URBAN EDGE ENVIRONMENTAL CONSULTING

NATURAL PROGRESSION

Land North West of Goring Station, Goring-by-Sea, West Sussex

Protected Species Surveys

July 2020

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CIEEM REGISTERED PRACTICE 2019-2020

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Abbreviations

ARS	Artificial Refuge Surveys
BPPH	Bat passes per hour
CHS	Conservation of Habitats and Species Regulations 2017
ECoW	Ecological Clerk of Works
EMP	Ecological Mitigation Plan
EPS	European Protected Species
GCN	Great crested newt
HSI	Habitat Suitability Index
LNR	Local Nature Reserve
LWS	Local Wildlife Site
NERC	Natural Environment and Rural Communities Act 2006
NNR	National Nature Reserve
PEA	Preliminary Ecological Assessment
PRF	Potential (bat) Roost Feature
SAC	Special Area for Conservation
SNCI	Site of Nature Conservation Interest
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SxBRC	Sussex Biological Records Centre
TN	Target Note
TP	Transect Point
VES	Visual Encounter Surveys
WCA	Wildlife & Countryside Act 1981 (as amended)

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0 Executive Summary

0.1 Introduction

0.1.1 Protected species surveys for foraging and commuting bats, badger *Meles meles*, otter *Lutra lutra*, water vole *Arvicola amphibius* and reptiles were undertaken for the site of a proposed mixed use development at Land North West of Goring Station, Goring-by-Sea, West Sussex (Grid Reference: 510120, 103430). The study was undertaken to identify and evaluate the potential impacts of development on protected species, and make recommendations accordingly. Protected species surveys were undertaken initially between 2013 and 2014 and were updated in 2018.

0.2 Results

0.2.1 The desk study data search returned the following records of target species from within 2km of the survey area: 38 records of eight species of bat, including serotine *Eptesicus serotinus,* Daubenton's *Myotis daubentonii*, whiskered *M. mystacinus*, Natterer's *M. nattereri,* noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus,* soprano pipistrelle *P. pygmaeus,* and brown long-eared *Plecotus auritus* bats*;* two records of water vole, the closest being located within the site; and 29 records of four reptile species, comprising slow worm *Anguis fragilis*, common lizard *Zootoca vivipara,* grass snake *Natrix natrix* and adder *Vipera berus.* Sussex Biodiversity Records Centre does not supply records for badger or otter.

0.2.2 Species diversity recorded during the bat activity surveys included up to ten species. The majority (88.3%) of bat calls recorded were from pipistrelle bats, with common pipistrelles registering an average of 5.92 bat passes per hour (BPPH), soprano pipistrelles registering an average of 3.50 BPPH, and Nathusius' pipistrelles *Pipistrellus nathusii* registering an average of 0.24 BPPH. Of the remaining bat passes, those of Brandt's/whiskered were the next most frequently recorded (3.4% or 0.35 BPPH), closely followed by noctule (3.4% or 0.33 BPPH). Serotine, other *Myotis* species, Leisler's *Nyctalus leisleri*, and brown long-eared bats each accounted for less than 2% of bats recorded. This means that 91.7% of all bats recorded were of the genus *Nyctalus* or *Pipistrellus*. The highest levels of bat activity were recorded along the rife in August 2018.

0.2.3 The results show that badger was not actively using the mammal holes within survey area during the monitored period in 2018, and the low number and restricted distribution of field signs indicate that the site is not a core part of their territory. Signs of foraging (a potential snuffle hole) were observed on the northern boundary of the survey area, and a mammal push-through was located on the southern boundary, with a mammal run leading from the railway land onto site. No evidence of badger was recorded elsewhere in the site.

0.2.4 However, an outlier sett was recorded close to location C2 during the 2013 surveys (WYG, 2015a) and was considered to be active at that time. This sett was no longer present during the

2018 surveys, but the historical presence of an active sett suggests that badgers may be present in the local area and could therefore re-establish a sett prior to the start of construction works.

0.2.5 No otter holts, couches, laying-up sites or field signs were recorded within the survey area in either 2013 or 2018. Evidence of water voles, including burrows, latrines and feeding stations were identified along the whole length of Ferring rife within the site boundary during the 2013 surveys (WYG, 2015d). During the subsequent September 2018 survey feeding stations, latrines, prints and burrows were recorded. The low number of latrines per 100 metres of bankside habitat and distribution of other field signs along the rife in 2018 suggests a low water vole population density focused on the eastern end of the site.

0.2.6 The survey findings indicate that low populations of common lizard (peak count of 3 adults) and slow worm (peak count of 1 adult) were present within the survey area during the 2018 survey season. No other species of reptile or signs of their presence were recorded during the survey and it is likely that they are absent from the site. These results are consistent with the 2014 surveys which also recorded low populations of common lizard and slow worm (WYG, 2015e).

0.2.7 A wintering bird survey carried out separately between December 2019 and February 2020 recorded a total of 14 bird species of which seven were considered to be of particular conservation importance, including peregrine *Falco peregrinus*, herring gull *Larus argentatus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, mallard *Anas platyrhynchos*, kestrel *Falco tinnunculus* and lesser black-backed gull *Larus fuscus*.

0.2.8 A breeding bird survey carried out separately between April and June 2020 recorded ten probable breeding species within the site, as well as eight possible breeding species, most notably populations of skylark, breeding in the arable, and house sparrow *Passer domesticus*, breeding in boundary vegetation in the south west of the site.

0.3 Evaluation

0.3.1 High levels (relative to the survey area) of bat activity were recorded in August 2018 along the eastern rife section of the survey area (4.74 BPPH). Moderate levels were recorded in August 2018 (1.60 BPPH) on the eastern boundary of the survey area, and in October 2018 on the southern (1.36 BPPH) and western (1.81 BPPH) boundaries of the survey area. These locations were also frequently used by foraging bats during the transect surveys. However, the majority of bats recorded using these features were common and soprano pipistrelles which are frequently found foraging in urbanised areas and are not thought to be highly sensitive to sources of artificial light. Low levels of bat activity were recorded elsewhere in the site. Overall, proposed habitat losses and changes in land use within the survey area are not predicted to result in significant impacts to foraging and commuting bats.

