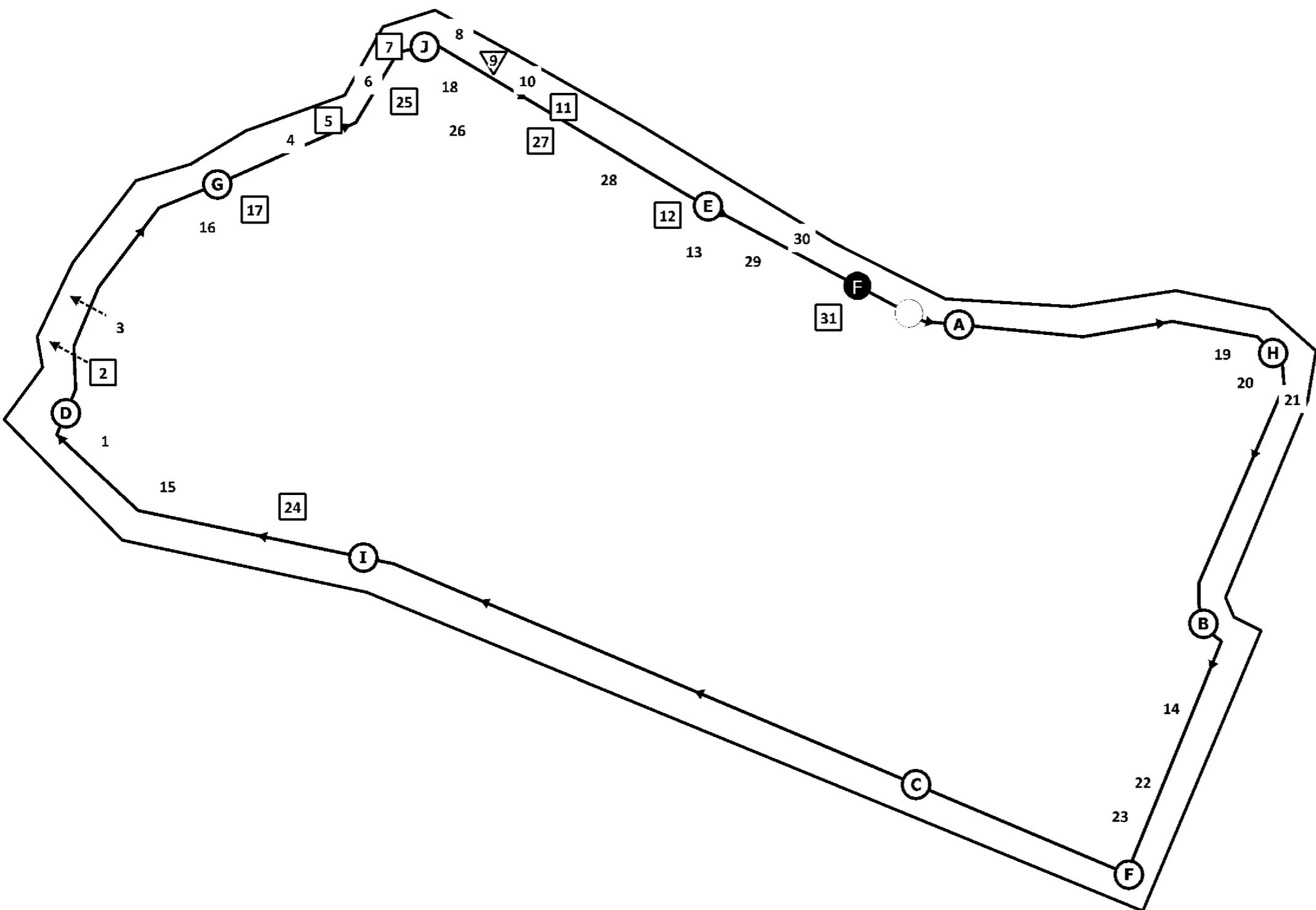
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Figure 2



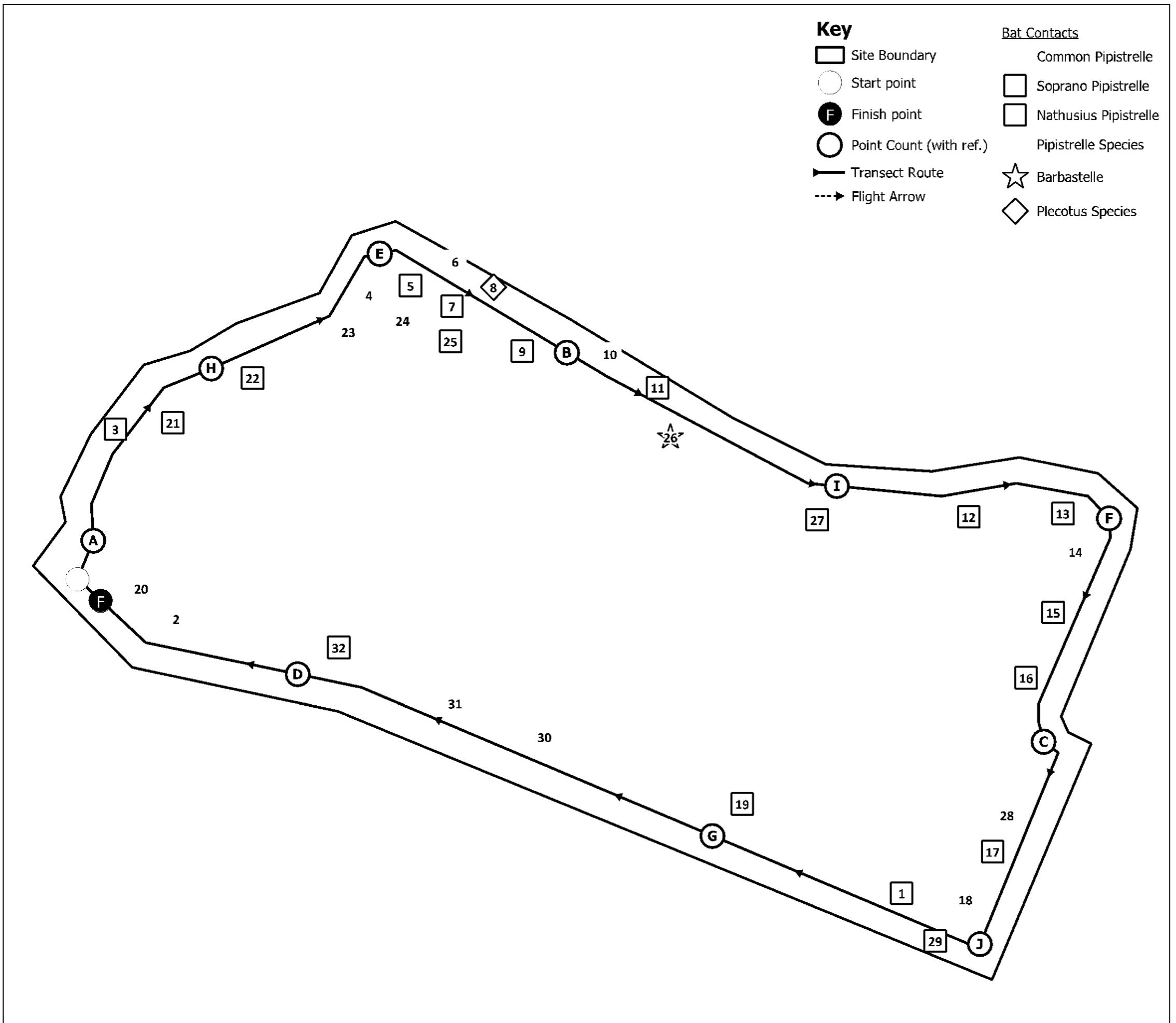
Key

Bat Contacts	
 	Site Boundary
 	Start point
F	Finish point
 	Point Count (with ref.)
 	Transect Route
 	Flight Arrow
 	Noctule



Plan Reference	Time	Species	Passes	Behaviour
Start	21:15			
PCA	21:15-21:20			
PCB	21:26-21:31			
PCC	21:35-21:40			
PCD	21:46-21:51			
1	21:46	Common Pipistrelle	5	Foraging
2	21:48	Soprano Pipistrelle	2	Commuting
3	21:49	Pipistrellus species	1	Commuting
4	21:53	Common Pipistrelle	1	Commuting
5	21:53	Soprano Pipistrelle	2	Commuting
6	21:55	Common Pipistrelle	6	Foraging
7	21:55	Soprano Pipistrelle	6	Foraging
8	21:56	Common Pipistrelle	1	Commuting
9	21:56	Noctule	2	Commuting
10	21:57	Common Pipistrelle	Continuous	Foraging
11	21:57	Soprano Pipistrelle	Continuous	Foraging
PCE	22:00-22:05			
12	22:00	Soprano Pipistrelle	Continuous	Foraging
13	22:01	Common Pipistrelle	Continuous	Foraging
14	22:09	Nyctalus species	2	Commuting
PCF	22:11-22:16			
15	22:21	Common Pipistrelle	2	Commuting
PCG	22:23-22:28			
16	22:26	Common Pipistrelle	3	Foraging
17	22:26	Soprano Pipistrelle	1	Commuting
18	22:29	Common Pipistrelle	1	Commuting
PCH	22:33-22:38			
19	23:35	Nyctalus species	1	Commuting
20	23:36	Common Pipistrelle	1	Commuting
21	22:38	Common Pipistrelle	1	Commuting

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BAT TRANSECT PLAN - 10.06.2021



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Plan Reference	Time	Species	Passes	Behaviour
Start	19:07			
PCA	19:07-19:12			
PCB	19:15-19:20			
PCC	19:24-19:29			
1	19:30	Soprano Pipistrelle	1	Commuting
PCD	19:33-19:38			
2	19:39	Common Pipistrelle	1	Commuting
3	19:41	Soprano Pipistrelle	1	Commuting
PCE	19:44-19:49			
4	19:44	Common Pipistrelle	2	Commuting
5	19:47	Soprano Pipistrelle	1	Commuting
6	19:49	Common Pipistrelle	2	Commuting
7	19:49	Soprano Pipistrelle	2	Commuting
8	19:50	Plecotus species	1	Commuting
9	19:52	Nathusius Pipistrelle	2	Commuting
10	19:52	Common Pipistrelle	Continuous	Foraging
11	19:53	Soprano Pipistrelle	1	Commuting
12	19:55	Nathusius Pipistrelle	3	Foraging
PCF	19:56-20:01			
13	19:57	Soprano Pipistrelle	1	Commuting
14	20:00	Pipistrellus species	1	Commuting
15	20:01	Soprano Pipistrelle	3	Foraging
16	20:02	Nathusius Pipistrelle	1	Commuting
17	20:04	Soprano Pipistrelle	4	Foraging
18	20:04	Common Pipistrelle	2	Commuting
PCG	20:07-20:12			
19	20:14	Soprano Pipistrelle	2	Commuting
20	20:15	Pipistrellus species	4	Foraging
21	20:17	Soprano Pipistrelle	1	Commuting
PCH	20:18-20:23			
22	20:18	Soprano Pipistrelle	Continuous	Foraging
23	20:24	Pipistrellus species	3	Foraging
24	20:24	Common Pipistrelle	1	Commuting
25	20:25	Soprano Pipistrelle	Continuous	Foraging
26	20:27	Barbastelle	1	Commuting
PCI	20:28-20:33			
27	20:29	Soprano Pipistrelle	2	Commuting
28	20:36	Common Pipistrelle	1	Commuting
PCJ	20:37-20:42			
29	20:41	Soprano Pipistrelle	1	Commuting
30	20:54	Common Pipistrelle	4	Foraging
31	20:55	Pipistrellus species	2	Commuting
32	20:59	Soprano Pipistrelle	1	Commuting

Hallam Land Management

Land West of Pagham Road,
Pagham

BAT TRANSECT PLAN - 20.09.2021

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Figure 4

APPENDIX E-1: STATIC BAT DETECTOR DATA

Recording Period	Species Recorded and Registrations																		
	No. Of hours analysed	Common Pipistrelle			Soprano Pipistrelle			Nathusius' pipistrelle			Pipistrelle species			Myotis species			Serotine		
		Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total
22 nd -27 th April 2021	52	20.43	331	1075	6.48	113	341	0.21	6	11	0.63	9	33	0.04	1	2	0.04	2	2
	52	1.56	28	82	0.84	13	44	0	0	0	0.15	3	8	0	0	0	0	0	0
10 th -15 th June 2021	42	186.6	1955	7966	42.99	515	1835	0.94	26	40	1.59	39	68	0.23	7	10	2.37	90	101
	42	15.81	353	675	5.93	91	253	0.14	3	6	1.57	52	67	0.68	10	29	0.09	3	4
20 th -25 th September 2021	64	1.92	69	124	3.33	76	215	0.14	4	9	0.09	3	6	0.22	4	14	0	0	0
	64	57.38	1685	3700	10.5	208	677	4.81	89	310	0.4	9	26	1.57	25	101	0	0	0

Recording Period	Species Recorded and Registrations																			
	No. Of hours analysed	Brown long-eared			Barbastelle			Noctule			Nyctalus/Eptesicus sp.			Nyctalus sp.			Leisler's			Total Reg.
		Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	Av.per hour	Peak Count	Total	
22 nd -27 th April 2021	52	0.02	1	1	0	0	0	0.02	1	1	0	0	0	0	0	0	0	0	0	1466
	52	0.04	2	2	0	0	0	0.02	1	1	0	0	0	0	0	0	0	0	0	137
10 th -15 th June 2021	42	0.4	6	17	0.05	1	2	0.21	6	9	0.66	18	28	0.02	1	1	0.02	1	1	10078
	42	0.16	3	7	0.12	3	5	0.84	34	36	0	0	0	0.28	6	12	0	0	0	1094
20 th -25 th September 2021	64	0.08	2	5	0.14	3	9	0.03	1	2	0	0	0	0.03	1	2	0	0	0	386
	64	0.9	13	58	0.74	17	48	0.03	2	2	0	0	0	0.05	2	3	0	0	0	4925



Hallam Land Management

Land West of Pagham Road, Pagham

APPENDIX F - BREEDING BIRD SURVEYS

December 2021

FPCR Environment and Design Ltd

Registered Office: Lockington Hall, Lockington, Derby DE74 2RH

Company No. 07128076. [REDACTED]

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APPENDIX

Appendix F-1: Breeding Bird Survey Results 2021

1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management to present the results of breeding bird surveys completed on Land West of Pagham Road, West Sussex (central OS Grid Reference SZ891698).
- 1.2 The scope and objectives of the report are to:
 - present the findings of the breeding bird surveys undertaken between April and May 2021;
 - assess the relative importance of the survey area for the breeding bird assemblage; and
 - review the site proposals and provide recommendations for mitigation, compensation, and enhancement where required.

Site Context

- 1.3 The site is 4.9ha and lies to the west of Pagham Road and north of Pagham. The site is dominated by an arable field, with a pocket of ruderal vegetation in the south-eastern corner; hedgerows and ditches (dry and wet) ran along the northern and western boundaries, with residential dwelling to the south.
- 1.4 The proposals are for the creation of a residential development with up to 106 new homes and associated infrastructure.

2.0 LEGISLATION AND POLICY

2.1 The Wildlife and Countryside Act (WCA) 1981 (as amended)¹ is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions, to recklessly or intentionally:

- Kill, injure or take any wild bird;
- Take, damage, or destroy the nest of any wild bird, while in use or being built; and
- Take or destroy the egg of any wild bird.

2.2 Species listed on Schedule 1 of the WCA are specially protected at all times.

2.3 Several bird species are also included on the list of species of principal importance for the conservation of biodiversity in England as required under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006². The S41 list is used to guide decision-makers, including local planning authorities, in implementing their duty under section 40 of the Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

2.4 In addition to statutory protection, some bird species are classified according to their conservation status, such as their inclusion on the Red and Amber lists of Birds of Conservation Concern (BoCC) in the UK³:

- Red List (high conservation concern) species are those that are Globally Threatened according to IUCN (International Union for the Conservation of Nature) criteria; those whose population has declined rapidly (50% or more) in recent years; and those that have declined historically and not shown a substantial recent recovery.
- Amber List (medium conservation concern) species are those with an unfavourable conservation status in Europe; those whose population or range has declined moderately (between 25% and 49%) in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.
- Green List (low conservation concern) species that fulfil none of the above criteria.

¹ <http://www.legislation.gov.uk/ukpga/1981/69> [Accessed August 2021]

² <http://www.legislation.gov.uk/ukpga/2006/16/contents> [Accessed August 2021]

³ Stanbury, A.J., Eaton, M.A., Aebscher, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds*, 114: p25.

3.0 METHODOLOGY

Desk Study

3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Sussex Biodiversity Record Centre (SxBRC)
- Multi Agency Geographic Information for the Countryside (MAGIC)⁴
- Arun District Council planning portal⁵

3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Breeding Bird Survey

3.3 Three breeding bird surveys (BBS) were undertaken in 2021; one survey per month in April, May, and June. The survey methodology employed was broadly based on that of territory mapping, as developed by the British Trust for Ornithology (BTO)⁶. All birds encountered (seen or heard) were recorded on a field survey plan using standard BTO species codes and symbols, which denote bird sex, age and behaviour (where appropriate).

3.4 The site was walked over by experienced ecologists between sunrise and 11:00am. A route was mapped out prior to the survey, with particular attention paid to linear features, such as hedgerows and tree lines, and other natural features, such as scrub or waterbodies.

3.5 The criteria used in the assessment of breeding birds has been adapted from the standard criteria proposed by the European Ornithological Atlas Committee (EOAC 1979)⁷ and are grouped into four categories:

- **Non-breeder** – flyover, or observed in unsuitable habitat
- **Possible breeder** – birds observed in suitable habitat, or a singing male recorded
- **Probable breeder** – a pair observed in suitable habitat, territory defence behaviour, agitated behaviour, or nest building; and
- **Confirmed breeder** – active nest with chicks, recently fledged young, adult birds carrying food/faecal material for/from young.