0.3.2 The impact of light on foraging and commuting bats is classified as low for *Eptesicus serotinus* and individuals of the genus *Nyctalus* or *Pipistrellus* –which includes 92.5% of all bats recorded at the site. These species are unlikely to be significantly affected by proposals for the site. Light intolerant species recorded at the site, including individuals of the genus *Myotis* and brown long-eared bats, together comprised 7.4% of activity recorded during passive

monitoring, and each registered less than one bat pass per hour on average. Use of the site by these species may be reduced by the development proposals, however, it is likely that the overall development quanta proposed can be accommodated without significant impacts on the abundance and distribution of bats within the survey area, or adverse effects on the conservation status of local bats populations within their natural range.

0.3.3 Badger is a legally protected species but is not of conservation significance, being common and widespread in the UK. No negative impacts on badger are predicted because no currently active setts were identified within the survey area. There is hence a negligible risk of killing, injury or disturbance to badgers while occupying a sett, or destruction/damage/obstruction of a sett. However, precautionary measures are recommended to manage the risk of a sett being re-established within the site prior to the start of construction works.

0.3.4 Otter is not considered to present a constraint to the development proposals and no further recommendations for this species are required.

0.3.5 Water voles are considered to be using the whole length of the rife within the site boundary, albeit that activity appears to be focused on the eastern half of the site. However, the burrows made by this species do not normally extend inland further than 5m from the top of the bank. The majority of proposed development is positioned much further away but construction works within close proximity to Ferring rife may include groundworks associated with open space landscaping, and creation of viewing deck foundations . Together these activities could result in a short term construction-phase risk of killing, injury or disturbance to water voles present during the works, and damage/destruction to their burrows. Long term negative impacts are not predicted and it is likely that the population of water voles would continue to use habitats along the rife following construction if recommended mitigation is adopted. Conversely the proposed water attenuation features may provide new habitats suitable for water vole leading to positive effects in future.

0.3.6 The recorded distribution of reptiles within the survey area was restricted to two locations: along the west bank of the rife within the north-east of the site, and adjacent to the train line along the southern boundary. Proposed land uses in the north-east include the retention of agricultural land and no development impacts are predicted for reptiles in this location.

0.3.7 The proposed residential development is focused on the southern half of the survey area close to the other reptile records, however, the majority of the construction zone is dominated by arable land unsuitable for reptiles. An open space buffer of c.10m would be maintained between the railway boundary fence and the developed area but the proposed treatment of this open space buffer is currently unclear and re-grading or other groundworks cannot be ruled out. Construction works could hence result in a short term construction-phase risk of killing or injury to reptiles present in these locations during the works. Long term impacts are not predicted and it is likely that the populations of common lizard and slow worm would continue to use habitats along the southern site boundary following construction if recommended mitigation is adopted.

0.3.8 Overall, a low number (14) of wintering bird species was recorded at the site, of which seven were of conservation concern, and two were species of waterbirds associated with the Ferring

Rife. Numbers of other species such as songbirds were low, with birds largely confined to the site boundaries where some boundary hedging and bushes and young trees were present. The site itself comprised largely arable fields which were little used by birds, and when a species present it was in low numbers; for example there were no gamebirds (such as pheasant *Phasianus colchicus* and grey partridge *Perdix perdix*) observed and no wintering flocks of finches, thrushes, larks and buntings etc. The presence of several skylark on the fourth survey was suggestive of the commencement of breeding activity. The Ferring Rife itself supported low numbers of moorhen *Gallinula chloropus* and also mallard, so does have more potential as wintering habitat. Much of the use of the site by species of conservation concern (e.g. the gulls) is considered to be opportunistic.

0.3.9 Breeding birds included Red and Amber listed and Section 41 species, most notably populations of skylark and house sparrow (both Red Listed/section 41). The other probable breeding species was dunnock (Amber listed/section 41) and possible breeding species were starling and song thrush (both Red Listed/section 41), mallard (Amber listed) and reed bunting (Amber listed/section 41). Seven and four BoCC Green Listed bird species were also identified as probable or possible breeding species respectively. The survey area is considered to be of Local Importance for its breeding bird populations and assemblage

0.4 Recommendations

0.4.1 Recommendations are made for the avoidance and/or mitigation of impacts to protected species, to prevent an offence under the relevant legislation from occurring and to reduce the risk of development proposals resulting in significant effects on the population and distribution of species recorded during the surveys; these are summarised in Table 0.1. Recommendations are also made for the protection of important ecological features, and to enhance the ecology of the site post-construction, with the aim of achieving an overall net gain for biodiversity in line with the requirements of local and national policy and guidance.

Table 0.1: Summary of recommendations

#	Summary of recommendations
Species-specific mitigation measures	
R1	Mature trees at TN1 and TN2 (Appendix I) were assessed by WYG (2015c) as of moderate suitability for roosting bats. It is currently understood that these trees will be retained and no specific roosting surveys were carried out. However, if these trees are to be felled or lopped to facilitate the proposals, then further presence/absence surveys for bats will be required during the roosting season (May to August/September).
R2	Negative impacts on foraging and commuting bats and other nocturnal species should be prevented, during both construction and operation of the proposed development, by avoiding light spill falling onto retained hedgerows and tree lines or directed towards the Ferring rife.
R3	A repeat badger sett search and field sign survey should be undertaken prior to commencement of development works in order to determine if any new badger setts have been established at the site. The survey area should include the construction zone plus a 30 metre buffer to ensure that disturbance to badgers occupying a sett does not occur during the works.

#	Summary of recommendations
R4	Secure fencing will be installed to protect retained habitats and in areas where it is important to exclude badgers for safety reasons e.g. fuel storage areas. The boundaries of the site should remain unlit in order to maintain commuting and foraging areas for badgers. At the end of each working day excavations should be covered over and open pipework should be capped to prevent badger entrapment.
R5	A water vole mitigation strategy is required for any construction works within 10m of Ferring rife. Dependent on the length of bankside affected, this is likely to focus on displacement of water voles from the working area under the direction of a Natural England Low Impact Class Licence holder, must be carried out between 15 February and 31 March, and must achieve a net conservation. If more than a 50m stretch of watercourse will be affected a project-specific licence is likely to be required.
R6	If a viewing deck over Ferring rife is required, this should be designed to minimise losses of bankside habitat. A Construction Environmental Management Plan (CEMP) will be required to ensure that no contaminants or effluent are released into the aquatic environment and to prevent impacts to the water course from changes in morphology, turbidity or flow regime.
R7	Where works are not required within 10m of Ferring rife, impacts will be prevented by implementing a fenced buffer zone at least 10m from the top of the bank within which construction activities and access by site personnel and machinery will be prohibited and enforced through appropriate fencing and signage.
R8	A habitat manipulation exercise will be undertaken, followed by a destructive search prior to commencement of construction, to encourage the reptile population to leave the construction zone of its own accord.
Ecological protection measures	
R9	Removal of nesting bird habitats should be undertaken outside of the bird nesting season, which runs from 1 March to 31 August. It should therefore be carried out between September and February.
R10	Sections of hedgerow, treeline and the rife at the site boundaries form a network of interconnected habitats of comparatively greater ecological value. These features provide habitats suitable for a range of protected species, are of value in their own right and should be retained and protected during construction, and could also provide a focus for ecological enhancement measures (see below). As far as possible retain and protect existing woody vegetation on the western and eastern boundaries of the site for the benefit of breeding birds.
R11	Construction works should be carried out in accordance with a Construction Environmental Management Plan.
R12	Standard site procedures to prevent impacts on nearby aquatic environments should be adhered to during construction.
R13	Standard site procedures to prevent impacts on trees should be adhered to during construction.
R14	At the end of each working day excavations should be covered over and open pipework should be capped to prevent impacts on mammals, amphibians and other fauna.
R15	Rabbit warrens should be destroyed in accordance with the Mammals Act 1996 by a registered pest control company.
Enhancement measures	

#	Summary of recommendations
R16	Areas of rank grassland, scrub and marginal vegetation along the rife should be retained and managed in rotation to support wintering / breeding mallard and other waterbirds, and also to support the prey populations of kestrel. Enhance the Ferring Rife for breeding birds, for example by widening the channel in places to create larger areas of emergent and marginal vegetation for nesting waterbirds, such as moorhen and mallard. Create high quality breeding habitat for skylarks, comprising appropriately managed permanent grassland with a variety of structures and heights, in the undeveloped area between the edge of development and Ferring Rife, and between the rife and the A259.
R17	Green spaces should be sown with a locally-sourced native wildflower and grass seed mix.
R18	Hedgerow creation and/or restoration should use a range of native fruit, seed, nut and nectar-bearing species shrub species of local provenance.
R19	New wetland habitats could be considered within the proposed development as part of the drainage strategy.
R20	Within the site's landscaping plans, use plant species which encourage bats by providing additional food sources or roosting opportunities.
R21	Buffers of less intensively managed vegetation (including the use of tussock-forming grass species) should be maintained within soft landscaped areas to maintain ecological connectivity through the site.
R22	Hibernacula and compost heaps for reptiles and amphibians could be created within areas of retained rough grassland or marginal vegetation.
R23	Small access gaps should be provisioned at the base of new fence boundaries to enable dispersal of small mammals across the site.
R24	The value of the site for birds could be enhanced by installing a range of artificial nest boxes onto new buildings and retained trees.
R25	The value of the site for bats could be enhanced by installing a range of artificial roost boxes onto new buildings and retained trees.

0.5 Conclusions

0.5.1 The proposed development will result in negative impacts to breeding birds, foraging and commuting bats, water vole and reptiles, however, long-term adverse effects on the conservation status of these species are not predicted. Mitigation methods are recommended to reduce and offset the predicted impacts on a proportionate basis. Measures to enhance the ecology of the site post-construction which are conducive to being shown spatially are depicted on the Ecological Mitigation Plan at Appendix X. A biodiversity net gain assessment has been carried out separately to demonstrate the overall value of the site for ecology after development.

1 Introduction

1.1 Purpose of this Report

1.1.1 An Extended Phase 1 Habitat Survey was carried out in April 2013 for the site of a proposed mixed use development at Land North West of Goring Station, Goring-by-Sea, West Sussex (Grid Reference: 510120, 103430). It was recommended that further surveys should be carried out for foraging and commuting bats, badger *Meles meles*, otter *Lutra lutra*, water vole *Arvicola amphibius* and reptiles due to the presence of favourable habitats. Protected species surveys were initially undertaken between 2013 and 2014 and were updated in 2018.

1.2 Objectives and Approach of the Study

1.2.1 The study was commissioned to fulfil the following objectives:

- To determine the presence or likely absence of badger, otter, water vole and reptiles, and record their locations within the survey area;
- To identify features of importance to foraging and commuting bats, record the species assemblage and assess the relative abundance of bats within the survey area;
- To identify and evaluate the potential impacts of development on bats, badger, otter, water vole and reptiles; and
- To outline the measures required for avoiding and mitigating negative impacts to protected species, and make recommendations for ecological enhancement.

1.2.2 To meet these objectives the survey approach involved:

- A desk study involving a review of protected species records from the local area (2km radius from the centre of the proposed development site);
- A review of information from the Phase 1 survey (WYG, 2015a) regarding the habitats present within the site boundary and wider area; and
- Field surveys using standard techniques to record the presence, distribution and relative abundance of target species within the survey area, with reference to current industry guidelines.

1.3 Survey Area

1.3.1 The survey area lies to the west of the village of Goring-by-Sea within the West Sussex coastal plain, currently comprising approximately 30.8 hectares (ha) of predominantly arable fields bordered with semi-improved grassland, scattered scrub and well managed species poor hedgerows. Ferring Rife runs from east to west through the northern part of the site. The site is

bounded to the north by the A259 Littlehampton Road, to the east by the A259 Goring Street, to the south by the south coast railway, and to the west by residential properties.