3.6 The surveys were conducted to ascertain the sites' potential to support breeding populations of bird species that have been assessed to be of some conservation importance, including those included on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 and/or Birds of Conservation Concern (BoCC) Red or Amber lists. These species are likely to be at greatest threat in relation to further decline and are commonly referred to as 'notable' species.

⁴ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

⁵ Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

⁶ Bibby, C.J., N.D. Burgess & D.A. Hill (2000) *Bird Census Techniques*: 2nd Edition. London: Academic Press

⁷ EOAC (1979) *Categories of Breeding Bird Evidence*. European Ornithological Atlas Committee.

3.7 The surveys were not undertaken in unfavourable conditions such as heavy rain or strong wind, which may negatively affect the results (*Table 1*).

Table 1: Survey Dates and Weather Conditions

Date	Cloud Cover (%)	Rain	Wind (Beaufort scale)	Visibility
14 th April 2021	70	0	0-1	Very Good
28 th May 2021	100	0	0-1	Very Good
23 rd June 2021	20	0	0-1	Excellent

Assessment Methodology

3.8 The value of bird populations was measured using two separate approaches: nature conservation value and conservation status.

3.9 The CIEEM guidance on Ecological Impact Assessment (EIA)⁸ assesses nature conservation value within a geographical context. To attain each level of value, an ornithological resource or one of the features (species population or assemblage of species) should meet the criteria set out in *Table 2*. In some cases, professional judgement may be required to increase or decrease the allocation of the specific value, based upon local knowledge.

3.10 In order for a species to obtain a conservation value as Local Level or higher, they must regularly occur in sustainable populations within the site boundaries.

3.11 The most recent annual bird report for Sussex⁹ was then consulted to inform the conservation status of species within the county.

⁸ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.1)*. Chartered Institute of Ecology and Environmental Management, Winchester.

⁹ Sussex Ornithological Society (2020) *The Sussex Bird Report 2019 (72nd Annual Report)*.

Table 2: Evaluation Criteria

Nature Conservation Value	Selection Criteria
International	<ul style="list-style-type: none"> • A species which is part of the cited interest of a SPA, and which regularly occurs in internationally, or nationally important numbers. • A species present in internationally important numbers (>1% of international population).
National	<ul style="list-style-type: none"> • A species which is part of the cited interest of a SSSI, and which regularly occurs in nationally or regionally important numbers. • A nationally important assemblage of breeding or over-wintering species. • A species present in nationally important numbers (>1% UK population). • Rare breeding species (<300 breeding pairs in the UK).
Regional	<ul style="list-style-type: none"> • Species listed as Priority Species under Schedule 41 of the Natural Environment and Rural Communities (NERC) Act (2006), which are not covered above, and which regularly occurs in regionally important numbers. • Species present in regionally important numbers (>1% of regional population). • Sustainable populations of species that are rare or scarce within a region. • Species on the BoCC Red List and which regularly occurs in regionally important numbers.
County	<ul style="list-style-type: none"> • Species listed as Priority Species under Schedule 41 of the Natural Environment and Rural Communities (NERC) Act (2006), which are not covered above, and which regularly occurs in county important numbers • Species present in county important numbers (>1% of county population). • Sustainable populations of species that are rare or scarce within a county or listed as priority species for nature conservation under S41 of the NERC Act. • A site designated for its county important assemblage of birds (e.g., a SINC Site). • Species on the BoCC Red List and which regularly occur in county important numbers.
Local	<ul style="list-style-type: none"> • Other species of conservation interest (e.g., all other species on the BoCC Red and Amber List or listed as Priority Species under Schedule 41 of the NERC Act (2006) which are not covered above) regularly occurring in locally sustainable populations. • Sustainable populations of species which are rare or scarce within the locality.
Site	<ul style="list-style-type: none"> • Species that are common and widespread

4.0 RESULTS

Desk Study

Designated Sites

4.1 There are two international designations within 2km of the site. The Pagham Harbour SPA, Ramsar, SSSI, LNR lies approximately 1.35km south-west. This is an important site due to its extensive area of saltmarsh and tidal mudflats with surrounding lagoons, shingle, open water, reed swamp and permanent wet grassland. These habitats support a wide array of species including internationally important populations numbers of wintering pintail *Anas acuta* and nationally important numbers of dark-bellied brent goose *Branta bernicla bernicla*, grey plover *Pluvialis squatarola* and black-tailed godwit *Limosa limosa*.

4.2 The Solent & Dorset Coast SPA lies approximately 1.6km south of site. It was designated in 2020 for regularly supporting breeding populations of sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sternula albifrons*, which utilise the coast for foraging.

4.3 In addition, the Bognor Reef SSSI is situated approximately 1.3km south of site. It includes an extensive area of vegetated shingle, a rare habitat, and an old sand dune which supports the nationally endangered chidling pink *Petrorhagia nanteuilii*.

Notable Bird Records

4.4 Consultation data from SxBRC included various protected and notable bird species within 1km of the site boundaries; summarised in *Table 3* and *Figure 1*.

4.5 A large volume of bird records were also returned from SxBRC from between 1-2km of the site, occurring in surrounding farmland to the north and residential land to the east. These included but were not limited to; herring gull *Larus argentatus*, stock dove *Columba oenas*, merlin *Falco columbarius*, house sparrow *Passer domesticus*, starling, tawny owl *Strix aluco*, and barn owl *Tyto alba*.

Table 3: Notable and Protected Bird Species Records within 1km of Site

Species	Conservation Status	Dates	Approximate Location Relative to Site Boundary
Black-tailed godwit <i>Limosa limosa</i>	WCA Sch1 Red List	2011 - 2019	Multiple records, nearest 239m SW
Kestrel <i>Falco tinunculus</i>	Amber List	2014 - 2017	Multiple records, nearest 557m NE
White-fronted goose <i>Anser albifrons</i>	Red List	2010 - 2014	Two records, nearest 591m W
Cuckoo <i>Cuculus canorus</i>	NERC S41 Red List	2015 - 2020	Multiple records, nearest 959m W
Barn owl <i>Tyto alba</i>	WCA Sch1	2014 - 2019	Multiple records, nearest 1051m N
Starling <i>Sturnus vulgaris</i>	NERC S41 Red List	2018	Multiple records, nearest 1074m E

4.6 A large proportion of the records were of waterbirds associated with the nearby Pagham Harbour SPA, located between 1.49 and 2.04km southwest, and included pintail *Anas acuta*, teal *A. crecca*, mallard *A. platyrhynchos*, pochard *Aythya ferina*, scaup *A. marlia*, mute swan *Cygnus olor*, shelduck *Tadorna tadorna*, oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, avocet *Recurvirostra avosetta*, ruff *Calidris pugnax*, curlew *Numenius arquata*, kingfisher *Alcedo atthis*, and bittern *Botaurus stellaris*.

4.7 Corncrake *Crex crex*, skylark *Alauda arvensis*, Cetti's warbler *Cettia cetti*, linnet *Linaria cannabina*, and bearded reedling *Panurus biarmicus* were also recorded in habitats associated with, or nearby the SPA.

Nearby Applications

4.8 A search of the Arun District Council planning portal revealed BBS were completed for two planning applications nearby.

4.9 Three BBS were undertaken between April and June 2016 at Hook Lane (P/30/19/OUT), approximately 25m east of the site. Notable species included:

- House sparrow *Passer domesticus* (NERC, Red List) – Confirmed breeder
- Dunnock *Prunella modularis* (NERC, Amber List) – Probable breeder
- Linnet *Linaria cannabina* (NERC, Red List) – Possible breeder
- Song thrush *Turdus philomelos* (NERC, formerly Red List) – Possible breeder
- Starling *Sturnus vulgaris* (NERC, Red List) – Possible breeder
- Yellowhammer *Emberiza citrinella* (NERC, Red List) – Possible breeder

4.10 Six surveys were completed between April and June 2014 at Summer Lane (P/58/15/OUT), approximately 280m south. Notable species identified on site to be breeding or likely breeding included:

- Dunnock
- Green woodpecker *Picus viridis* (formerly Amber List)
- House martin *Delichon urbica* (formerly Amber List)
- House sparrow
- Song thrush
- Starling
- Swallow *Hirundo rustica* (formerly Amber List)
- Whitethroat *Sylvia communis* (Amber List)

Field Surveys

Breeding Bird Survey in 2021

4.11 Over the course of three BBS, a total of 30 bird species were recorded within site. A full table of results is provided in *Appendix A*.

4.12 Of the 30 recorded bird species, twelve were found to be of conservation importance due to their inclusion under WCA Schedule 1, NERC Section 41 and/or the BoCC Red or Amber lists, these are listed below, detailed in *Table 4* and *Figure 2*:

- Confirmed breeders – starling
- Probable breeders – Cetti's warbler, house sparrow, greenfinch *Chloris chloris* and dunnock
- Possible breeders – willow warbler *Phylloscopus trochilus*, song thrush *Turdus philomelos* and linnet
- Non-breeders – mallard, herring gull, stock dove and black-headed gull *Chroicocephalus ridibundus*

4.13 The remaining 19 species were common and widespread and, as such, were not of conservation concern due to their inclusion on the BoCC green list. These include blackbird *Turdus merula*, robin *Erythacus rubecula*, woodpeckers, several tit species (blue *Cyanistes caeruleus* and great *Parus major*) and non-native species collared dove *Streptopelia decaocto* and feral pigeon *Columba livia*.

4.14 Following the release of the fifth BoCC review on 1st December 2021 during the preparation of this report; wren *Troglodytes troglodytes*, wood pigeon *Columba palumbus* and rook *Corvus frugilegus* have been added to the Amber List. These species have not however been included within *Table 4* and *Figure 2* as their status as Amber List species is associated with their international population and the relative significance of the UK population comparative to other countries. This shift is not due to a decline in the UK populations of each species and all three remain common and widespread across both Sussex and the United Kingdom.

4.15 No species identified within the site boundaries or surrounding area during the BBS were recorded in significant numbers.

4.16 Cetti's warbler, a probable breeder, was the only species listed under Schedule 1 of the WCA encountered on site.

Table 4: Species of Conservation Importance On-Site with Breeding Status

Species	Conservation Status	Survey Area Breeding Status	Breeding Status in West Sussex
Mallard <i>Anas platyrhynchos</i>	Amber List	<p><i>Non-breeder</i></p> <p>Mallards were observed during all three breeding bird surveys, in varying numbers, peaking at 17 individuals, recorded in May. Records of mallards occurring within the site boundaries each month were entirely comprised of flyovers from individuals or small groups.</p>	Common resident and winter visitor.
Black-headed gull <i>Chroicocephalus ridibundus</i>	Amber List	<p><i>Non-breeder</i></p> <p>Black-headed gulls were observed during the May and June breeding bird surveys, in similarly low numbers (between two and six). Most records of black-headed gulls occurring within the site boundaries during May and June were comprised of flyovers from individuals or small groups. One individual was recorded during the June survey loafing in south-eastern part of the arable field.</p>	Common breeding species and very common to abundant passage migrant and winter visitor.
Herring gull <i>Larus argentatus</i>	Red List	<p><i>Non-breeder</i></p> <p>Herring gulls were observed during all three breeding bird surveys, in similarly low numbers (between one and six). Records of herring gulls occurring within the site boundaries each month were entirely comprised of flyovers from individuals or small groups.</p>	Very common resident; status uncertain as passage migrant and winter visitor.
Stock dove <i>Columba oenas</i>	Amber List	<p><i>Non-breeder</i></p> <p>A single stock dove was observed in May 2021 flying into the site from the east, landing near the scrub belt that borders the western boundary of the site, parallel with ditch D2 and contiguous with the scrub that surrounds the pond immediately west of the site. The species was not encountered in April or June.</p>	Common resident and possible winter visitor.
Cetti's Warbler <i>Cettia cetti</i>	Green List WCA Sch1	<p>Probable Breeder</p> <p>Cetti's warblers were recorded on all three surveys. Two males were heard singing separately during the April survey; one of which was identified in the scrub bordering the pond immediately adjacent to the site, the other in nearby scrub along ditch D2. The latter individual was recorded singing during subsequent surveys in May and June, from the same approximate location, suggesting it was holding territory over the course of the 2021 breeding season.</p>	Fairly common and increasing resident; passage migrant and winter visitor.
Willow Warbler <i>Phylloscopus trochilus</i>	Amber List	<p>Possible Breeder</p> <p>A single male willow warbler was heard singing from the hedgerow along the eastern site boundary in April. The species was not encountered during subsequent surveys.</p>	Common but declining summer visitor and passage migrant.

Species	Conservation Status	Survey Area Breeding Status	Breeding Status in West Sussex
Song thrush <i>Turdus philomelos</i>	Amber List NERC S41	<p>Possible Breeder</p> <p>A single male song thrush was heard singing from the north-eastern edge of the scrub surrounding the pond immediately to the west during April. The species was not encountered during subsequent surveys.</p>	Very common but decreasing resident and partial migrant; common passage migrant and winter visitor.
Starling <i>Sturnus vulgaris</i>	Red List NERC S41	<p>Confirmed Breeder</p> <p>Starlings were recorded on each survey in comparatively low numbers, with between one and three individuals recorded sporadically from within the hedgerows bordering the site. Several starlings were also recorded as flyovers, passing across the site individually, or in small groups, with a peak of 12 observed during the June survey.</p>	Common but declining resident and very common to abundant winter visitor.
Dunnock <i>Prunella modularis</i>	Amber List NERC S41	<p>Probable Breeder</p> <p>Dunnock were encountered during each survey in relatively low numbers, peaking at six, recorded in April 2021. Dunnock were identified from all the boundary hedgerows bordering the site. Three males were heard singing on multiple surveys from the same location, including hedgerows H2, H3 and H6, suggesting they were holding breeding territory.</p>	Very common resident.
House sparrow <i>Passer domesticus</i>	Red List NERC S41	<p>Probable Breeder</p> <p>House sparrows were recorded on each survey, comprised of single individuals, small groups, and colonies. House sparrows were identified from most of the boundary hedgerows, with scattered records from hedgerows H3, H5 and H6; however most were found in association with the southern boundary hedgerow H2, adjacent to the caravan park. A resident colony of house sparrows was consistently recorded from the far southern end of hedgerow H1 at the south-easternmost corner of the site.</p>	Very common but possibly declining resident.
Linnet <i>Carduelis cannabina</i>	Red List NERC S41	<p>Possible Breeder</p> <p>Four linnet was recorded in April, two were identified from the northern edge of the scrub surrounding the pond immediately west of the site, with another two observed from the western end of hedgerow H4, which forms the northern site boundary. The species was not encountered during subsequent surveys.</p>	Fairly common but decreasing resident and partial migrant.
Greenfinch <i>Chloris chloris</i>	Red List	<p>Probable Breeder</p> <p>Greenfinch were recorded on each survey, with only individuals in April and June 2021. Two pairs were observed on site in May 2021 within the hedgerows in the north-east corner of the site.</p>	Common but declining resident.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 The overall breeding bird assemblage recorded within the site is typical of edge-of-settlement farmland. It provides suitable nesting and foraging habitat for a range of bird species, in the form of hedgerows, ditches and arable land, with most species recorded in association with one or more of these features.

5.2 Most species observed within the survey area are common and widespread, both nationally and within the county of West Sussex. As such, their occurrence during the surveys is considered typical and would be expected on a site of this nature. Those species recorded on the site that are vulnerable to impacts resulting from the proposed development are the confirmed, probable, and possible breeding notable species; in this case, Cetti's warbler, willow warbler, song thrush, greenfinch, starling, dunnock, house sparrow, and linnet.

5.3 The notable non-breeding species, which were almost entirely flyovers, are considered unlikely to be negatively impacted by the proposals, since they do not appear to utilise the site as a breeding resource.

Impact Assessment

5.4 The most likely impacts from the development on the assemblage recorded would be:

- Direct loss/change of breeding habitat.
- Disturbance during construction and/or operation.

Farmland Species

5.5 Linnet, a notable species typically associated with farmland habitats, was documented within the site. Linnet numbers recorded within the survey area were lower than the numbers recorded elsewhere in West Sussex. Linnet were recorded in 384 tetrads across Sussex, with 421 records during BBS surveys. Breeding was confirmed in 15 tetrads, and probable in a further 61, suggesting breeding was widespread across the county. Additionally, there were 15 counts of 50 or more. As such, the small population of linnet, occurring infrequently within the site, is considered unremarkable in the context of West Sussex as a whole, and as such this species is unlikely to be significantly affected by the proposed development.

5.6 It is likely that a proportion of arable specialist birds, including linnet, will be displaced from site post-development, as a direct result of the land use change from arable to residential, and therefore will be adversely impacted at a local level. However, the northern section of the site, which is outside the residential development footprint, where many of the linnets were observed, will be retained, with existing scrub retained and bolstered. As such, the low numbers of linnet will likely continue to be supported by the habitat in the northern portion of the site, as well as the neighbouring areas of farmland, which are separated from the development by ditches.

Urban Edge Species

5.7 Starling, greenfinch, and house sparrow are species typically found near human habitation, with house sparrow particularly favouring hedgerows and gardens. The network of gardens, hedgerows, and buildings to be created post-development, along with new grassland buffers, will continue to support these species.

Hedgerow and Woodland Species

5.8 Song thrush, dunnock, and willow warbler (all assessed as possible breeders) typically breed in association with thick hedgerows, dense scrub, and/or broadleaved woodland habitats and as such their presence is not unexpected within site. In the context of West Sussex, none of these species were recorded in exceptional numbers, with only a single willow warbler and song thrush recorded on a single survey each, while dunnocks were recorded on each survey, peaking at six individuals in April. The populations of these species are considered of no more than local conservation value.

5.9 Under the current proposals, the existing hedgerows and tree lines are to be retained and buffered, with linear expanses of green infrastructure that will pass along the boundaries of the site. These areas will comprise new tree and shrub planting that will benefit each of these species, with the northern and western boundaries to be planted up to form new woodland belts.