1.3.2 The extent of the survey area is outlined in red on Figure 1.1 and the Phase 1 habitats map of the site is included for reference at Appendix I.

1.3.3 The local area comprises residential neighbourhoods with arable fields to the north and a school located beyond the railway to the southern boundary of the site. The wider semi-rural landscape is dominated by residential development, industrial estates and arable farmland. Two ponds lie within 500m of the survey area.

1.4 Proposed Construction Activities

1.4.1 Outline planning permission is being sought for a mixed use development comprising up to 475 dwellings along with associated access, internal roads and footpaths, car parking, public open space, landscaping, local centre (uses including A1, A2, A3, A4, A5, D1, D2) with associated car parking, car parking for the adjacent railway station, undergrounding of overhead HV cables and other supporting infrastructure and utilities.

1.4.2 The planning application boundary is smaller than the survey area boundary and measures 19.96ha. The indicative masterplan for the site is shown on Figure 1.2.

Land North West of Goring Station

Survey area

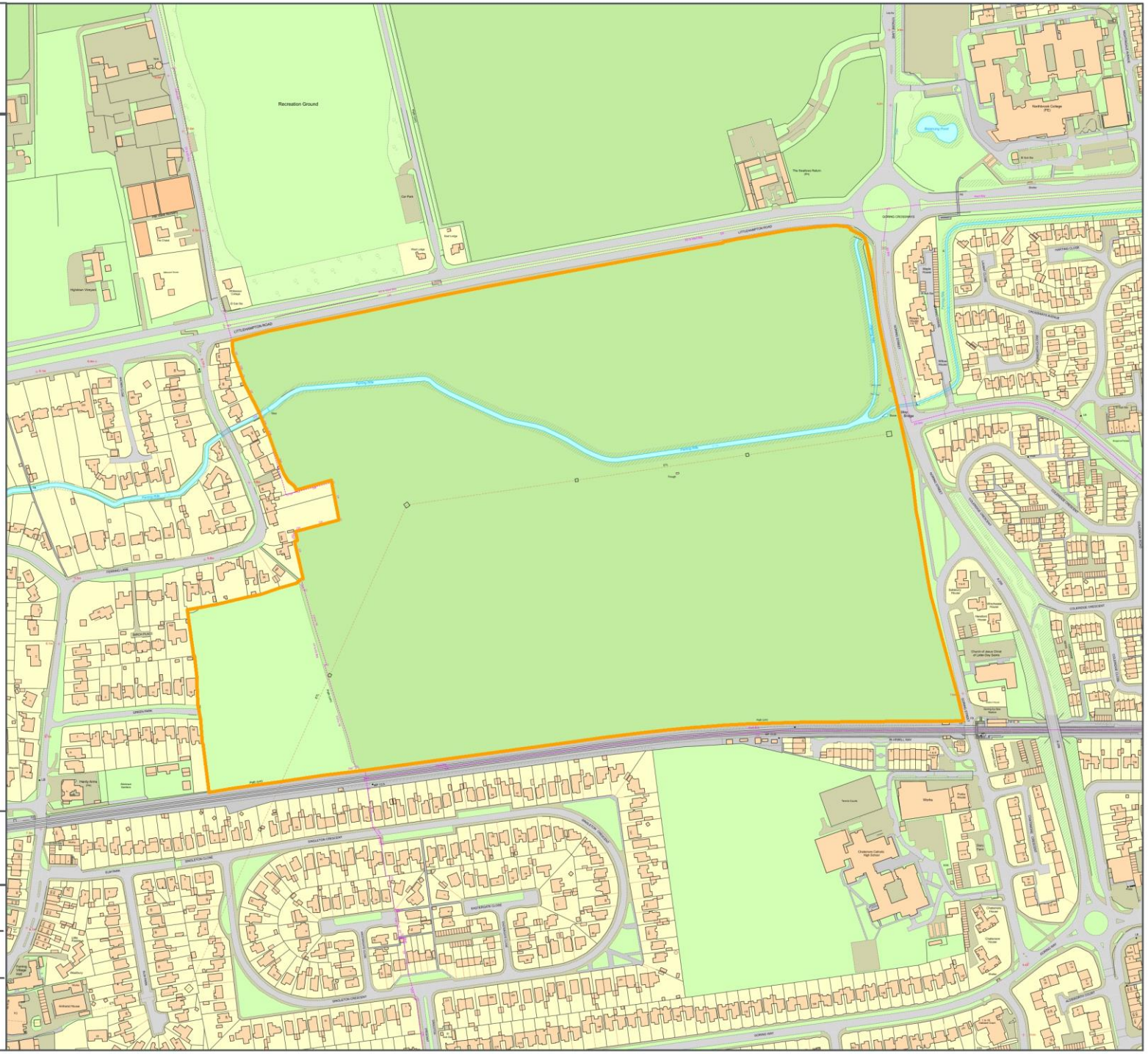

Figure 1.1: Survey area

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Ordnance Survey 0100031673

0 0.1 0.2 Kilometers

N

ENVIRONMENTAL CONSULTING
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Scale	Date
1:5,000	Dec2018
Created by	**Reviewed by**
NP	NP

Drawing number
UE0284ECO-Site181205

Figure 1.2: Indicative masterplan

2 Survey Methodology

2.1 Desk Study

2.1.1 A desk-based study was undertaken to examine published information and biological records from within the search area (site centroid plus 2km). The desk study established the presence of designated sites of nature conservation interest, or records of protected/notable habitats/species within the site and its surrounding area. This information was collected from the following sources:

- The 'MAGIC' (Multi-agency Geographic Information for the Countryside) website: www.magic.gov.uk; and
- Sussex Biological Records Centre (SxBRC).

2.1.2 The desk study was carried out during the Phase 1 survey and is reported in full in WYG (2015a); summaries in relation to each target species/group are presented alongside survey results in Chapter 3.

2.2 Previous Ecological Surveys

2.2.1 An Extended Phase 1 Habitat Survey was undertaken by White Young Green on 03 April 2013 (WYG, 2015a) and included an assessment of the site's suitability for a range of protected species. Based on its findings a number of protected species surveys were carried out during 2013 and 2014, as listed below. For details on the methods, limitations and personnel applicable to the surveys refer to each WYG report. Summaries of findings in relation to each target species/group are presented alongside survey results in Chapter 3.

- Aquatic Invertebrate Survey (WYG, 2015b)
- Bat Activity Survey (WYG, 2015c)
- Otter and Water Vole Survey (WYG, 2015d)
- Reptile Survey (WYG, 2015e)

2.2.2 Regarding great crested newt *Triturus cristatus*, the Phase 1 survey concluded that "*there are two ponds located to the north-east of the site, the closest one being approximately 130m from the site. However, a dual carriageway, the A259, which runs along the northern boundary of the site is considered to act as a barrier preventing great crested newts migrating from the ponds, to the site, if breeding within the ponds*" (WYG, 2015a). This remains a valid conclusion and no surveys for great crested newt were carried out.

2.3 Bat Activity Survey

2.3.1 Bat activity surveys were based on standard industry guidelines (Collins (ed.), 2016) and Natural England's standing advice[1] for bats, comprising:

- Transect surveys: walking through a representative sample of the survey area's habitats to a predetermined route, to listen for, observe and record bats in flight away from their roosts using handheld bat detectors, noting bat activity and behaviour; and
- Remote monitoring: installation of automated detectors for a five night period per deployment to remotely monitor bat activity in fixed locations within the survey area, with locations changing over the course of the season.

2.3.2 Current guidelines (Collins (ed.), 2016) recommend reasonable levels of bat activity survey effort, based on overall habitat suitability; see Box 1. The Phase 1 survey concluded that the arable land which dominated the survey area was unlikely to host an abundant invertebrate fauna and was considered to have low suitability as foraging habitat for bats, with the exception of the rife which was considered to be of moderate suitability.

Box 1: Recommended survey effort for bat activity surveys (Collins, 2016)

Low suitability habitat	*Moderate suitability habitat*	*High suitability habitat*
One survey visit per season (spring/summer/autumn), and One static detector location per transect, monitored for five consecutive nights per season (30mins before sunset (SS) to 30mins after sunrise (SR) each night)	One survey visit per month (April to October), including at least one dusk & pre-dawn survey, and Two static detector locations per transect, each monitored for five consecutive nights per month (SS-30mins to SR+30mins)	Up to two survey visits per month (April to October), including at least one dusk and pre-dawn survey, and Three static detector locations per transect, each monitored for five consecutive nights per month (SS-30mins to SR+30mins)

2.3.3 The activity surveys reported herein were instructed in August 2018, and the survey method was adapted from the standard approach for low suitability habitat as follows:

- One survey visit per month (August to October) with two static detector locations per transect; and,
- One transect to be walked by one surveyor on each occasion.

Transect surveys

2.3.4 Transect surveys of the site coincided with deployment and retrieval of the automated detectors. A transect route representative of the survey area's habitats and transitional zones was plotted and walked once during each survey. Start points were randomised and the direction of travel alternated to avoid crepuscular bias. One surveyor undertook each transect survey, and walked at a slow, consistent speed along the transect route, stopping for

[1] Natural England (2015): *Bats: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects

approximately 3 to 5 minutes at each transect point to listen for bats and record activity and behaviour (spot counts). Bat activity between transect points was also recorded where possible. The locations of transect points are shown in Appendix II, and these are referred to within the results.

2.3.5 Dusk activity surveys commenced at sunset and continued for at least two hours. Two hours was considered to be a sufficient length of time in which to adequately cover the survey area and to account for the species likely to be present in these habitats in Sussex. Dawn activity surveys (where applicable) started at least two hours before dawn and continued at least until sunrise.

2.3.6 Wildlife Acoustics Echometer EM3 and Echometer Touch time expansion detectors were used during the transect surveys. Bat recordings were analysed using Kaleidoscope Pro (v5.0.3) software which enables evaluation of a range of echolocation call parameters to identify bats to genus or species level. Weather conditions were noted during each survey (minimum/maximum air temperatures, wind speed/direction, precipitation and cloud cover) and are reported in Table 2.1 and alongside the results in Appendix III. Sample call sonograms recorded during the surveys are given at Appendix IV.

Table 2.1: Bat survey dates and weather conditions

Date	Dusk/dawn	Weather conditions
30 Aug 2018	Dusk	15.8°C – 14.1°C, 90% cloud cover, light northerly (Beaufort 1), no precipitation
17 Sep 2018	Dusk	19.2°C – 18.3°C, 0% cloud cover, light south easterly (Beaufort 1 to 2), no precipitation
02 Oct 2018	Dusk	14.3°C – 14.0°C, 80% cloud cover, light easterly (Beaufort 2), no precipitation

Remote monitoring

2.3.7 Two Wildlife Acoustics SM4BAT zero-crossing bat detectors were used for the automated monitoring. These were sited at a height of around 3–5m above ground level and left in-situ for at least 5 nights during each month of survey. Deployment locations were chosen systematically to achieve an even distribution across the survey area representative of its habitats, and are shown in Appendix II; these locations are referred to within the results.

2.3.8 The bat detector was set to record passes from 30 minutes before sunset to 30 minutes after sunrise to capture early emerging and late returning bats and this was standard for all surveys. Data from the recorder were analysed using AnalookW (v4.2d) and Kaleidoscope Pro (v5.0.3) software. Sample call sonograms recorded during the surveys are given at Appendix IV.

2.3.9 Weather data for the survey period was obtained from the closest weather station using the Met Office Weather Observations Website (http://wow.metoffice.gov.uk/home). Weather data is presented in Appendix V.