Wetland Species

5.10 Cetti's warbler (assessed as a probable breeder) was recorded along the western edge of the site. These species breed in dense, low-lying scrub, typically composed of willow and bramble, often near reedbeds, and as such their occurrence is not unexpected due to the ditches present, which will be retained.

5.11 The peripheral scrub habitat backing onto the ditches, in which Cetti's warbler occurred, will be retained, enhanced, and strengthened under current proposals through additional planting of linear structural features, including hedgerows and native scrub, and will consequently be unaffected by the development. In addition, a new attenuation basin, with associated trees, scrub and marginal planting, will be incorporated into the GI on the northwest edge of the site, habitat suitable for Cetti's warbler.

Mitigation and Compensation

5.12 Measures to ensure that breeding birds are not disturbed during construction will be provided within a Construction and Environmental Management Plan (CEMP) at Reserved Matters stage. This will ensure that no offences are committed under the Wildlife and Countryside Act 1981 (as amended). Recommendations will include:

- Removal of any vegetation suitable for nesting birds will take place outside of the bird breeding season (March to August inclusive) to protect nesting birds.
- If vegetation removal is required during the bird breeding season, it should first be inspected by a suitably qualified ecologist. If an active nest is discovered, the vegetation containing the nest will remain in situ and an appropriate buffer adopted, as stipulated by the ecologist. The removal of vegetation can only be undertaken once young birds have fledged.
- Retained hedgerows and other woody habitats should be protected with Heras fencing or similar to protect them from accidental damage or disturbance.

5.13 The retention of suitable breeding habitats, particularly the boundary hedgerows and tree lines, as well as the adjacent ditches and surrounding scrub, will ensure continued use of the site by local bird populations.

5.14 New habitat creation, including a native species tree line, attenuation basin with associated marginal planting and species-rich grassland buffers will increase foraging and nesting resources available for local bird populations, while appropriate management of existing, retained habitat will help protect nesting/roosting birds from predation. New hedgerow planting will also compensate for the partial loss of hedgerow H6.

5.15 The proposed development will not be able to replicate farmland habitats lost during the proposed development, but the overall adverse effects on the breeding farmland bird assemblage can be reduced and offset by appropriate mitigation and management of the retained areas that will benefit breeding birds in general.

5.16 Where feasible, hedgerows will benefit from the creation of wide headlands to ensure they are buffered from the development. Strips of species-rich grassland will be sown in front of the hedgerows, where possible, to separate the hedgerows from the development footprint. These will be allowed to form a diverse tussock-forming structure, which, once established, would increase the value of the hedgerows as wildlife corridors.

5.17 An appropriate management regime should be implemented to maximise the nature conservation of habitats on site. This can be secured through appropriate planning conditions for a Landscape and Ecological Management Plan (LEMP). Recommendations include:

- Hedgerow cutting on a three-year rotational basis, once established, to form a thick A-shape structure with dense bases. This provides protection against predation and additional nesting opportunities.
- Supplementary planting of native species within newly created hedgerows and tree lines, where required, to prevent gaps forming and maintain corridors of movement across the site and into the wider landscape.

Enhancements

5.18 Proposals for the site include the provision of new habitats within the GI, which will benefit a range of bird species. This includes:

- Planting of a native species woodland belt along the northern and western boundaries to add structural and species diversity. This will enhance the site for many of the woodland edge generalists recorded, such as blackbird, chaffinch *Fringilla coelebs* and robin.
- The creation of dense patches of native scrub/shrubs within grassland mosaics may also attract species such as bullfinch, mistle thrush and spotted flycatcher.
- Buffered areas adjacent to hedgerows and within larger areas of green space will be planted with a species-rich meadow grassland mix, incorporating vetch species, common bird's-foot-trefoil *Lotus corniculatus*, white and red clover *Trifolium repens/pratense*, black medick *Medicago lupulina* and common fumitory *Fumaria officinalis*. This would provide a valuable foraging resource for seed specialists and will support a diverse invertebrate assemblage for insectivorous migrant species, such as warblers.
- Marginal planting, including both herbaceous and woody species, around the margins of the attenuation basin, including reed where appropriate, will increase the amount of habitat available to wetland species such as Cetti's warbler, reed bunting *Emberiza schoeniclus*, moorhen *Gallinula chloropus* and mallard.

5.19 A mixture of bird boxes should be installed within retained habitats. Specialised boxes can also be designed into the built environment. Recommendations include:

- A mixture of small hole (26mm and 32mm) boxes placed throughout the site on suitable trees and buildings to provide nesting opportunities for blue tit and great tit. These boxes generally have a high uptake rate.
- Larger nest boxes with a 45mm hole should be placed under the eaves of buildings or approximately 2.5m above ground in trees to provide nesting opportunities for starling.
- Terraced-style or multiple single-holed 32mm nest boxes should be placed on buildings to attract house sparrows.
- Small open fronted nest boxes should be placed throughout the site, especially on trees that support a climber such as ivy *Hedera helix*, which provides a degree of concealment for the nest. These boxes typically attract robin.
- A mixture of more specialised nest boxes should be placed on retained trees and new buildings particularly on the edge of new residential areas and should include boxes suitable for stock dove *Columba oenas*, kestrel, swallow *Hirundo rustica*, and swift *Apus apus*.



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Key

- Site Boundary
- 1km Buffer
- 2km Buffer

Birds

△ Avocet	+	Merlin
▲ Bearded Reedling	+	Mute Swan
△ Black-tailed Godwit	+	Oystercatcher
△ Cetti's Warbler	+	Pintail
▲ Common Firecrest	+	Pochard
△ Common Gull	+	Red Kite
▲ Common Reed Bunting	+	Redshank
△ Common Ringed Plover	+	Redstart
△ Common Sandpiper	+	Ruff
▲ Common Scoter	+	Scaup
△ Corn Bunting	+	Shelduck
▲ Corncrake	+	Short-eared Owl
▲ Cuckoo	+	Snipe
★ Curlew	+	Song Thrush
★ Eurasian Bittern	+	Spoonbill
★ Eurasian Skylark	+	Starling
★ European Herring Gull	+	Stock Dove
★ Grasshopper Warbler	+	Tawny Owl
★ Grey Partridge	+	Teal
★ Hobby	+	Tufted Duck
★ House Sparrow	+	Turtle Dove
★ Kestrel	+	Western Barn Owl
★ Kingfisher	+	Western Yellow Wagtail
★ Lapwing	+	Wheatear
★ Linnet	+	Whinchat
	+	White-fronted Goose
	+	Whooper Swan
	+	Wood Warbler
	+	Yellow-legged Gull

Hallam Land Management

Land West of Pagham Road,
Pagham

fpcr

BIRD CONSULTATION PLAN

Scale 1:16000 Date 6/12/2021

Figure 1

Key

- Site Boundary
- Fly Over Only
- ♀ Pair symbol
- NERC Species of Principle Importance
- Schedule 1 Species
- Confirmed Breeder
- Probable Breeder
- Possible Breeder
- Non-breeder

BoCC Red Listed Species

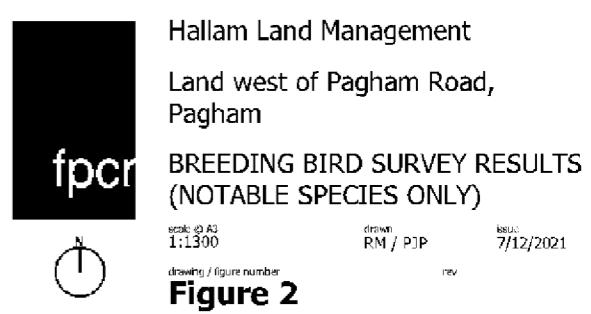
- GR Greenfinch
- HG Herring Gull
- HS House Sparrow
- LI Linnet
- SG Starling

BoCC Amber Listed Species

- Black-headed Gull
- Dunnock
- Mallard
- Song Thrush
- Stock Dove
- Willow Warbler

Date Reference:

- A - 14.04.2021
- B - 28.05.2021
- C - 23.06.2021



APPENDIX F-1: BREEDING BIRD SURVEY RESULTS & CATEGORISATION OF BREEDING STATUS

Survey	Surveyor	Date	Cloud (%)	Rain	Wind	Visibility
1	OMS	14.04.21	70	None	1	V. Good
2	LC	28.05.21	100	None	1	V. Good
3	RM	23.06.21	20	None	1	Excellent

British Common Name	Latin name	Survey 1	Survey 2	Survey 3	Conservation Status & Protection	Breeding status ¹
Canada goose	<i>Branta canadensis</i>	(2 flyovers)	-	-	Not listed	Non-breeder – F
Mallard	<i>Anas platyrhynchos</i>	(2 flyover)	(17 flyovers)	(2 flyovers)	Amber list	Non-breeder – F
Cormorant	<i>Phalacrocorax carbo</i>	-	(1 flyover)	(4 flyovers)	Green list	Non-breeder – F
Black-headed gull	<i>Chroicocephalus ridibundus</i>	-	(2 flyovers)	1 (+ 5 flyovers)	Amber list	Non-breeder – F
Herring gull	<i>Larus argentatus</i>	(1 flyover)	(6 flyovers)	(2 flyovers)	Red list	Non-breeder – F
Rock dove/Feral pigeon	<i>Columba livia</i>	(8 flyovers)	(4 flyovers)	-	Green list	Non-breeder – F
Stock dove	<i>Columba oenas</i>	-	1	-	Amber list	Non-breeder - UH
Woodpigeon	<i>Columba palumbus</i>	10 (+36 flyovers)	15 (+ 16 flyovers)	11 (+ 10 flyovers)	Amber list	Possible – S / H
Collared dove	<i>Streptopelia decaocto</i>	-	2 (+ 4 flyovers)	1	Green list	Possible – H
Great spotted woodpecker	<i>Dendrocopos major</i>	2	-	3	Green list	Possible – H
Magpie	<i>Pica pica</i>	4	2 + 1 family	1 (+ 1 flyover)	Green list	Confirmed – FL
Jackdaw	<i>Corvus monedula</i>	-	(2 flyovers)	(10 flyovers)	Green list	Non-breeder – F
Carriion crow	<i>Corvus corone</i>	1 (+ 4 flyovers)	1	3 (+ 4 flyovers)	Green list	Non-breeder – UH
Blue tit	<i>Cyanistes caeruleus</i>	7	3	3	Green list	Possible – H
Great tit	<i>Parus major</i>	5	-	1	Green list	Possible – S / H
Cetti's warbler	<i>Cettia cetti</i>	1	1	1	Green list WCA Sch1	Probable – T
Chiffchaff	<i>Phylloscopus collybita</i>	3	2	-	Green list	Probable – T
Willow Warbler	<i>Phylloscopus trochilus</i>	1	-	-	Amber list	Possible – S / H
Blackcap	<i>Sylvia atricapilla</i>	1	-	1	Green list	Possible – S / H
Reed warbler	<i>Acrocephalus scirpaceus</i>	-	1	-	Green list	Possible – S / H
Wren	<i>Troglodytes troglodytes</i>	6	3	2	Amber list	Probable – T
Starling	<i>Sturnus vulgaris</i>	1 (+ 3 flyovers)	3 (+ 10 flyovers)	1 (+ 12 flyovers)	Red list NERC S41	Confirmed – FF / FL
Blackbird	<i>Turdus merula</i>	3	4	6 (+ 1 flyover)	Green list	Probable – T
Song thrush	<i>Turdus philomelos</i>	2	-	-	Amber list NERC S41	Possible – S / H
Robin	<i>Erythacus rubecula</i>	9	5	4	Green list	Probable – T
Dunnock	<i>Prunella modularis</i>	6	5	2	Amber list NERC S.41	Probable – T

¹European Ornithological Atlas Committee, 1979. *Categories of Breeding Bird Evidence*. European Ornithological Atlas Committee.

British Common Name	Latin name	Survey 1	Survey 2	Survey 3	Conservation Status & Protection	Breeding status ¹
House sparrow	<i>Passer domesticus</i>	5 + 1 colony (+ 2 flyovers)	3 + 1 colony	4 + 1 colony	Red list NERC S.41	Probable – P
Chaffinch	<i>Fringilla coelebs</i>	1	2	3	Green list	Possible – H
Greenfinch	<i>Carduelis chloris</i>	1	4	1	Red list	Probable – P
Linnet	<i>Carduelis cannabina</i>	4	-	-	Red list NERC S.41	Possible – H
Goldfinch	<i>Carduelis carduelis</i>	1 (+ 2 flyovers)	5 (+ 11 flyovers)	2 (+ 5 flyovers)	Green list	Possible – H
Total No. Species		24	24	23	(30 total)	

Breeding Status evidence can be broken down into four sections, each with their own codes, as defined by the European Ornithological Atlas Committee:

Confirmed breeder

DD – distraction display or injury feigning
UN – used nest or eggshells found from this season
FL – recently fledged young or downy young
ON – adults entering or leaving nest-site in circumstances indicating occupied nest
FF – adult carrying faecal sac or food for young
NE – nest containing eggs
NY – nest with young seen or heard

Probable breeder - Evidence accumulated during the survey indicates that the bird species is breeding on site.

P – pair in suitable nesting habitat
T – permanent territory (defended over at least 2 survey occasions)
D – courtship and display
N – visiting probable nest site
A – agitated behaviour
I – brood patch of incubating bird (from bird in hand)
B – nest building or excavating nest-hole

Possible breeder - Evidence accumulated during the survey indicates that the bird species could be breeding on site, but the evidence is less conclusive than that obtained for probable breeders.

H – observed in suitable nesting habitat
S – singing male

Non-breeder

F – flying over
M – migrant
U – summering non-breeder
UH – observed in unsuitable nesting habitat



Hallam Land Management

Land West of Pagham Road, Pagham

APPENDIX G - WINTERING BIRD SURVEYS

December 2021

FPCR Environment and Design Ltd

Registered Office: Lockington

Company No. 07128076. [T]

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Figure 2: Wintering Bird Survey Results: 15th December 2020

Figure 3: Wintering Bird Survey Results: 18th January 2021

Figure 4: Wintering Bird Survey Results: 9th February 2021

Figure 5: Wintering Bird Survey Results: 25th February 2021

APPENDICES

Appendix G-1: Wintering Bird Survey Results 2020/21

1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management to present the results of wintering bird surveys completed on Land West of Pagham Road, West Sussex (central OS Grid Reference SZ891698).
- 1.2 The scope and objectives of the report are to:
 - present the findings of the wintering bird surveys undertaken between December and January 2020/21;
 - assess the relative importance of the survey area for the wintering bird assemblage; and
 - review the site proposals and provide recommendations for mitigation, compensation, and enhancement where required.

Site Context

- 1.3 The site is 4.9ha and lies to the west of Pagham Road and north of Pagham. The site is dominated by an arable field, with a pocket of ruderal vegetation in the southeastern corner; hedgerows and ditches (dry and wet) ran along the northern and western boundaries, with residential dwelling to the south.
- 1.4 The proposals are for the creation of a residential development with up to 106 new homes and associated infrastructure.

2.0 LEGISLATION AND POLICY

2.1 The Wildlife and Countryside Act (WCA) 1981 (as amended)¹ is the principal legislation affording protection to UK wild birds. Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions, to recklessly or intentionally:

- Kill, injure or take any wild bird;
- Take, damage, or destroy the nest of any wild bird, while in use or being built; and
- Take or destroy the egg of any wild bird.

2.2 Species listed on Schedule 1 of the WCA are specially protected at all times.

2.3 Several bird species are also included on the list of species of principal importance for the conservation of biodiversity in England as required under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006². The S41 list is used to guide decision-makers, including local planning authorities, in implementing their duty under section 40 of the Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

2.4 In addition to statutory protection, some bird species are classified according to their conservation status, such as their inclusion on the Red and Amber Lists of Birds of Conservation Concern (BoCC) in the UK³:

- Red List (high conservation concern) species are those that are Globally Threatened according to IUCN (International Union for the Conservation of Nature) criteria; those whose population has declined rapidly (50% or more) in recent years; and those that have declined historically and not shown a substantial recent recovery.
- Amber List (medium conservation concern) species are those with an unfavourable conservation status in Europe; those whose population or range has declined moderately (between 25% and 49%) in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.
- Green List (low conservation concern) species that fulfil none of the above criteria.

¹ <http://www.legislation.gov.uk/ukpga/1981/69> [Accessed August 2021]

² <http://www.legislation.gov.uk/ukpga/2006/16/contents> [Accessed August 2021]

³ Stanbury, A.J., Eaton, M.A., Aebscher, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. & Win, I. (2021) The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. *British Birds*, 114: p25.

3.0 METHODOLOGY

Desk Study

3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Sussex Biodiversity Record Centre (SxBRC)
- Multi Agency Geographic Information for the Countryside (MAGIC)⁴
- Arun District Council planning portal⁵

3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Winter Bird Surveys (WBS)

3.3 Given the farmland habitat and proximity of the site to nearby Pagham Harbour and Solent & Dorset Coast SPA and Ramsar sites, wintering bird surveys were undertaken to determine the nature of the wintering assemblage occurring within the site. Survey effort undertaken was proportional given the small size of the site and limited habitat diversity. Four survey visits were conducted between December 2020 and February 2021, during which few notable species were recorded on-site, none of which were qualifying species of the SPA sites. Given the limited assemblage, no more than four surveys were deemed necessary.

3.4 In addition to assessing the site's value to SPA qualifying species, these surveys were also conducted to ascertain the potential of the site to support other overwintering bird species, assessed to be of some conservation importance for their inclusion on the WCA Schedule 1, NERC S41 and / or BoCC Red or Amber lists. These species are considered likely to be at greatest threat in relation to further decline and are commonly referred to as 'notable' species.

3.5 The survey methodology employed was broadly based on that of territory mapping, as developed by the British Trust for Ornithology (BTO)⁶. All birds encountered (both seen or heard) were recorded on a field survey plan using standard BTO species codes and symbols to denote bird sex, age, and behaviour, wherever appropriate.

3.6 The site was walked over a one-day period by experienced ecologists, between sunrise and 16:00. A route was mapped out prior to the survey being undertaken, with particular attention paid to linear features, such as hedgerows and tree lines, as well as other natural features, such as areas of scrub or waterbodies.

3.7 The surveys were not undertaken in unfavourable conditions such as heavy rain or strong wind, which may negatively affect the results (Table 1).

⁴ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

⁵ Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

⁶ Bibby, C.J., N.D. Burgess & D.A. Hill, (2000). *Bird Census Techniques*: 2nd Edition. London: Academic Press

Table 1: Wintering Bird Survey Dates and Weather Conditions

Date	Cloud Cover (%)	Rain	Wind	Visibility
15.12.20	60	None	2-3	Very Good
18.01.21	90	None	2-3	Very Good
09.02.21	100	None	0-1	Very Good
25.02.21	90	Light drizzle (10:50-11:48)	1-2	Good

Assessment Methodology

3.8 The value of bird populations on site has been measured using two separate approaches: nature conservation value and conservation status.

3.9 The CIEEM guidance on Ecological Impact Assessment (EclA)⁷ assesses nature conservation value within a geographical context. To attain each level of value, an ornithological resource or one of the features (species population or assemblage of species) should meet the criteria set out in Table 2. In some cases, professional judgement may be required to increase or decrease the allocation of the specific value, based upon local knowledge.

3.10 In order for a species to obtain a conservation value as Local Level or higher, they must regularly occur in sustainable populations within the site boundaries.

3.11 The most recent annual bird report for Sussex⁸ was then consulted to inform the conservation status of species within the county.

⁷ CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (version 1.1)*. Chartered Institute of Ecology and Environmental Management, Winchester.

⁸ Sussex Ornithological Society (2020) *The Sussex Bird Report 2019 (72nd Annual Report)*.

Table 2: Evaluation Criteria

Nature Conservation Value	Selection Criteria
International	<ul style="list-style-type: none"> • A species which is part of the cited interest of a SPA, and which regularly occurs in internationally, or nationally important numbers. • A species present in internationally important numbers (>1% of international population).
National	<ul style="list-style-type: none"> • A species which is part of the cited interest of a SSSI, and which regularly occurs in nationally or regionally important numbers. • A nationally important assemblage of breeding or over-wintering species. • A species present in nationally important numbers (>1% UK population). • Rare breeding species (<300 breeding pairs in the UK).
Regional	<ul style="list-style-type: none"> • Species listed as Priority Species under Schedule 41 of the Natural Environment and Rural Communities (NERC) Act (2006), which are not covered above, and which regularly occurs in regionally important numbers. • Species present in regionally important numbers (>1% of regional population). • Sustainable populations of species that are rare or scarce within a region. • Species on the BoCC Red List and which regularly occurs in regionally important numbers.
County	<ul style="list-style-type: none"> • Species listed as Priority Species under Schedule 41 of the Natural Environment and Rural Communities (NERC) Act (2006), which are not covered above, and which regularly occurs in county important numbers • Species present in county important numbers (>1% of county population). • Sustainable populations of species that are rare or scarce within a county or listed as priority species for nature conservation under S41 of the NERC Act. • A site designated for its county important assemblage of birds (e.g., a SINC Site). • Species on the BoCC Red List and which regularly occur in county important numbers.
Local	<ul style="list-style-type: none"> • Other species of conservation interest (e.g., all other species on the BoCC Red and Amber List or listed as Priority Species under Schedule 41 of the NERC Act (2006) which are not covered above) regularly occurring in locally sustainable populations. • Sustainable populations of species which are rare or scarce within the locality.
Site	<ul style="list-style-type: none"> • Species that are common and widespread

4.0 RESULTS

Desk Study

Designated Sites

4.1 There are two international designations within 2km of the site. The Pagham Harbour SPA, Ramsar, SSSI, LNR lies approximately 1.35km south-west. This is an important site due to its extensive area of saltmarsh and tidal mudflats with surrounding lagoons, shingle, open water, reed swamp and permanent wet grassland. These habitats support a wide array of species including internationally important populations numbers of wintering pintail *Anas acuta* and nationally important numbers of dark-bellied brent goose *Branta bernicla bernicla*, grey plover *Pluvialis squatarola* and black-tailed godwit *Limosa limosa*.

4.2 The Solent & Dorset Coast SPA lies approximately 1.6km south of site. It was designated in 2020 for regularly supporting breeding populations of sandwich tern *Sterna sandvicensis*, common tern *Sterna hirundo* and little tern *Sternula albifrons*, which utilise the coast for foraging.

4.3 In addition, the Bognor Reef SSSI is situated approximately 1.3km south of site. It includes an extensive area of vegetated shingle, a rare habitat, and an old sand dune which supports the nationally endangered chidling pink *Petrorhagia nanteuilii*.

Notable Bird Records

4.4 Consultation with SxBRC returned various protected and notable bird species within 1km of the site boundaries. These are summarised in Table 3 and Figure 1.

Table 3: Notable and Protected Bird Species Records

Species	Conservation Status	Dates	Approximate Location Relative to Site Boundary
Black-tailed godwit <i>Limosa limosa</i>	WCA Sch1 Red List	2011 - 2019	Multiple records, nearest 239m SW
Kestrel <i>Falco tinnunculus</i>	Amber List	2014 - 2017	Multiple records, nearest 557m NE
White-fronted goose <i>Anser albifrons</i>	Red List	2010 - 2014	Two records, nearest 591m W
Cuckoo <i>Cuculus canorus</i>	NERC S41 Red List	2015 - 2020	Multiple records, nearest 959m W
Barn owl <i>Tyto alba</i>	WCA Sch1	2014 - 2019	Multiple records, nearest 1051m N
Starling <i>Sturnus vulgaris</i>	NERC S41 Red List	2018	Multiple records, nearest 1074m E

4.5 A large volume of bird records were also returned from SxBRC between 1-2km of the site, occurring in surrounding farmland to the north and residential land to the east. These included but were not limited to generalist species such as herring gull *Larus argentatus*, stock dove *Columba oenas*, merlin *Falco columbarius*, house sparrow *Passer domesticus*, starling, tawny owl *Strix aluco*, and barn owl *Tyto alba*.

4.6 As expected, a large proportion of the records were of waterbirds associated with the nearby Pagham Harbour SPA, located between 1.49 and 2.04km southwest, and included pintail *Anas acuta*, teal *A. crecca*, mallard *A. platyrhynchos*, pochard *Aythya ferina*, scaup *A. marlia*, mute swan *Cygnus olor*, shelduck *Tadorna tadorna*, oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, avocet *Recurvirostra avosetta*, ruff *Calidris pugnax*, curlew *Numenius arquata*, kingfisher *Alcedo atthis*, and bittern *Botaurus stellaris*.

4.7 Various other notable species, such as corncrake *Crex crex*, skylark *Alauda arvensis*, Cetti's warbler *Cettia cetti*, linnet *Linaria cannabina*, and bearded reedling *Panurus biarmicus* were also recorded in habitats associated with, or nearby the SPA.

Nearby Applications

4.8 A search of the Arun District Council planning portal revealed wintering bird surveys (WBS) completed for two nearby planning applications, summarised in Table 4.

Table 4: Summary of WBS results for surrounding planning applications

Application site name	Application reference	Distance from site	Dates	Results
Hook Lane	P/30/19/OUT	25m east	Oct-Nov 2016 (8 surveys)	40 species on site, 18 of which were NERC and/or BoCC listed. No SPA/Ramsar designated species were recorded.
Land at Summer Lane	P/58/15/OUT	280m south	Nov 2014 – Feb 2015 (16 surveys)	32 notable species were recorded on site, including a wintering flock of Brent Geese <i>Branta bernicla</i> from Pagham Harbour on two occasions.

Field Surveys

Wintering Bird Surveys in 2020 and 2021

4.9 Four WBS identified a total of 31 bird species within the survey area, twelve of which were of conservation importance due to their inclusion under WCA schedule 1, NERC S41 and/or the BoCC Red or Amber lists:

- Greenfinch *Chloris chloris* – Red list
- Mallard – Amber list
- Red Kite *Milvus milvus* – WCA Sch1
- Black-headed gull *Chroicocephalus ridibundus* – Amber list
- Common gull *Larus canus* – Amber list
- Lesser black-backed gull *Larus fuscus* – Amber list
- Herring gull – Red list, NERC S41
- Starling – Red list, NERC S41
- Dunnock *Prunella modularis* – Amber list, NERC S41
- House sparrow – Red list, NERC S41

- Meadow pipit *Anthus pratensis* – Amber list
- Linnet – Red list, NERC S41

4.10 Details of the notable species are summarised in Table 4, with their locations mapped on Figures 2–5. Details of all species observed are provided in Appendix G-1.

4.11 The remaining species were common and widespread and, as such, were not of conservation concern. These included blackbird *Turdus merula*, robin *Erithacus rubecula*, several tit species (blue *Cyanistes caeruleus*, great *Parus major*, and long-tailed *Aegithalos caudatus*), finches (chaffinch *Fringilla coelebs*, goldfinch *Carduelis carduelis*) and non-native species such as pheasant *Phasianus colchicus*, collared dove *Streptopelia decaocto* and feral pigeon *Columba livia*.

4.12 Following the release of the fifth BoCC review on 1st December 2021, during the preparation of this report; wren *Troglodytes troglodytes*, wood pigeon *Columba palumbus* and rook *Corvus frugilegus* have been added to the Amber List. These species have not however been included within Table 4 and *Figure 2* as their status as Amber List species is associated with their international population and the relative significance of the UK population comparative to other countries. This shift is not due to a decline in the UK populations of each species and all three remain common and widespread across both Sussex and the United Kingdom.

4.13 No species identified within the site boundaries or surrounding area during the WBS were recorded in significant numbers. Red kite, recorded only from flyovers, was the only species encountered on site that is listed under Schedule 1 of the WCA.

5.0 DISCUSSION AND RECOMMENDATIONS

- 5.1 During the wintering surveys conducted between December 2020 and February 2021, twelve species were assessed as of conservation concern, including red kite, mallard, black-headed gull, common gull, lesser black-backed gull, herring gull, starling, dunnock, house sparrow, meadow pipit, greenfinch, and linnet.
- 5.2 Of these twelve notable species, starling, house sparrow, greenfinch, dunnock, meadow pipit and linnet were observed within and/or utilising habitat present within the site boundaries. The rest were only recorded as flyovers.

Individual Species Value

- 5.3 Linnet are typically associated with farmland habitats and were documented on-site, with a single individual recorded from the northwest site boundary, along hedgerow H4, in February. Linnet were not recorded during wintering surveys in November, December, or January. Linnets continue to be recorded widely across West Sussex, so the small population of linnet occurring on-site are considered unremarkable in the context of West Sussex.
- 5.4 It is likely that a proportion of the linnet population, even if frequenting the site only occasionally, will be displaced from within the site post-development, as a direct result of the change in land use from farmland to residential development. However, the site is situated amongst large expanses of arable land, and it is likely that the current populations of these species will disperse into the neighbouring arable fields.
- 5.5 Dunnock, house sparrow, greenfinch and starling are species typically found in association with hedgerows and gardens, often near human habitation and as such their presence within the application boundaries is not unexpected. Each species is widespread across West Sussex, and none were recorded in exceptional numbers for the county, with house sparrow and starling the only species recorded in numbers exceeding ten (peaking at two colonies and 17 individuals, respectively). Given the adaptability of each species to urban-edge habitats, all three species are likely to benefit from new gardens, hedgerows, and green infrastructure, once established.
- 5.6 Meadow pipit are a widespread species that migrates to lowland grassland and farmland to overwinter. The species occurs in a broad range of lowland habitats. Given the extensive areas of habitat available in the surrounding landscape, including arable farmland and coastal grassland, alternative habitat is present into which the small on-site population (of no more than two individuals on two surveys) can move. As such, the existing local population will persist.
- 5.7 Under the current proposals, boundary habitats, including the hedgerows and scrub along the boundaries, are to be retained and enhanced with additional tree planting that will form a woodland belt along the northern edge of the site. New habitat will also be incorporated into the landscape design, including residential gardens, an attenuation basin with associated marginal planting, species-rich grassland buffer zones and structural landscaping. Many of the notable species identified on site will benefit from supplementary planting of native species, which will strengthen the existing site boundaries and contribute to maintaining connectivity into the wider landscape, once established.

5.8 Given the unremarkable numbers of each of the 'notable' species recorded within the site boundaries, and their relatively common and widespread occurrence in West Sussex, the small, localised populations of each are assessed as of no more than local conservation value. Such low numbers of each species recorded on-site are unlikely to be significantly affected by the development, with the proposed elements of habitat creation and enhancement likely to provide additional foraging resources and wintering habitat, with additional woodland/scrub and enhancement of hedgerows which will have a *benefit in the long term*.

5.9 The gull species, identified exclusively from flyovers, are typically nomadic, have low site fidelity and wide wintering ranges and are consequently unlikely to be affected significantly by the development proposals. Similarly, red kite, mallard and mute swan were also recorded solely as flyovers, indicating the habitat on-site does not form a significant wintering resource for any of these species, particularly as both mute swan and mallard require areas of open water, which the site lacks. Consequently, these species are unlikely to be impacted significantly by the development, with the overall effects considered *negligible*.

Overall Effect

5.10 The proposed development will not be able to replicate farmland habitats lost during the development, but the overall adverse effects on the farmland bird assemblage can be reduced and offset by appropriate mitigation and management of the retained and newly created habitats that will benefit wintering birds in general.

5.11 Managed green infrastructure (GI), which includes hedgerow, scrub, woodland and an attenuation basin as well as a network of new residential gardens, will provide opportunities for many of the bird species recorded on site, benefitting several wintering birds listed under the NERC S41 and BoCC Amber or Red lists.

5.12 The overall effects on the population of wintering generalist species from the proposed development will be **beneficial** once created habitats have established. These will increase site suitability for several notable species such as starling, thrushes, house sparrow, and dunnock, which will offset the habitat losses.

Potential Effects of Development

5.13 The most likely negative effects from a residential development of this type on the assemblage recorded would be due to:

- Direct loss / change of breeding habitat; and
- Disturbance during construction and / or operation.

5.14 Habitats that will be lost to the proposed development include the cultivated arable land that comprises the bulk of the main field compartments, which is planned to accommodate the proposed residential area. A small section of hedgerow H6 will also be lost to facilitate access onto the site for pedestrian footpaths and roads. Linnet is the only 'notable' species likely to be negatively affected in the long-term by the changes in land use, largely resulting from the loss of potential foraging habitat. However, the retention and enhancement of hedgerows, along with further planting will ensure that there are benefits in the long term.

5.15 The proposed development includes an attenuation basin, linear woodland belt, scrub and species-rich meadow type habitats, which will readily be utilised by birds throughout the year, providing roosting and foraging opportunities, as well as additional breeding sites.

5.16 NERC S41 and BoCC Red and Amber list species such as house sparrows, starlings, and dunnocks are likely to increase as a result of the proposals, due to the availability of suitable foraging habitat in gardens, but this population increase can also be facilitated by the introduction of nest boxes on new buildings.

Construction Phase Mitigation

5.17 Works undertaken during the construction phase could result in disturbance to any of the bird species of nature conservation importance that were recorded as using the site for roosting, foraging, and/or loafing. While it is species dependent, the construction works most likely to disturb, and consequently impact upon wintering birds, include the use of heavy plant machinery, vegetation clearance, ground works, and any other associated construction activities which may result in noise and vibration.

5.18 It is likely that the population and diversity of species on-site will reduce temporarily during construction, particularly as existing habitat is cleared. As most species of bird do not actively hold territory during the winter months, species most susceptible to this type of disturbance should move elsewhere, such as dunnock, linnet, and greenfinch. As there were no significantly high populations of any notable species recorded regularly using the habitat present on the proposed development area over the winter period, any effect would likely be negligible.

Operation Phase Mitigation, Management and Enhancement

5.19 Hedgerow enhancements and new woodland/scrub will include native tree planting that will increase foraging and nesting resources available for local bird populations, while appropriate management will help protect nesting/roosting birds from predation.

5.20 Linnet typically forage in arable land or grassland in close proximity to low, woody hedgerows with scattered trees, into which they can easily take cover, therefore the habitats created around the site peripheries, where the site abuts neighbouring arable fields, will accommodate these requirements in the long term.

5.21 Existing and newly created hedgerows, scrub and woodland will use species that are seed and fruit bearing species, as these provide additional foraging resources for local frugivorous and granivorous bird populations. Such seed/fruit bearing plants also support more diverse invertebrate communities, which increase available foraging opportunities for insectivorous birds, including meadow pipit and overwintering warblers, such as Cetti's warbler.

5.22 The following are a list of habitat creation and management principles that would be of benefit to wintering bird species within areas of GI on site:

- Edge habitats bordering areas of scrub/woodland and grassland areas will be managed to create habitat gradients that will encourage ecological 'edge effects' and micro-habitats to form that will favour, among other wildlife, invertebrates and therefore create increased foraging opportunities for birds.

- Hedgerows will be managed to maximise their nature conservation potential and increase the diversity of resources available for birds. An appropriate management regime would involve trimming on a three-year rotational basis once established.
- Increased structural diversity within existing hedgerows will be encouraged through the planting of standard trees, which will increase height, while existing gaps and sparser sections, will be planted up with native berry bearing tree and shrub species, which will increase width and depth. Planting of native, low-lying shrub species throughout the hedgerow will also encourage greater structural diversity by forming a denser base layer, which will provide areas of cover to help protect foraging birds from predation.
- Areas of wildflower flower meadow will be created around the scheme to provide additional foraging areas for granivorous species such as stock dove, linnet, chaffinch, and greenfinch, throughout the year. Given the provision of an appropriate diversity of floral species that produce seed at different times of year, these species will benefit from a consistent and reliable source of food throughout the year.