Limitations

2.3.10 The activity surveys reported herein were instructed in August 2018 and carried out during August, September and October 2018. The surveys were hence undertaken in accordance with the BCT's recommended timings for activity surveys (Collins (ed.), 2016), with at least 14 days between each survey but it is acknowledged that, due to the timing of instruction, no early season bat activity data has been recorded for the site. However, given the low suitability of the dominant arable habitat it is considered unlikely that the levels of bat activity recorded between August and October would increase significantly between April and July. Furthermore, the deployment of two static detectors each month rather than one has generated sufficient survey data to make an adequate assessment of bat usage over the site.

2.3.11 There were no difficulties in gaining access to the site to carry out the surveys. Weather conditions were generally good during the surveys and within acceptable parameters. There were no other limitations of relevance to the methods applied.

2.3.12 See Appendix XII for general Legal and Technical Limitations which apply to this document.

Evaluation criteria

2.3.13 Within this report, the potential suitability of foraging/commuting habitats is classified as negligible, low, moderate or high with reference to Table 4.1 in the *Good Practice Guidelines* (Collins (ed.), 2016). Levels of bat activity are also noted as low, moderate or high, however, these should be taken as relative terms applicable within the survey area only. In other words, they are intended to indicate which parts of the survey area are used more frequently by bats, and which may therefore be of importance to the conservation status of local bat populations. Interpretation of these terms and the accompanying data on species assemblage and abundance is, where appropriate, used to indicate areas of high and moderate value to bats. These again are relative terms applicable within the survey area only.

2.3.14 It should be noted that bat passes recorded during automated static monitoring were split to a maximum duration of 60 seconds and do not equate to numbers of individual bats. Bats will often repeatedly pass a detector when hunting along a linear feature such as a hedgerow or tree line, and there is no way to determine numbers of individuals from this data. The number of bat passes should instead be taken as an index of relative bat activity at a particular location within the site.

2.3.15 Evaluation of the potential impacts on bats was undertaken with reference to Chapter 6 of English Nature (2004) and Natural England Standing Advice[2], with predicted impacts to each feature noted as of low, medium or high significance.

[2] Natural England (2015): *Bats: surveys and mitigation for development projects.* Accessed online [23/7/17] at: https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-development-projects

2.4 Badger Survey

2.4.1 There is no formal guidance currently in existence for badger survey, particularly with regards to establishing whether a sett is active, however common practice is for surveys to focus on a search for signs of badger activity (after Harris, Creswell & Jeffries, 1989) with reference to Natural England's standing advice[3] on badgers. Surveys comprised detailed site walkovers coupled with monitoring of potential badger sett entrances using camera traps.

Field sign surveys

2.4.2 Field sign surveys comprised a detailed investigation of all suitable areas of habitat for foraging and sett creation (subject to safe access) to record badger activity within the site, including:

- Dung pits: badgers usually deposit faeces in characteristic excavated pits, concentrations of which (latrine sites) are typically found at home range boundaries;
- Setts: comprising either single isolated holes or a series of holes, likely to be interconnected underground. Sett searches included the entire site plus a minimum buffer of 30m, subject to safe access;
- Runs: paths between setts or leading to feeding areas;
- Scratching posts at the base of tree trunks;
- Snuffle holes: small scrapes where badgers have searched for insects, earthworms and plant tubers;
- Day nests: bundles of grass and other vegetation where badgers may sleep above ground;
- Hair traces; and
- Footprints.

2.4.3 The location, type and approximate extent of each sett or field sign was recorded using GPS coordinates. The survey was initially undertaken in September 2018, and repeated in October and November as the vegetation died back; approximately three hours of search effort was expended on each occasion. Weather conditions were noted during each survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.2.

Table 2.2: Badger survey dates and weather conditions

Date	Weather conditions
17 Sep 2018	27°C, 0% cloud cover, no wind, no precipitation.
26 Oct 2018	12°C, 40% cloud cover, light north-westerly (Beaufort 1), showers.
27 Nov 2018	9°C, 60% cloud cover, light southerly (Beaufort 2), no precipitation.

[3] Natural England (2015): *Badgers: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/badgers-surveys-and-mitigation-for-development-projects

Camera trap monitoring

2.4.4 An extended period of camera trap monitoring outside the potential sett entrances was undertaken, with the objective of recording animal activity to determine whether potential setts were actively used by badgers and to assess the level of use. Signs of recent activity at sett entrances (e.g. fresh excavations, footprints, badger hairs or bedding) were also noted.

2.4.5 Bushnell Trophy Cam HDmax movement-triggered infrared cameras were deployed on site, with the lens trained on individual or groups of potential sett entrances. The cameras record both still image and video footage, and were set to operate during night-time hours, capturing three images per trigger event. The cameras were periodically moved within the site to ensure that all potential setts were monitored, and to focus on areas where the likelihood of recording badger activity was considered to be greatest based on the findings of the field sign surveys.

2.4.6 One camera was deployed on 17 September 2018 for a total 41 nights and used to monitor a potential sett at C1 within the east of the survey area, as shown on the plan at Appendix VI, and retrieved on 28 October 2018.

2.4.7 The camera was re-deployed on 28 October to monitor a potential sett at C2 within the west of the survey area for a total 44 nights. This camera was re-positioned twice on 20 and 27 November, and retrieved on 11 December 2018.

2.4.8 The camera was re-deployed on 11 December to monitor a potential sett at C3 within the east of the survey area. Data from the camera was downloaded on 17 January 2019 and the camera was left in the field to continue monitoring C3. It was checked again in February 2019 but had been stolen; a replacement camera was not deployed.

Limitations

2.4.9 Whilst the majority of the site was readily accessible for survey, it was not possible to check the residential gardens within 30m of the western site boundary or the rail corridor to the south for evidence of badger; although attempts were made to visually assess neighbouring land from within the site itself, some areas adjacent to the site's boundary were in private ownership and not accessible. There were no other limitations of relevance to the methods applied.