5.23 The proposed scheme will lead to a **negligible** short term, adverse effect, on the existing wintering bird assemblage within the site during construction, with an overall **minor beneficial** effect in the medium to long term as the new habitat provision matures, ensuring continued use of the site by local bird populations.



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Key

- Site Boundary
- 1km Buffer
- 2km Buffer

Birds

△ Avocet	+	Merlin
▲ Bearded Reedling	+	Mute Swan
△ Black-tailed Godwit	+	Oystercatcher
△ Cetti's Warbler	+	Pintail
▲ Common Firecrest	+	Pochard
△ Common Gull	+	Red Kite
▲ Common Reed Bunting	+	Redshank
△ Common Ringed Plover	+	Redstart
△ Common Sandpiper	+	Ruff
▲ Common Scoter	+	Scaup
△ Corn Bunting	+	Shelduck
▲ Corncrake	+	Short-eared Owl
▲ Cuckoo	+	Snipe
★ Curlew	+	Song Thrush
★ Eurasian Bittern	+	Spoonbill
★ Eurasian Skylark	+	Starling
★ European Herring Gull	+	Stock Dove
★ Grasshopper Warbler	+	Tawny Owl
★ Grey Partridge	+	Teal
★ Hobby	+	Tufted Duck
★ House Sparrow	+	Turtle Dove
★ Kestrel	+	Western Barn Owl
★ Kingfisher	+	Western Yellow Wagtail
★ Lapwing	+	Wheatear
★ Linnet	+	Whinchat
	+	White-fronted Goose
	+	Whooper Swan
	+	Wood Warbler
	+	Yellow-legged Gull

Hallam Land Management

Land West of Pagham Road,
Pagham

fpcr

BIRD CONSULTATION PLAN

Scale 1:16000 Date 6/12/2021

Figure 1

Key

Site Boundary

→ Fly over only

BoCC Red Listed Species

HG Herring Gull

HS House Sparrow

SG Starling

BoCC Amber Listed Species

Black-headed Gull

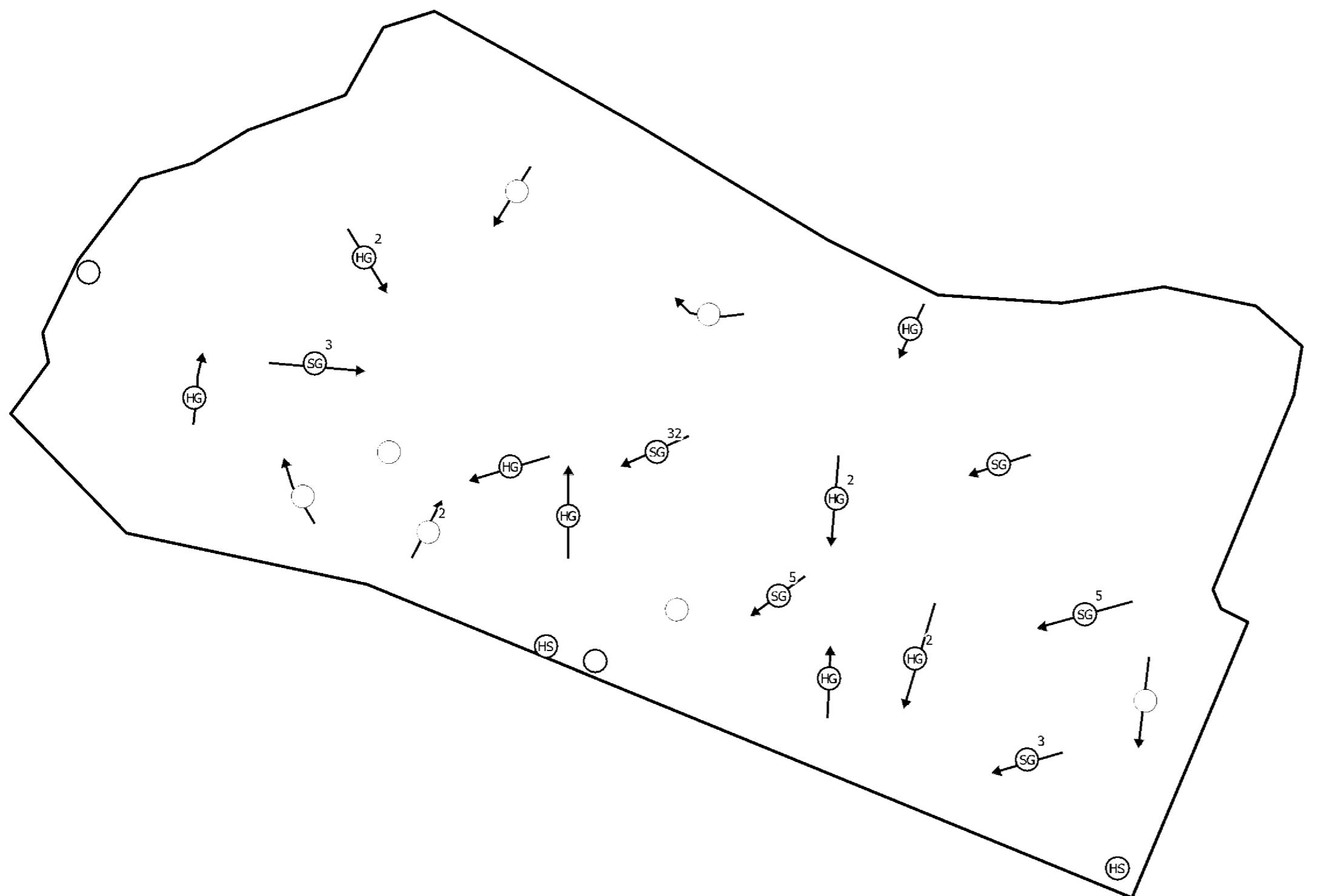
Dunnock

Kestrel

Lesser Black-backed Gull

Meadow Pipit

○ NERC Species of Principal Importance



Key

Site Boundary

→ Fly Over Only

BoCC Red Listed Species

HG Herring Gull

SG Starling

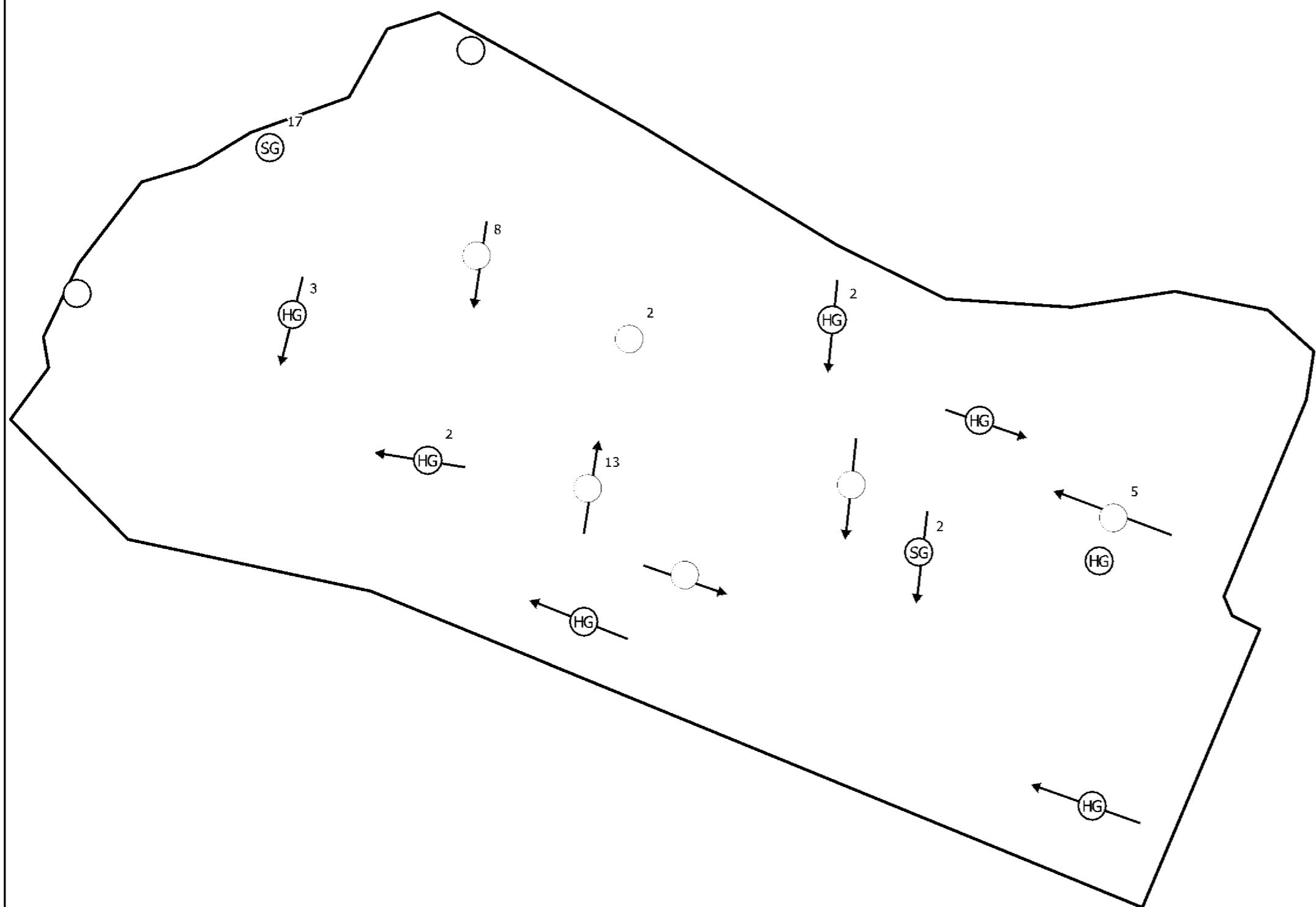
BoCC Amber Listed Species

Black-headed Gull

Dunnock

Mute Swan

○ NERC Species of Principal Importance



Key

Site Boundary

→ Fly Over Only

BoCC Red Listed Species

HG Herring Gull

HS House Sparrow

SG Starling

GR Greenfinch

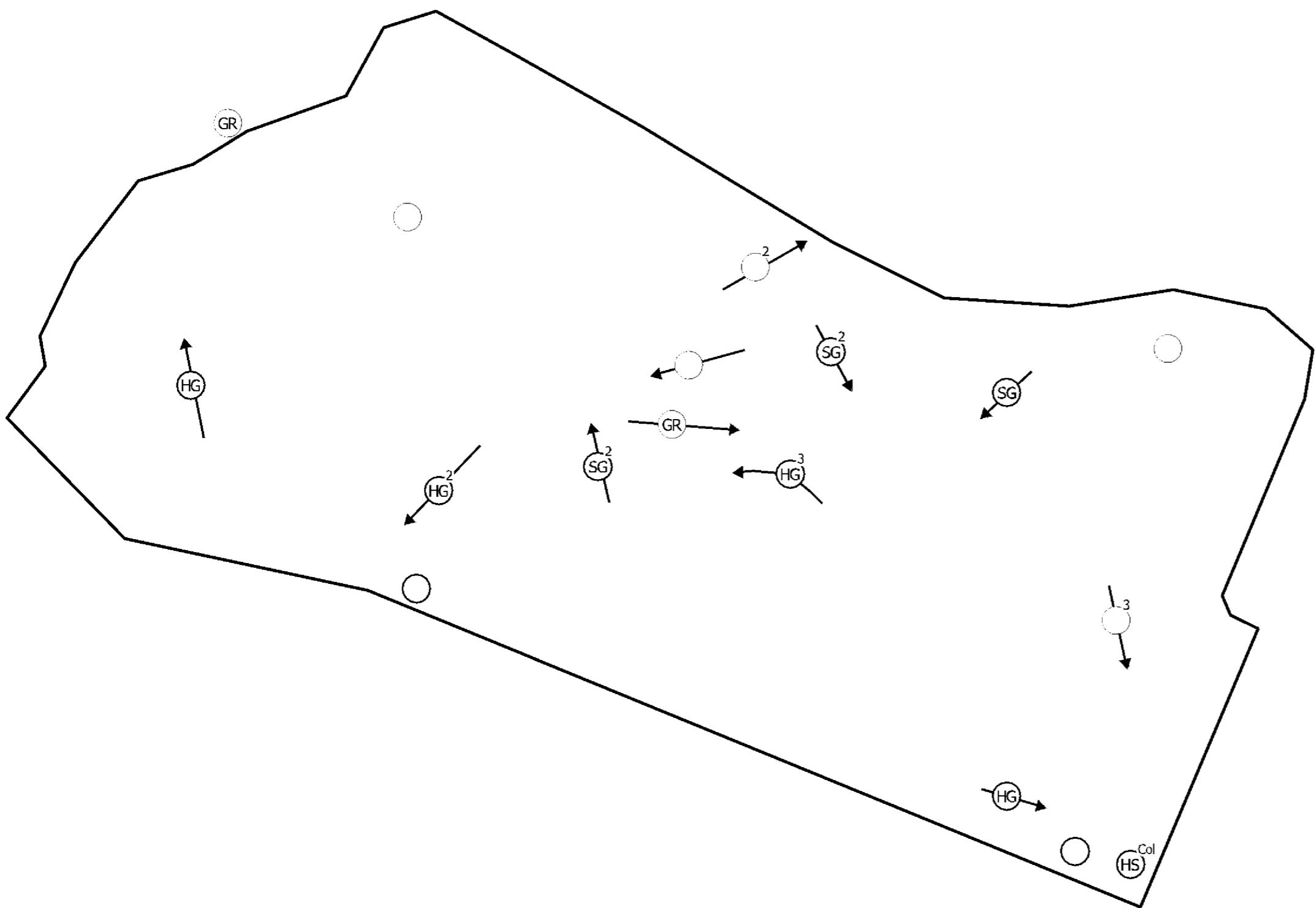
BoCC Amber Listed Species

Black-headed Gull

Dunnock

Meadow Pipit

○ NERC Species of Principal Importance



Key

 Site Boundary

 Fly Over Only

BoCC Red Listed Species

GR Greenfinch

HG Herring Gull

HS House Sparrow

LI Linnet

SG Starling

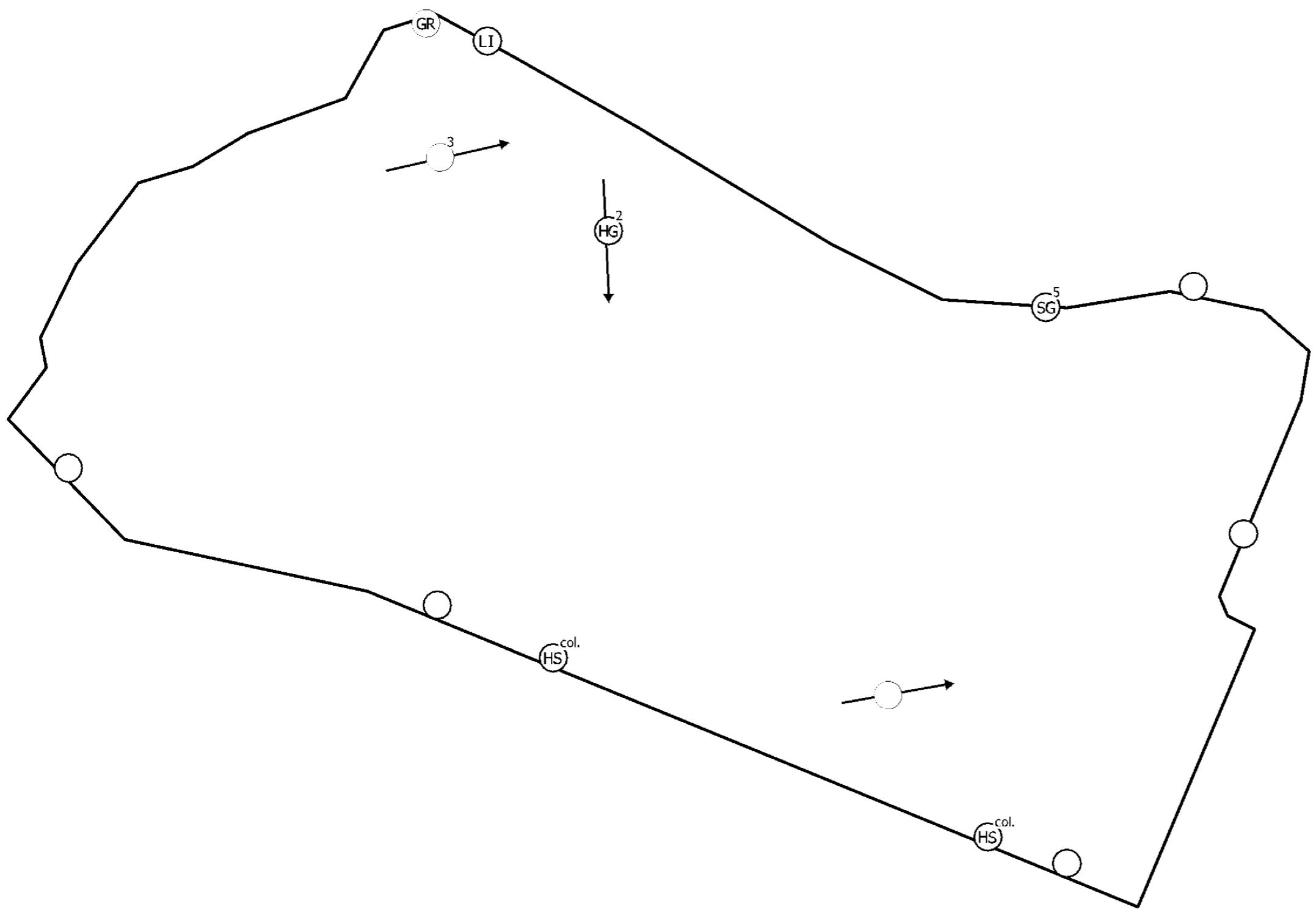
BoCC Amber Listed Species

Common Gull

Dunnock

Mallard

 NERC Species of Principal Importance



APPENDIX G-1: WINTERING BIRD SURVEY RESULTS

Survey	Surveyor	Date	Cloud (%)	Rain	Wind	Visibility
1	LC	15.12.20	60	None	2-3	V. Good
2	LC	18.01.21	95	None	2-3	V. Good
3	LC	09.02.21	100	None	0-1	V. Good
4	OMS	25.02.21	90	Light drizzle	1-2	Good

British Common Name	Latin name	Survey 1	Survey 2	Survey 3	Survey 4	Conservation Status & Protection
Mute swan	<i>Cygnus olor</i>	-	(2 flyovers)	-	-	Amber list
Mallard	<i>Anas platyrhynchos</i>	-	-	-	(3 flyovers)	Amber list
Pheasant	<i>Phasianus colchicus</i>	-	-	1	-	Not listed
Cormorant	<i>Phalacrocorax carbo</i>	-	-	1	-	Green list
Red kite	<i>Milvus milvus</i>	(1 flyover)	-	-	-	Green list WCA Sch.1
Black-headed gull	<i>Chroicocephalus ridibundus</i>	(3 flyovers)	(28 flyovers)	(6 flyovers)	-	Amber list
Common gull	<i>Larus canus</i>	-	-	-	(1 flyover)	Amber list
Lesser black-backed gull	<i>Larus fuscus</i>	(1 flyover)	-	-	-	Amber list
Herring gull	<i>Larus argentatus</i>	(12 flyovers)	(11 flyovers)	(9 flyovers)	(2 flyovers)	Red list NERC S.41
Rock dove/Feral pigeon	<i>Columba livia</i>	(4 flyovers)	-	-	-	Green list
Woodpigeon	<i>Columba palumbus</i>	9 (+ 11 flyovers)	21 (+ 17 flyovers)	17 (+ 20 flyovers)	76 (+ 1 flyover)	Amber list
Collared dove	<i>Streptopelia decaocto</i>	-	-	-	1	Green list
Great spotted woodpecker	<i>Dendrocopos major</i>	-	(1 fly over)	-	-	Green list
Magpie	<i>Pica pica</i>	2	1 (+ 1 flyovers)	1	2 (+ 2 flyovers)	Green list
Jackdaw	<i>Corvus monedula</i>	(16 flyovers)	8 (+ 6 flyovers)	(2 flyovers)	(7 flyovers)	Green list
Carriion crow	<i>Corvus corone</i>	4 (+ 10 flyovers)	37	2 (+ 4 flyovers)	1 (+ 2 flyovers)	Green list
Blue tit	<i>Cyanistes caeruleus</i>	3 (+ 1 flyover)	4	5 (+ 2 flyovers)	3	Green list
Great tit	<i>Parus major</i>	-	1	4	1	Green list
Long-tailed tit	<i>Aegithalos caudatus</i>	1 family	-	1 + 1 family	-	Green list
Wren	<i>Troglodytes troglodytes</i>	1	2	1	2	Green list
Starling	<i>Sturnus vulgaris</i>	(49 flyovers)	17 (+ 2 flyovers)	(5 flyovers)	5	Red list NERC S.41
Blackbird	<i>Turdus merula</i>	5	2	3	2	Green list
Robin	<i>Erithacus rubecula</i>	2	6	6	6	Green list
Dunnock	<i>Prunella modularis</i>	2	2	2	5	Amber list NERC S.41
House sparrow	<i>Passer domesticus</i>	1 + 1 colony	-	-	2 colonies	Red list NERC S.41
Pied wagtail	<i>Motacilla alba</i>	(1 flyover)	-	-	-	Green list
Meadow pipit	<i>Anthus pratensis</i>	2 (+ 1 flyover)	-	2	-	Amber list
Chaffinch	<i>Fringilla coelebs</i>	(1 flyover)	-	1 (+ 1 flyover)	(1 flyover)	Green list
Greenfinch	<i>Chloris chloris</i>	-	-	1 (+ 1 flyover)	1	Red list
Linnet	<i>Linaria cannabina</i>	-	-	-	1	Red list NERC S.41
Goldfinch	<i>Carduelis carduelis</i>	1 (+ 4 flyovers)	-	-	(9 flyovers)	Green list
Total No. Species		21	15	19	20	31 total



Hallam Land Management

Land West of Pagham Road, Pagham

APPENDIX H - GREAT CRESTED NEWT SURVEYS

December 2021

FPCR Environment and Design Ltd

Registered Office: Lockington Hall, Lockington, Derby DE74 2RH

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Table 2: Possible results of eDNA analysis

Table 3: Summary of GCN survey results for surrounding planning applications

Table 4: HSI scores and pond suitability

FIGURE

Figure 1: Waterbody Location Plan

APPENDIX

Appendix H-1: HSI Score Data

1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management for a proposed residential development on Land West of Pagham Road, Pagham, West Sussex (central OS grid reference SZ891698).
- 1.2 The scope and objectives of the report are to:
 - present the findings of the great crested newt *Triturus cristatus* (GCN) surveys undertaken in 2021;
 - assess the relative importance of the survey area for GCN;
 - review the site proposals and provide recommendations for mitigation, compensation and enhancement.

Site Context

- 1.3 The application site is approximately 4.9ha and is hereafter referred to as 'the site'. It was dominated by an arable field with hedgerows and ditches along the boundaries. There is a single pocket of tall ruderal vegetation near the south-east boundary.
- 1.4 The site is situated to the north of Pagham in the Arun District of West Sussex. The surrounding area consists of residential dwellings to the south, scrub to the west and agricultural land to the north and west. The wider landscape is dominated by the Pagham settlement and agricultural fields.
- 1.5 The proposals are for a residential dwelling of up to 106 dwellings and associated infrastructure.

2.0 LEGISLATION AND POLICY

- 2.1 Great crested newts and the places they use for refuge and breeding are protected under Schedule 2 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats & Species Regulations 2017 (as amended).
- 2.2 They are also a European Protected Species (EPS) and protected under Annexes II and IV of the EU Habitats and Species Directive and Appendix II of the Bern Convention.
- 2.3 In summary, it is an offence to:
 - deliberately or recklessly take, injure or kill a great crested newt;
 - intentionally or recklessly damage, destroy or obstruct access to any structure or place used for breeding, shelter or protection by the species;
 - intentionally or recklessly disturb while it is occupying a structure or place which it uses for such purpose;
 - intentionally take or destroy the eggs of a great crested newt.
- 2.4 This legislation equally protects all life stages, including eggs, efts and adults.
- 2.5 Proposals which could lead to any of the above would require a derogation licence from Natural England alongside appropriate avoidance, mitigation and compensation measures.

3.0 METHODOLOGY

Desk Study

3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Sussex Biodiversity Record Centre (SxBRC)
- Arun District Council planning portal¹

3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Habitat Suitability Survey

3.3 The habitats within the survey area were assessed for their potential to support GCNs during both their breeding and terrestrial phases, including an assessment of waterbodies.

3.4 In addition, access was sought to assess waterbodies within a 250m radius of the survey area which had suitable connective habitat to the site. Access was not granted to survey pond P2 but it was possible to survey ponds P1 and P3 and ditches D3, D4 and D5 (Figure 1).

3.5 All accessible waterbodies were assessed using a Habitat Suitability Index (HSI)². The HSI incorporates ten suitability indices, all of which are factors known to affect this species:

- Geographic location
- Pond area
- Pond drying
- Water quality
- Shade
- Presence of waterfowl
- Presence of fish
- Number of linked ponds
- Terrestrial habitat
- Macrophytic coverage

3.6 A score is assigned for each attribute and a total score is calculated between 0 and 1. Pond suitability is then determined according to the scale in Table 1.

Table 1: HSI scale

HSI Score	Pond Suitability
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

¹ Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

² Oldham, R.S., Keeble, K., 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.

eDNA Survey

3.7 eDNA sampling was undertaken on six waterbodies in April 2021 in accordance with the recommended protocol³. Waterbody locations are shown in Figure 1. Survey dates were:

- 15th April 2021 – Ditches D1, D3, Pond P1
- 29th April 2021 – Ditches D4, D5, Pond P3

3.8 Sampling was undertaken by suitably trained and licenced ecologists (2017-27921-CLS-CLS; 2016-20468-CLS-CLS). From each pond, 20 agitated water samples were taken, mixed thoroughly and then 15ml placed into six sample tubes. They were sent to the ADAS laboratory in Helsby, Chester for analysis. The possible results are summarised in Table 2.

Table 2: Possible results of eDNA analysis

Result	Description
Positive	A positive result means GCN eDNA was detected and they have been present within the water in the 20 days preceding sampling. A score is provided indicating the number of positive replicates from a series of twelve.
Negative	GCN eDNA was not detected. Where samples are negative, further testing for PCR inhibitors and degradation of the sample is undertaken.
Inconclusive	Controls indicate degradation or inhibition of the sample. Therefore, the lack of detection of GCN eDNA is not conclusive evidence for determining the absence of this species using the sample provided.

Limitations

3.9 D2 was dry at the time of survey so no eDNA test could be conducted.

³ Biggs, J. et al. (2014) *Analytical and Methodological Development for Improved Surveillance of the Great Crested Newt*. Appendix 5: Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

4.0 RESULTS

Desk Study

4.1 There were no GCN records within 2km of the site returned by SxBRC.

4.2 A search of the Arun District Council planning portal revealed GCN surveys completed for three planning applications surrounding the site, summarised in Table 3. Pond and ditch numbers refer to those used for this site and not those from the surrounding applications.

Table 3: Summary of GCN survey results for surrounding planning applications

Application site name	Application reference	Distance from site	Surveys & dates	Waterbody number & results
Hook Lane	P/30/19/OUT	25m east	Apr-Jun 2016 (6 pond surveys)	No GCNs found in P1, P2, P3 or D5
Land at Summer Lane	P/58/15/OUT	280m south	Apr 2014 (4 pond surveys)	No GCNs found in P2
Sefters Farm	P/117/21/PL	400m north	June 2021 (eDNA survey)	Likely absent from two waterbodies 400m north

Habitat Suitability

4.3 There was limited suitable terrestrial habitat for GCN on site due to the dominance of the arable field. The hedgerows, field margins and ditches provide some potential commuting and foraging habitat. However, there are significant barriers to dispersal surrounding the site including dense housing to the south and Pagham Road to the east.

4.4 The HSI scores for the accessible ditches and ponds on and within 250m of the site are summarised in Table 4 and the complete data set is shown in Appendix H-1.

Table 4: HSI scores and waterbody suitability

Waterbody	HSI Score	HSI Category	Predicted Presence
P1	0.79	Excellent	93%
P3	0.73	Good	79%
D1	0.59	Below Average	20%
D2	0.46	Poor	3%
D3	0.79	Excellent	93%
D4	0.74	Good	79%
D5	0.78	Good	79%

eDNA Survey

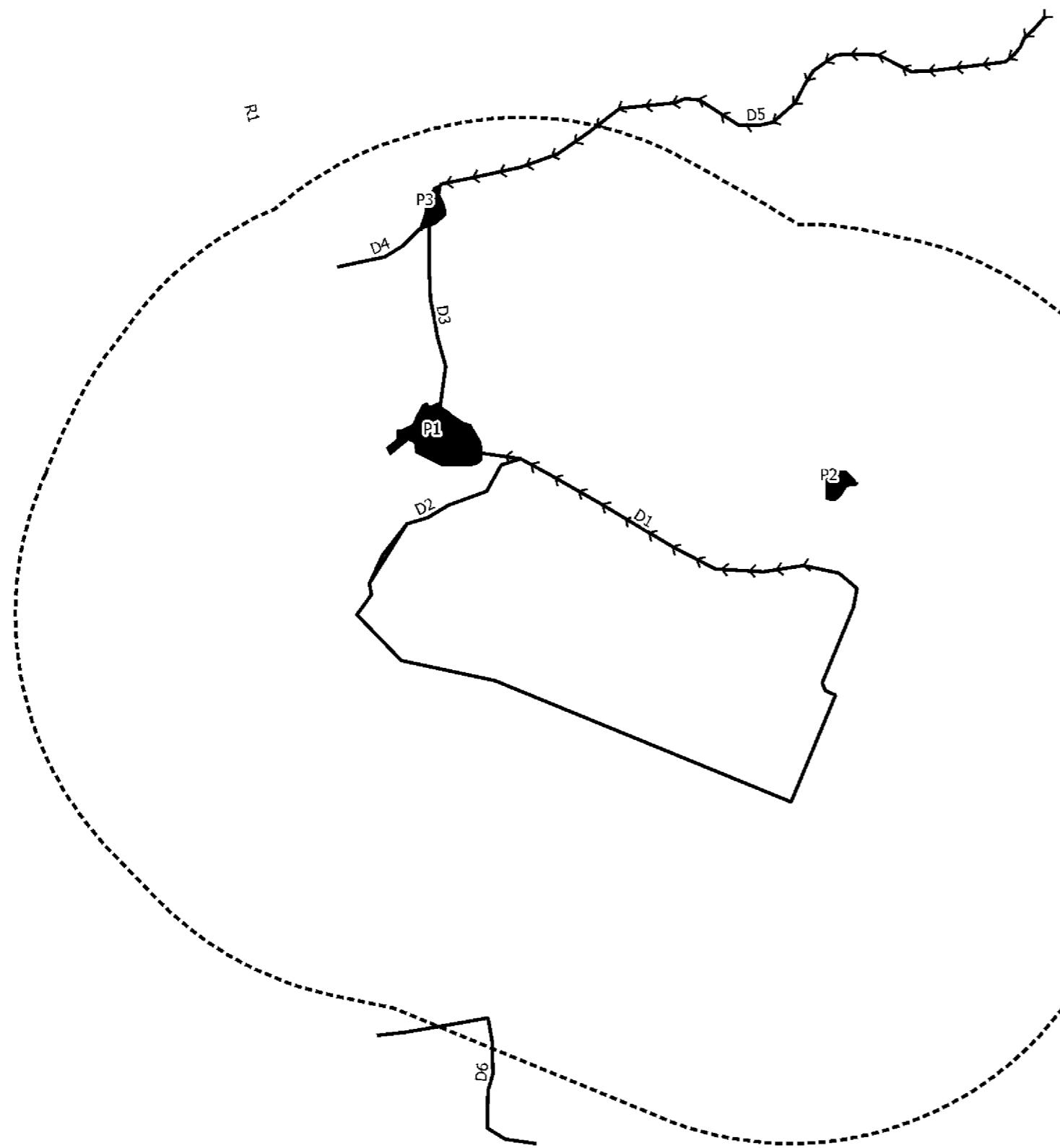
4.5 Of the six waterbodies surveyed in 2021, all ponds and ditches returned a negative result, indicating likely GCN absence.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 None of the waterbodies on or within 250m were found to support GCN. Indeed, data from the records centre and from nearby applications suggest that GCN are likely absent from the local area (including historical surveys on the one inaccessible pond (P2) confirming the absence of this species). As such, this species is not considered a constraint on development.

5.2 Other amphibian species are known to be in the local area, including smooth newt *Lissotriton vulgaris* and palmate newt *Lissotriton helveticus*. The proposals include enhancements which would benefit amphibians and other wildlife, including:

- A mosaic of tussocky species-rich grassland and enhanced ditches along the boundaries of the site will improve opportunities for foraging.
- Linear features, such as improved hedgerows, around the development will provide cover and dispersal opportunities.
- Hibernacula and log piles to increase refuge availability.



Key

- Site Boundary
- 250m buffer
- Waterbody
- Ditch (with standing water)
- Ditch (with flowing water)
- River

Distance between waterbodies and site

Number	Approximate Distance (m)
P1	15
P2	50
P3	185
D1	0
D2	0
D3	64
D4	175
D5	210
D6	230
R1	45



Hallam Land Management
Land West of Pagham Road,
Pagham

WATERBODY LOCATION PLAN

scale 1:4000
drawing / figure number
7/12/2021
SG
rev

Figure 1

APPENDIX H-1 – DETAILED HSI SCORES

Waterbody	SI -1		SI - 2		SI -3		SI -4		SI -5		SI -6		SI -7		SI -8		SI -9		SI -10		HSI score	Pond suitability		
	geographical location		pond area		pond drying		water quality		shade (perimeter)		fowl		fish		ponds		terrestrial habitat		macrophytes					
	Field result (A,B,C)	SI score	Field result (m ²)	SI score	Field result	SI score	Field result	SI score	Field result (% cover)	SI score	Field result	SI score	Field result	SI score										
P1	A	1	1850	0.82	Rarely	1	Moderate	0.67	90	0.6	Minor	0.67	Possible	0.67	9	0.91	Good	1	40	0.7	0.79	Excellent		
P3	A	1	290	0.5	Never	0.9	Moderate	0.67	20	1	Absent	1	Possible	0.67	8	0.89	Moderate	0.67	5	0.35	0.73	Good		
D1	A	1	200	0.4	Annually	0.1	Poor	0.33	80	0.4	Absent	1	Absent	1	8	0.89	Good	1	75	1	0.59	Below Average		
D2	A	1	500	1	Annually	0.1	Bad	0.01	5	1	Absent	1	Absent	1	9	0.91	Good	1	20	0.5	0.46	Poor		
D3	A	1	1500	0.88	Rarely	1	Moderate	0.67	90	0.9	Minor	0.67	Possible	0.67	8	0.89	Good	1	15	0.45	0.79	Excellent		
D4	A	1	1200	0.92	Rarely	1	Poor	0.33	50	1	Minor	0.67	Possible	0.67	8	0.89	Moderate	0.67	30	0.6	0.74	Good		
D5	A	1	1000	0.95	Rarely	1	Poor	0.33	50	1	Minor	0.67	Possible	0.67	8	0.89	Moderate	0.67	70	0.78	0.78	Good		



Hallam Land Management

Land West of Pagham Road, Pagham

APPENDIX I – REPTILE SURVEYS

December 2021

FPCR Environment and Design Ltd

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1.0 INTRODUCTION

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd on behalf of Hallam Land Management to present the results of reptile surveys completed on the site at Land West of Pagham Road, Pagham, West Sussex (central OS grid reference SZ891698).
- 1.2 The scope and objectives of the report are to:
 - present the findings of the reptile surveys undertaken in 2021;
 - assess the relative importance of the survey area for reptiles;
 - review the site proposals and provide recommendations for mitigation, compensation and enhancement.