Evaluation criteria

2.4.10 Badger setts are usually classified into four types as follows:

- Main Sett: Large well-established setts normally in continuous use. The main sett will form the most likely location for the raising of cubs.
- Annex Sett: It is common for annex setts to be found in close association with the main sett and will often be linked to it by a well-worn path. Annex setts are often used to raise a second litter of cubs should a clan produce two litters within a season.
- Subsidiary Sett: Subsidiary setts often have only a few holes and are usually at least 50m from a main sett. They are not continuously active.

- Outlier Sett: These setts are used on an occasional basis and usually consist of only one to three entrance holes. Spoil heaps will generally be smaller than those found associated with the other sett types, indicating a smaller underground structure.

2.4.11 However, sett use varies over time as badgers respond to environmental factors such as food availability, competition with other social groups or sources of disturbance. In practice it is often difficult to distinguish between annex, subsidiary and outlier setts without extensive monitoring.

2.5 Otter and Water Vole Survey

2.5.1 A presence/absence survey for otter and water vole was carried out, based on standard industry guidelines (Chanin, 2003; Dean *et al.*, 2016) and Natural England's standing advice for otter[4] and water vole[5], combining habitat suitability assessment, field sign surveys and camera trap monitoring (the latter targeting otter only).

Field sign surveys

2.5.2 Field sign surveys comprised a detailed investigation of all suitable areas of riparian habitat to record evidence of otter or water vole activity within or close to the site. The survey covered the full length of both banks (subject to safe access) of the stream within the site boundary, extending at least 2m from the water when looking for water vole signs, and included at least 10m of adjacent riparian habitat when looking for otter. The survey area also extended approximately 100m upstream and downstream of the site boundary (subject to safe access) to enable consideration of the abundance and distribution of otter and water vole in the wider area during impact assessment and mitigation planning.

2.5.3 Otter surveys can be conducted year round but the optimal survey period is springtime, after winter water levels subside and before for vegetation regrowth becomes too vigorous. Surveyors searched for characteristic signs of otter activity, including:

- *Spraints*: Otters communicate to each other by marking or 'sprainting' with small droppings along a watercourse at waypoint features such as fallen trees, boulders, prominent grass tussocks and bridge supports. Fresh spraints can appear as a black, spiky cylinder coated in mucus, 2 to 8cm long and 1 to 5cm in diameter. Spraints have a sweet odour and scales, bones and sometimes feathers are often visible. Weathered spraints are grey with the scales and bones appearing ashy.
- *Tracks/footprints*: Otter tracks have a characteristic pattern; they are approximately 4 to 8cm long with five rounded toe prints. Otters often follow a habitual route so tracks can be evident on repeat visits. The tail drag is sometimes visible in an otter trail.

[4] Natural England (2014): *Otters: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/otters-protection-surveys-and-licences

[5] Natural England (2015): *Water voles: surveys and mitigation for development projects*. Accessed online at: https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences

- ***Runways and slides***: Runways are trampled pathways, approximately 30cm wide on river banks and reedbeds. Runways may go down a bank to form a slide, leaving twists in the vegetation and/or smoothed mud and substrate.
- ***Holts***: Usually a secure underground resting site and particularly significant when used for and cub raising. Often located next to a watercourse under boulders or fallen trees but can also be found away from the water in adjacent habitats. Those close to the water's edge, although affording underground security, are only generally used for resting purposes. Breeding dens are rarely aside flowing main rivers being usually away from sources of flooding. Females appear to favour these for most of their resting sites.
- ***Couches***: Similar to holts but are found above ground and are used temporarily. Couches are frequently located in dense vegetation cover or natural cavities formed by bankside trees.

2.5.4 The optimal survey period for water vole is during the breeding season, mid-April to September. Surveyors searched for characteristic signs of water vole activity, including:

- ***Droppings and Latrines***: Droppings are the most distinctive field sign, approximately 8 – 12mm in length often with a blunt end. They are usually found accumulated at latrine sites, close to the water's edge, near the nest or at the boundaries of territories. These are marked with scent from the lateral flank glands when deposited and drummed-down with the hind feet, so often resemble a flattened pile of old droppings with fresh on top.
- ***Feeding stations***: These are piles of neat chewed vegetation found along water vole pathways within vegetation or at the edge of the water. The sections are typically 10cm long with the chewed ends being at approximately 45° and often showing the marks of the two large incisors.
- ***Burrows and nests***: As many animals and birds will construct holes in the river bank, burrows found on their own cannot be regarded as conclusive evidence of water vole presence. Water vole burrow entrances are typically taller than they are wide; with a diameter of 4 – 8cm. Burrows away from the water can also sometimes have grazed 'lawns' surrounding them, where the vegetation has been grazed within easy reach of the entrance. Most nests are created underground within burrows. However, in areas of fen and rush pasture nests may sometimes be woven and found within tussocks.
- ***Footprints***: As with all rodents, water vole footprints show variation between the fore and hind feet. Fore-foot prints show four toes which are splayed in a star-like arrangement. Hind-foot prints show five toes with the outer toes on either side being at right angles to the middle three. However, as there is again significant overlap with the prints of other species, (for example with juvenile brown rats), footprints may not be conclusive without the presence of other field signs.
- ***Runways***: Most often found within 2m of the water's edge, these take the form of low tunnels (c.5-9cm width) pushed through the vegetation, often branched many times, and leading between the water, burrows and favoured feeding areas.

2.5.5 The location, type and approximate extent of each field sign was recorded using GPS coordinates. The survey was undertaken on 17 September 2018, and approximately six hours of

search effort was expended. Weather conditions were noted during each survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.3. Field signs of key predators (e.g. mink *Neovison vison*, fox *Vulpes vulpes* and cat *Felis catus*) were also noted if present.

Table 2.3: Otter / water vole survey date and weather conditions

Date	Weather conditions
17 Sep 2018	27°C, 0% cloud cover, no wind, no precipitation.

Camera trap monitoring

2.5.6 No camera trap monitoring was undertaken because no potential otter holts or couches were found during the field sign surveys.