Site Context

- 1.3 The application site is approximately 4.9ha and is hereafter referred to as 'the site'. The site lies to the west of Pagham Road and north of Pagham.
- 1.4 An extended Phase 1 habitat survey was carried out in May 2021. The site is dominated by an arable field with hedgerows and ditches (dry and wet) along the boundaries. There is a single pocket of tall ruderal vegetation near the south-eastern boundary.
- 1.5 The site is bordered by residential dwellings to the south, scrub to the west and agricultural land to the north and east. The wider landscape is dominated by Pagham to the east and south and agricultural land to the north and west.
- 1.6 The proposals are for the creation of a residential development with up to 106 new homes and associated infrastructure.

2.0 LEGISLATION AND POLICY

2.1 All common reptile species, including common lizard and grass snake, are partially protected under Sections 9(1) and 9(5) of Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). This legislation protects these animals from:

- intentional killing and injury;
- selling, offering for sale, possessing or transporting for the purpose of sale or publishing advertisements to buy or sell a protected species.

2.2 This partial protection does not directly protect the habitat of these reptile species. Where these animals are present on land that is to be affected by development, the implications of legislation are that providing that killing can reasonably be avoided then an operation is legal. Guidance provided by Natural England¹ and the Amphibian and Reptile Groups of the UK² recommends that this should be achieved by ensuring that:

- the animals are protected from injury or killing;
- mitigation is provided to maintain the conservation status of the species;
- population monitoring is carried out subsequent to operations.

2.3 All common reptiles are also included on the list of species of principal importance for the conservation of biodiversity in England as required under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006. The S41 list is used to guide decision-makers, including local planning authorities, in implementing their duty under section 40 of the Act, to have regard to the conservation of biodiversity in England, when carrying out their normal functions.

¹ English Nature (2004) Reptiles: guidelines for developers - <http://publications.naturalengland.org.uk/publication/76006?category=31018> [Accessed 18.10.2021]

² Maintaining best practise in reptile mitigation/translocation programmes: Herpetofauna Groups of Britain and Ireland. http://www.arguk.org/index.php?option=com_docman&task=cat_view&gid=13&Itemid=17 [Accessed 18.10.2021]

3.0 METHODOLOGY

Desk Study

- 3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:
 - Sussex Biodiversity Record Centre (SxBRC)
 - Multi Agency Geographic Information for the Countryside (MAGIC)³
 - Arun District Council planning portal⁴
- 3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Reptile Survey

- 3.3 Strategic reptile presence/absence surveys were undertaken within the survey area following current guidance^{5,6,7}. These were completed between May-June 2021 (Table 1).
- 3.4 Artificial refugia (0.5m² sections of roofing felt) were placed throughout the survey area at a density of 10 refugia per hectare of suitable reptile habitat. These habitats included the field boundaries with pockets of tall ruderal vegetation, hedgerows, scrub around the ponds and scattered log piles. Refugia locations are shown in Figures 1.
- 3.5 Refugia were left to bed in for a period of seven days before seven survey visits were undertaken by experienced FPCR ecologists in suitable weather conditions. These include air temperatures between 9-19°C in the absence of strong winds and heavy rain.
- 3.6 Each survey visit included the following:
 - Checking all refugia within the survey area at least once;
 - Approaching refugia carefully from downwind and without casting a shadow so as not to disturb basking animals;
 - Lifting and replacing refugia with care to check for the presence of reptiles underneath;
 - Checking other suitable basking areas and resting places within the survey area, such as log piles.

³ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

⁴ Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

⁵ Gent, T. & Gibson, S. (eds) (2003) *Herpetofauna Workers' Manual*. JNCC, Peterborough.

⁶ Froglife (2016) *Surveying for reptiles: Tips, techniques and skills to help you survey for reptiles*. Froglife, Peterborough.

⁷ Natural England & Defra (2015) *Reptiles: surveys and mitigation for development and projects* - <https://www.gov.uk/guidance/reptiles-protection-surveys-and-licences> [Accessed 18.10.2021]

Table 1: Reptile survey weather conditions in 2021

Date & Time	Weather
10 th May - 09:33	11°C, clear, bright, sunny, dry, 60-70% cloud cover, moderate breeze
17 th May - 08:55	13°C, rain earlier in the day, sunny intervals, 80-90% cloud cover, light breeze
24 th May - 09:44	11°C, bright, sunny, showery, 70-80% cloud cover, light breeze
28 th May - 10:19	13°C, clear, bright, dry, 80-90% cloud cover, light breeze
1 st June - 08:27	17°C, clear, bright, sunny, dry, 0-10% cloud cover, light breeze
9 th June - 08:41	13°C, clear, bright, sunny, dry, 10-20% cloud cover, light breeze
16 th June - 08:25	17°C, clear, bright, sunny, dry, 0-10% cloud cover, light breeze
23 rd June - 06:54	10°C, bright, sunny, dry, 10-20% cloud cover, light breeze

Population Assessment

3.7 Reptile populations were assessed in accordance with the Key Reptile Site Register criteria⁸. This system classifies populations of individual reptile species into three population categories according to importance (Table 2). These categories are based on the peak number of adults observed during individual surveys.

Table 2: Reptile population categories

Species	Low Population (no. of individuals)	Good Population (no. of individuals)	Exceptional Population (no. of individuals)
Adder <i>Vipera berus</i>	<5	5-10	>10
Grass Snake <i>Natrix helvetica</i>	<5	5-10	>10
Common Lizard <i>Zootoca vivipara</i>	<5	5-20	>20
Slow-Worm <i>Anguis fragilis</i>	<5	5-20	>20

Limitations

3.8 Unseasonably cold and wet weather in April and May 2021 meant some surveys had to be undertaken in June 2021. However, weather conditions were favourable and therefore the timing of surveys are not considered to have affected the results.

⁸ Froglife (1999) *Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

4.0 RESULTS

Desk Study

4.1 The most recent reptile records within 2km of the site were provided by SxBRC in 2020:

- One record of common lizard in 2014 approximately 1.6km south;
- One record of grass snake in 2010 approximately 1.9km south-west;
- Six records of slow worm between 2012 and 2020, with the closest located 0.9km south-west.

4.2 A search of the Arun District Council planning portal revealed reptile surveys completed for five planning applications surrounding the site, summarised in Table 3.

Table 3: Summary of reptile survey results for surrounding planning applications

Application site name	Application reference	Distance from site	Dates	Results
Hook Lane	P/30/19/OUT	25m east	Sept 2015	Good population of common lizard (peak 19)
253-255 Pagham Road	P/58/19/PL	170m south	Mar-May 2018	None
251 Pagham Road	P/125/14/PL	200m south	Sept-Oct 2013	Good population of slow-worm (peak 8) Low population of grass snake and common lizard (peaks 1)
Land at Summer Lane	P/58/15/OUT	280m south	Apr-Jul 2014	Good population of slow-work (peak 9) Low population of common lizard (peak 4) and grass snake (peak 1)
Sefters Farm	P/76/16/PL	400m north	May-Jul 2016	None

Habitat Suitability

4.3 The arable habitat which dominated the site does not provide any opportunities for reptiles. Suitable habitat comprised the species-poor semi-improved field margins which were narrow along the majority of the peripheries. Within the north-eastern corner and along the south-eastern boundary this habitat was wider, however suitability was limited due to the grassland lacking a tussock structure and it did not support a mosaic of habitats which is preferred by reptiles.

Reptile Survey and Population Assessment

4.4 Surveys in 2021 identified a low population of grass snake within the survey area, with a peak count of one adult on two separate occasions (Table 4). These individuals were recorded along the northern boundary alongside hedgerow H4 and the western boundary along D2 (Figure 1).

Table 4: 2021 Reptile survey results

Date	Grass Snake
10 th May	
17 th May	
24 th May	
28 th May	1
1 st June	1
9 th June	
16 th June	
23 rd June	

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 In the absence of mitigation, there is potential for an adverse impact on reptiles due to the development. These impacts include:

- Loss of habitat through vegetation clearance
- Population fragmentation
- Incidental harm during site clearance

5.2 Recommended mitigation measures will therefore aim to avoid killing or injuring reptiles during works and to maintain their local conservation status post-development.

Mitigation Strategy

5.3 Due to the low number of grass snake restricted to the boundaries, it is recommended that prior to any development the arable field is maintained as unsuitable habitat for reptiles, either through continued arable farming or ensuring that vegetation does not encroach on the field if farming activities cease.

5.4 In addition, as part of the proposed development passive displacement measures should be carried out along the field margins where grassland, ruderal vegetation and scrub require removal. This will encourage individual reptiles to move away from the construction area and into the surrounding suitable habitats and will minimise any potential risk of killing or injury. This will involve the following:

- **Timing** – Displacement will take place between late March and early October when reptiles are active during suitable weather conditions (day temperature above 10°C).
- **Toolbox talk** – The site manager and relevant staff will be briefed on the presence of reptiles on site and the legislation protecting them. They will also be made aware of the procedures to take if reptiles are found during clearance and construction works. This will be undertaken by the supervising ecologist.
- **Clearance** – This will involve the vegetation being given two cuts. Vegetation will first be strimmed under ecological supervision to a height of 250mm from the south-east corner of the site and around toward neighbouring suitable habitat in the north-west. This will encourage individuals to move into areas off-site. This will be followed by a second cut 1-2 hours later to ground level. Any potential refuges/hibernacula such as log piles will be carefully removed by hand. Any reptiles found will be placed in areas of retained habitat along the boundaries by the supervising ecologist. Following this, the topsoil can be removed to make those areas unsuitable for future reptile colonisation. This will be maintained as unsuitable during works.
- **Protection** - Where suitable habitats are to be retained, they will be protected during construction using heras fencing with clear signage to prevent machinery and materials entering these areas.

5.5 If prior to works commencing, the site becomes more suitable for reptiles i.e. the vegetation is left to grow, then further surveys and a reptile translocation may be required.

Enhancements

5.6 The proposals for the site include the provision of reptile-suitable habitats within the green infrastructure (GI) as well as the maintenance of connectivity around the site and into the wider area. New habitats will include:

- A mosaic of tussocky species-rich grassland, shrubs and edge habitats to provide a range of opportunities for foraging and basking.
- Linear features, such as hedgerows and tree lines, around the development to provide cover and corridors for individuals.
- Hibernacula and log piles to increase refuge availability.

5.7 Habitats created and maintained on site will be managed in the long-term to ensure they remain in favourable condition. Details will be outlined in a separate management plan.

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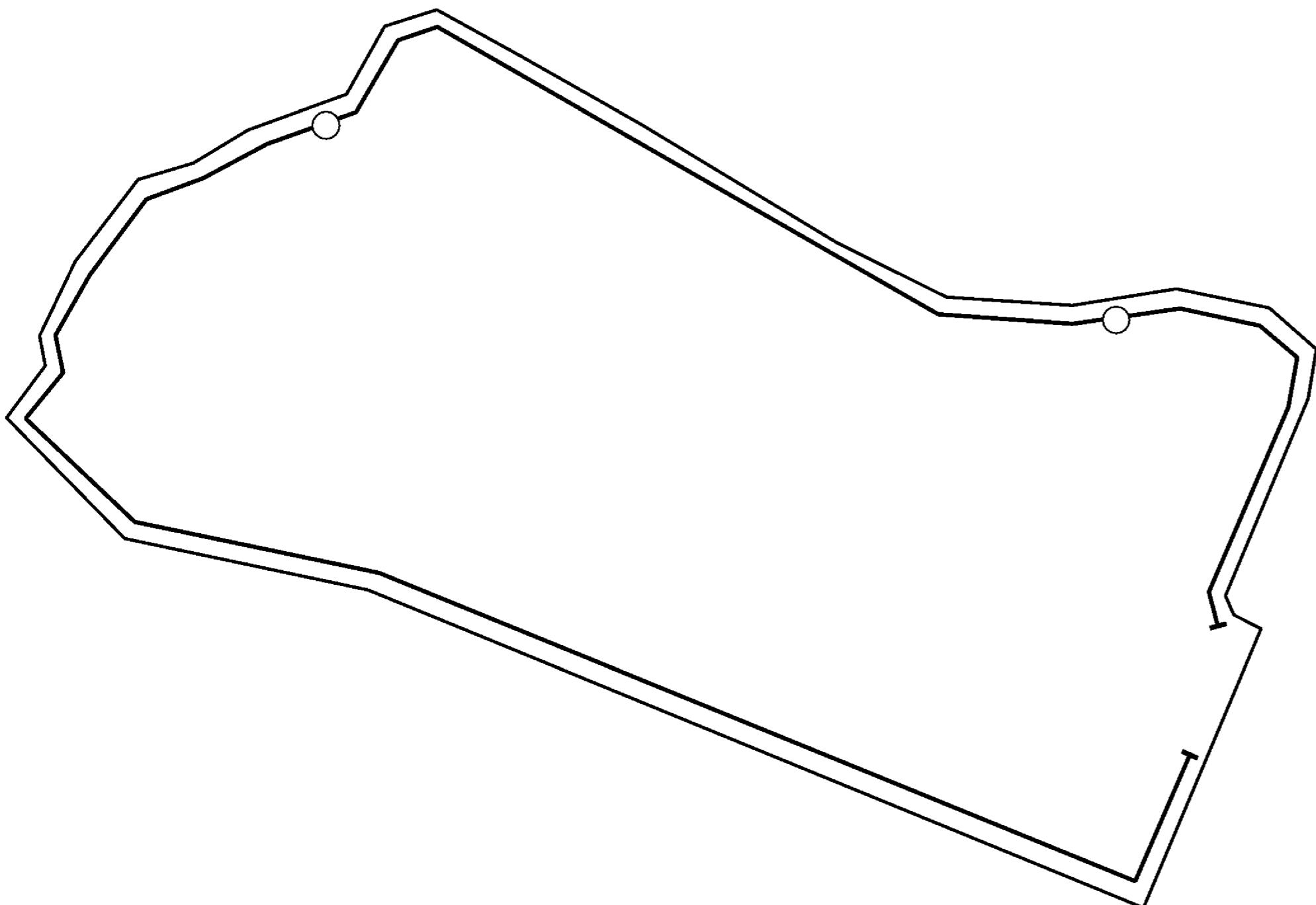
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Key

■ Site Boundary

■ Indicative Refugia Locations

○ Grass Snake



Hallam Land Management

Land West of Pagham Road,
Pagham

REPTILE SURVEY PLAN



scale 1:1000
1:1400
drawing / figure number
RM
7/12/2021
rev

Figure 1



Hallam Land Management

Land West of Pagham Road

APPENDIX J - RIPARIAN MAMMAL SURVEYS

December 2021

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TABLE

Table 1: Assessing the value of habitat for water voles

APPENDIX

Appendix J-1: Waterbody Photographs

1.0 INTRODUCTION

1.1 The following report has been prepared by FPCR Environment and Design Ltd. on behalf of Hallam Land and provides the results of surveys for water vole *Arvicola amphibius* and European otter *Lutra lutra* undertaken at land west of Pagham Road, Pagham, West Sussex (central OS grid reference SZ891698).

Site Context

1.1 The application site is approximately 4.9ha and is hereafter referred to as 'the site'. The site lies to the west of Pagham road and north of Pagham.

1.2 An extended Phase 1 habitat survey was carried out in May 2021. The site is dominated by an arable field with hedgerows and ditches (dry and wet) along the boundaries. There is a single pocket of tall ruderal vegetation near the south-eastern boundary.

1.3 The site is bordered by residential dwellings to the south, scrub to the west and agricultural land to the north and east. The wider landscape is dominated by Pagham to the east and south and agricultural land to the north and west.

1.2 The proposals are for the creation of a residential development with up to 106 new homes and associated infrastructure.

2.0 LEGISLATION

Otter

2.1 Otters are protected under Schedule 5 of the Wildlife & Countryside Act (WCA) 1981 (as amended) and the Conservation of Habitats and Species Regulations (CHSR) 2017 (as amended). In summary, it is an offence to:

- Intentionally or recklessly kill, injure or take these species
- Possess or control live or dead species or derivatives
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection
- Intentionally or recklessly disturb these species whilst occupying a structure or place used for that purpose
- Sell these species or offer or expose for sale or transport for sale
- Publish or cause to be published any advertisement which conveys the buying or selling of these species

2.2 The otter is also listed as a Species of Principal Importance in England under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006.

2.3 Any operations that may lead to either a direct or indirect effects on otter require a Natural England European Protected Species (EPS) licence.

Water Vole

2.4 Water voles are fully protected under WCA, making it an offence to:

- Intentionally kill, injure or take water voles
- Possess or control live or dead water voles or derivatives
- Intentionally or recklessly damage, destroy and obstruct access to any structure or place used by water voles for shelter or protection
- Intentionally or recklessly disturb water voles whilst they are using such a place
- Sell water voles or offer to expose for sale or transport for sale
- Publish or cause to publish any advertisement which conveys the buying or selling of water voles

2.5 Water voles also are listed as a Species of Principal Importance under S41 of the NERC Act 2006.

2.6 If impacts to water voles cannot be avoided, then depending on the size of area to be affected, a licence from Natural England may be required and suitable mitigation implemented to ensure this species comes to no detrimental harm during and after development and the scheme results in a conservation benefit to the species.

3.0 METHODOLOGY

Desk Study

3.1 In order to compile existing baseline information, relevant ecological information was requested from both statutory and non-statutory nature conservation organisations including:

- Sussex Biodiversity Record Centre (SxBRC)
- Multi Agency Geographic Information for the Countryside (MAGIC)¹
- Arun District Council planning portal²

3.2 When handling data, species records were filtered to those from the previous ten years. Older records were reviewed but only included where they were considered relevant to the site assessment.

Field Surveys

3.3 Two field surveys were carried out on 28th May and 20th September 2021 to search for evidence of otter and water vole on site.

Otter

3.4 The survey followed methodologies outlined in the New Rivers and Wildlife Handbook³ and Channin (2003)^{4,5} and were carried out in suitable weather conditions.

3.5 Due to the unlikely event of actual observation, the survey concentrated on locating field signs indicating otter presence or use:

- Spraints – characteristic sweet-smelling, black tar-like (where fresh/relatively recent i.e. within a few weeks) or grey crumbly (when old) faecal deposits usually containing fish scales, bones and occasionally invertebrate exoskeleton and bird feathers.
- Footprints – In good substrate typically asymmetrical and showing five toes arched around a large pad and, depending on substrate, webbing and claw marks. Poorer, generally coarser substrates do not often enable the identification of otter footprints.

3.6 Additional signs of otter presence may occur, although without additional evidence are usually not conclusive proof of current otter presence, such as:

- Feeding remains – Remains of fish and aquatic invertebrates.
- Slides/haul-outs – Routes into and out of the water, which are usually associated with terrestrial routes such as short cuts around meanders or along traditionally, used otter paths/routes.

¹ MAGIC - <https://magic.defra.gov.uk/> [Accessed 20.09.2021]

² Arun District Council Planning Portal - <https://www.arun.gov.uk/planning-application-search> [Accessed 20.09.2021]

³ Holmes, N., Ward, D. & Jose, P. (1994) *The New Rivers and Wildlife Handbook*. RSPB, Sandy.

⁴ Chanin, P (2003) *Ecology of the European Otter*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

⁵ Chanin, P (2003) *Monitoring the European Otter*. Conserving Natura 2000 Rivers. Ecology Series No.10. English Nature, Peterborough.

- Couches/hovers – above ground resting place. Usually associated with cover such as dense scrub, rushes or reed, flood debris or fallen trees. Many couches are rarely used whilst others more so. Difficult to prove use without radio tracking.
- Holts – below ground resting site usually associated with spraiting. Sometimes used with greater frequency than couches and can be important for breeding (natal holts) where other signs are usually absent. Notoriously difficult to find or prove without radio tracking.

Water Vole

3.7 An initial habitat assessment was made by an experienced surveyor to determine the site's suitability to support water voles, based on current guidance^{6,7}. Suitable features include:

- Dry areas above water level for nesting, either in burrows or above-ground woven nests;
- Steep bank profiles;
- Suitable bank substrate for burrowing;
- Daily water level fluctuations;
- Herbaceous marginal and bankside vegetation; and
- Suitable water depth.

3.8 These criteria are rationalised in a matrix which can be used to assess the potential value of habitat for water vole, as summarised in *Table 1*.

3.9 Presence/absence surveys were then undertaken by experienced ecologists during suitable conditions, in accordance with guidance^{6,7}. Evidence of water vole activity was searched for within 5m of the banks of waterbodies and any suitable habitat, including ditches, including:

- Water voles – live sightings
- Latrines – distinct piles of water vole droppings found near nest sites, at the ranges of territorial boundaries and where the animals enter and leave the water. The presence of droppings is the only field sign which can be used reliably on its own;
- Burrows – burrow entrances are typically wider than high with a diameter between 4 and 8cm. Generally, these burrow entrances are located at the water's edge;
- Deeding stations – areas with distinct neat piles of chewed lengths of vegetation along pathways or haul out platforms along the water's edge;
- Footprints – identifiable prints in soft margins of the watercourse;
- Runways – low tunnels that are pushed through the vegetation and often leading to burrows or feeding stations; and
- Nest balls – woven vegetation of approximately the size and shape of a rugby ball, usually found within a tuft of vegetation above the water line.

⁶ Dean, M., Strachan, R., Gow, D & Andrews, (2016) *The Water Vole Mitigation Handbook*. The Mammal Society Guidance Series. Eds F. Matthews & P. Chanin. The Mammal Society, London.

⁷ Dean, M. (2021) *Water Vole Field Signs and Habitat Assessment: A Practical Guide to Water vole Surveys*, Pelagic Publishing

Table 1: Assessing the Value of Habitat for Water voles

Habitat category	Bank Profile	Bank substrate	Variation in water level	Herbaceous vegetation	Water
	Dry areas for burrows or nests				
Optimal (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat	No noticeable variation during the summer months; banks are not overtopped regularly ^a	Continuous swathe of tall and luxurious riparian vegetation providing 90-100% cover on the banks (tall tussocky grassland) and marginal/in-channel vegetation is present (emergent species)	Permanent water
Good (all criteria need to be met)	Steep (approaching 1:1) on at least one side of a watercourse. Steep or shallow banks on static waterbodies or fen-type habitat, where water levels do not fluctuate significantly	Earth or peat bank, or stony/reinforced bank with gaps allowing access to the earth behind	No noticeable variation during the summer months; banks are not overtopped regularly	Continuous swathe of bankside or in-channel (emergent) vegetation providing at least 60% ground cover. May be dominated by grasses and weeds, rather than luxurious riparian vegetation. The vegetation should generally be tall, except in urban or suburban areas, where shorted bankside vegetation may also qualify	Permanent water. Or routinely wet for at least 2-3 months during the summer, and where other 'good' habitat is present in immediately adjacent areas with permanent water
Suitable but poor	Any habitat that falls short of the criteria to qualify as 'good' but does not meet the criteria of 'negligible value' could reasonably be considered to be suitable but 'poor'				
Negligible value (will generally need to meet the criteria for herbaceous vegetation and at least one other)	Shallow profile on both banks	Rocky or gravel, unsuitable for burrowing	Considerable variation in water level – the bank toe can move by more than 1m horizontally over the breeding season	No or limited bankside and marginal vegetation (due to shading or other 'permanent' factors – note that management can change and is often a 'temporary' factor)	n/a
	Vertical bank face with no burrowing opportunities behind it	Reinforced banks with no gaps	n/a		n/a

^a overtopping once every 5-10 years is likely to be too frequent in most cases; overtopping less frequently than this may also be problematic for water voles.

^b the term 'suitable but poor' is used to avoid the possible misinterpretation of this habitat category opposed to the term 'poor', which some would dismiss as 'unsuitable'.

4.0 RESULTS

Desk Study

- 4.1 The SxBRC returned 17 records of water voles within 2km of the site between 2011 and 2020 (see Figure 1 of Ecological Appraisal report). The closest water vole record was approximately 855m from the site.
- 4.2 No records for otter or mink *Mustela vison* were returned within 2km.
- 4.3 A search of the Arun District Council planning portal revealed water vole surveys completed for three planning applications surrounding the site, summarised in Table 4.

Table 4: Summary of water vole survey results for surrounding planning applications

Application site name	Application reference	Distance from site	Dates	Results
Hook Lane	P/30/19/OUT	25m east	May 2016	Water vole evidence (including 27 burrows and six latrines) were recorded on one ditch.
Land at Summer Lane	P/58/15/OUT	280m south	2014	Water vole were confirmed to be present in two ditches on site.
Sefton Farm	P/68/15/PL	400m north	May 2016	No evidence on site.

Waterbody and Habitat Descriptions

On-site Habitats

- 4.4 There are two ditches that run alongside the field boundaries of the site, and a network of ditches are present within the immediate surrounding area which connect to the Pagham Rife.
- 4.5 D1, which is located along the northern boundary and culverts underneath a land bridge at the western extent, had steep banks measuring 1-1.5m in height with a channel measuring 1m. The channel and the banks were heavily vegetated, and the water level was shallow, with occasional pooling of 5-10cm deep. The water gently flowed in an east to west direction.
- 4.6 D2, which is located along the western boundary, had steep banks measuring 1.5-2m in height and a channel measuring 1-1.5m. Water was only present within this ditch during times of heavy rainfall and was notably dry during April during a great crested newt *Triturus cristatus* (GCN) eDNA survey. D1 was also heavily vegetated both within the channel and the banks.
- 4.7 Aquatic/marginal species present in the ditches included great willowherb *Epilobium hirsutum*, hemlock water-dropwort *Oenanthe crocata*, cleavers *Galium aparine* and rough meadow-grass *Poa trivialis*. Species present along the bank sides include common hogweed *Heracleum spondylium*, broad-leaved dock *Rumex obtusifolius*, germander speedwell *Veronica chamaedrys*, red campion *Silene dioica* and barren brome *Bromus sterilis*.

Off-site Habitats

- 4.8 To the north-east of the site, within 250m of the site boundary, there is a network of three ditches and two ponds that flow into one another as well as the Pagham Rife.

- 4.9 P1 is connected to D1 on-site via a culvert and measures 60 by 30m. The pond is largely shaded by canopy vegetation comprising willow species *Salix* sp., sycamore *Acer pseudoplatanus* and hawthorn *Crataegus monogyna*, and is heavily vegetated in the eastern extent with common reed *Phragmites australis*.
- 4.10 D3 connects P1 to P3 and has a channel 3m wide with gently sloping banks. It is partially shaded by the presence of willow species, ash *Fraxinus excelsior*, and poplar species *Populus* sp., with hemlock water-dropwort, rosebay willowherb *Chamerion angustifolium* and reed mace *Typha* sp. species present on the banks.
- 4.11 P3 measures 40 by 30m and has limited aquatic vegetation, however common reed is present on the southern bank and hawthorn and willow species provide partial shade on the eastern, western and northern peripheries.
- 4.12 D4 contains standing water year-round and is 3m wide and 50m in length. Bankside vegetation comprises grass species such as cock's-foot *Dactylis glomerata* and false oat grass *Arrhenatherum elatius*, with herbs such as hemlock *Conium maculatum*, common nettle *Urtica dioica* and hogweed *Heracleum sphondylium*. The northern banks are partially shaded by hawthorn.
- 4.13 D5 flows from east to west to the north of the site, feeding into P3. This ditch is 2m wide and 525m in length and is heavily vegetated with common reed.
- 4.14 Further afield, this ditch network extends to the north and the west of the site and comprises a series of drains, ditches and the Pagham Rife.

Habitat Suitability

- 4.15 Otters are known to utilise virtually all types of water and waterway in the UK including small streams and ditches, even when dry (Channin 2003). It is considered that the ditches on-site have limited value to otters, however the off-site network of ditches offer opportunities for commuting, resting and foraging.
- 4.16 It is considered that ditch D1 is 'suitable but of poor quality' for water vole due to the shallow nature of the water. D2 is of 'negligible' value to water vole due to it regularly drying and only holding water for limited periods throughout the year.

Field Survey

- 4.17 During the surveys, no evidence of otters was observed.
- 4.18 No evidence of water vole was recorded on any of the field surveys conducted. However, a single water vole was observed during a GCN eDNA survey on April 29th in D5 off-site.

5.0 DISCUSSION

5.1 No evidence of otter was recorded during the surveys, therefore this species does not pose a constraint to development.

5.2 The on-site ditches are considered to be of poor quality for water voles due to the limited levels of water present. Surveys identified no evidence of water voles, which is consistent with the poor quality of available habitat. On this basis, it is considered reasonably likely that water vole are absent from the site.

5.3 However, as a known water vole population is present within the wider area, it is recommended that a pre-commencement survey is undertaken to confirm the status of the species. This can be secured through a planning condition.

5.4 In order to encourage the expansion of this species into the on-site watercourses, it is proposed that the ditches should be enhanced to provide suitable habitats to support and sustain a population. This includes the following measures:

- Widen and deepen existing channels so that they retain water and provide suitable banks for burrowing.
- Plant suitable native riparian plants to provide food sources and cover for water voles.
- A suitable buffer between the ditches and development as provided by the green infrastructure. In addition, any footpaths should be created 5-10m from the ditch edges.

5.5 The maintained ditches would provide opportunities for commuting, resting and foraging which would be of benefit to the local water vole population.

APPENDIX J-1: WATERBODY PHOTOGRAPHS**Photo 1: Ditch 1****Photo 2: Ditch 2****Photo 3: Ditch 3****Photo 4: Pond 1**



Photo 5: Ditch 4



Photo 6: Ditch 5



Photo 7: Pond 3

APPENDIX K: BIODIVERSITY NET GAIN HEADLINE ASSESSMENT

Land West of Pagham Lane	Return to results menu
Headline Results	

On-site baseline	<i>Habitat units</i>	10.90
	<i>Hedgerow units</i>	7.06
	<i>River units</i>	0.93

On-site post-intervention (including habitat retention, creation & enhancement)	<i>Habitat units</i>	12.09
	<i>Hedgerow units</i>	10.82
	<i>River units</i>	1.16

On-site net % change (including habitat retention, creation & enhancement)	<i>Habitat units</i>	10.93%
	<i>Hedgerow units</i>	53.28%
	<i>River units</i>	25.00%

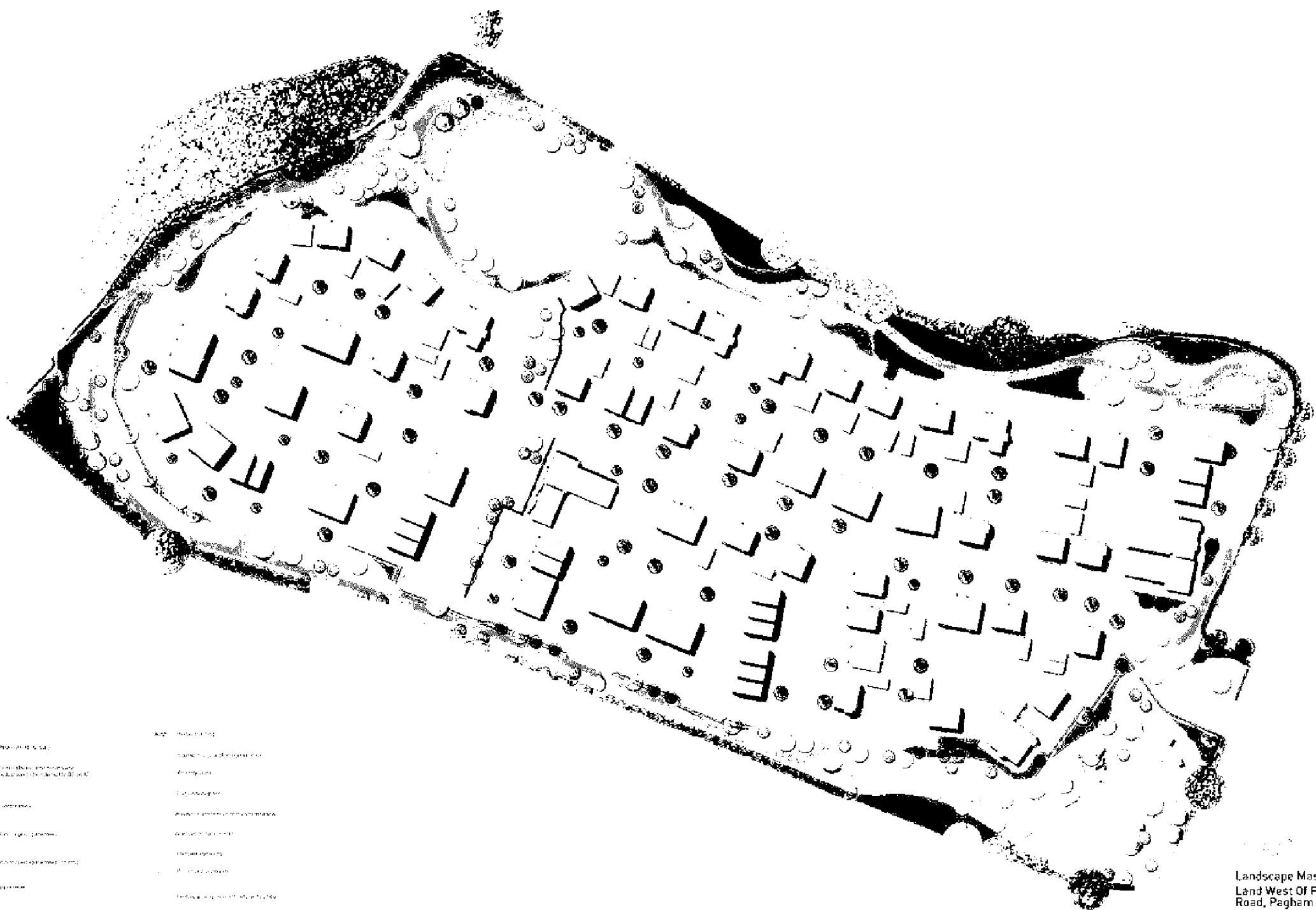
Off-site baseline	<i>Habitat units</i>	0.00
	<i>Hedgerow units</i>	0.00
	<i>River units</i>	0.00

Off-site post-intervention (including habitat retention, creation & enhancement)	<i>Habitat units</i>	0.00
	<i>Hedgerow units</i>	0.00
	<i>River units</i>	0.00

Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	<i>Habitat units</i>	1.19
	<i>Hedgerow units</i>	3.76
	<i>River units</i>	0.23

Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	<i>Habitat units</i>	10.93%
	<i>Hedgerow units</i>	53.28%
	<i>River units</i>	25.00%

Trading rules Satisfied?	Yes
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KEY

Open area (No shade)	Open area (No shade)
Evergreen trees (No shade)	Evergreen trees (No shade)
Evergreen trees (Shaded)	Evergreen trees (Shaded)
Deciduous trees (No shade)	Deciduous trees (No shade)
Deciduous trees (Shaded)	Deciduous trees (Shaded)
Shrubs (No shade)	Shrubs (No shade)
Shrubs (Shaded)	Shrubs (Shaded)
Grass (No shade)	Grass (No shade)
Grass (Shaded)	Grass (Shaded)
Path	Path
Water feature	Water feature
Hardstanding	Hardstanding
Proposed	Proposed
Existing	Existing
Proposed (No shade)	Proposed (No shade)
Existing (No shade)	Existing (No shade)
Proposed (Shaded)	Proposed (Shaded)
Existing (Shaded)	Existing (Shaded)

Landscape Masterplan
Land West Of Paignton
Road, Paignton

1:2500
0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
N
Pegasus