Limitations

2.5.7 A risk assessment was carried out for the field work. Handling of animals is generally not required for this type of survey and in any event would need to be done under licence. The risk assessment focused on biosecurity, leptospirosis and difficult terrain (working on steep banksides near water). Surveyors worked in teams of two with the use of waders and a rope and harness where necessary. There were no other limitations of relevance to the methods applied.

Evaluation criteria

2.5.8 The number of water vole latrine sites recorded during a survey can give an indication of relative abundance, and is useful in determining the most valuable parts of a site to water voles. Hence the survey area can be subdivided into areas supporting water voles at high, medium or low density. These relative terms are defined in Table 2.4 (Dean *et al.*, 2016).

2.5.9 There are no formally agreed standards for evaluating otter survey results. However, in general terms it is not unreasonable to assume that, the greater the abundance of field signs within a stretch of riparian habitat, the more frequently it is used by otter. Resting sites (holts/couches) are features of greater significance, particularly those used as breeding dens.

Table 2.4: Population density assessment (after Dean et al., 2016)

Relative population density	Approx. number of latrines per 100m of bankside habitat	
	1st half of season (mid-Apr to end Jun)	2nd half of season (Jul to Sep)
High	10 or more	20 or more
Medium	3 – 9	6 – 19
Low	≤ 2 (or 0, but with other field signs)	≤ 5 (or 0, but with other field signs)

2.6 Reptile Survey

2.6.1 A presence/absence survey for reptiles was carried out, based on standard industry guidelines (Hill *et al.*, 2005; Froglife, 1999; Gent and Gibson (eds.), 2003) and Natural England's standing advice[6] for reptiles, combining habitat suitability assessments, Visual Encounter Surveys (VES) and Artificial Refuge Surveys (ARS). A minimum of seven survey visits during suitable weather (principally an air temperature between 9 and 18 ℃, and in the absence of rain and strong wind) are required to establish the presence or likely absence of reptiles within the survey area.

2.6.2 In total, 130 artificial refuges were used. The survey area covers 30.8ha in total but large expanses of the dominant arable habitat were sub-optimal, formed of crop stubble with a short, uniform sward and absence of shelter features. Approximately 25ha of this habitat type was excluded from the survey, away from boundary features such as hedgerow/treeline, the rife and rough grassland at the field margins. The refuges were hence distributed across approximately 5.8ha of potentially suitable habitat as shown on the plan at Appendix VIII. Guidelines recommend that at least 10 refuges are used per hectare of land surveyed (refuge density during this survey = c.22/ha). To give reptiles time to locate and habituate to new refuges in their environment they were placed on 30 August 2018, 12 days prior to the start of the main survey period.

2.6.3 The location of reptiles (including sloughed skins or eggs) was recorded using GPS coordinates, together with species counts, sex (when distinguishable) and maturity data. Weather conditions were noted during each survey (air temperature, wind speed, precipitation and cloud cover) and are reported in Table 2.5.

Table 2.5: Reptile survey dates and weather conditions

Date	Weather conditions
11 Sep 2018	17.7°C – 18.1°C, 30% cloud cover, moderate easterly (Beaufort 3), no precipitation, dry ground conditions
13 Sep 2018	17.6°C – 16.5°C, 70% cloud cover, moderate easterly (Beaufort 3), no precipitation, dry ground conditions
17 Sep 2018	17.8°C – 18.2°C, 30% cloud cover, no breeze, no precipitation, dry ground conditions
19 Sep 2018	18.1°C – 18.6°C, 50% cloud cover, moderate northerly (Beaufort 4), no precipitation, dry ground conditions
21 Sep 2018	16.5°C – 15.6°C, 80% cloud cover, light north easterly (Beaufort 2), no precipitation, dry ground conditions
25 Sep 2018	15.2°C – 14.7°C, 70% cloud cover, light north westerly (Beaufort 1-2), no precipitation, dry ground conditions
05 Oct 2018	17.8°C – 16.7°C, 30% cloud cover, light westerly (Beaufort 1-2), no precipitation, dry ground conditions

[6] Natural England (2015): *Reptiles: surveys and mitigation for development projects.* Accessed online at: https://www.gov.uk/guidance/reptiles-protection-surveys-and-licences

Limitations

2.6.4 There were no difficulties in gaining access to the site to carry out the surveys and the entire site was accessible throughout the survey Refuge density within areas of favourable habitat exceeded that recommended by current guidelines. All survey visits were undertaken during suitable weather conditions. No other limitations of consequence were noted.

Evaluation criteria

2.6.5 Criteria for establishing a population size class assessment based on a refuge density of 10/ha are given in Froglife (1999), as shown in Table 2.6, but it should be noted that this is intended to be used in conjunction with a higher number of survey visits than normally undertaken for a presence/absence survey. Site scores can be compared to the Key Reptile Site selection criteria (Froglife, 1999) to establish the overall importance of a site for reptiles.

Table 2.6: Population size class assessment and Key Reptile Site criteria (Froglife, 1999)

Species	Low Population Score =1	Good Population Score =2	Exceptional Population Score =3
Adder	<5	5 - 10	>10
Grass snake	<5	5 - 10	>10
Common lizard	<5	5 - 20	>20
Slow-worm	<5	5 - 20	>20
To qualify as a Key Reptile Site, the survey site must meet at least one of the following criteria:			
1. Supports three or more reptile species 2. Supports two snake species 3. Supports an exceptional population of one species (see above) 4. Supports an assemblage of species with a combined score of at least 4 (see above) 5. Does not satisfy 1 - 4 but is of particular regional importance due to local rarity			

2.7 Breeding and Wintering Bird Surveys

2.7.1 A wintering bird survey was subsequently commissioned carried out separately to the other surveys reported herein (TSA Ecology, 2020[7]). Four visits were undertaken between December 2019 and February 2020. A breeding bird was also carried out separately (UEEC, 2020[8]) based on three surveys undertaken between April and June 2020.

2.8 Personnel

2.8.1 The site surveys were led by Nick Pincombe BA(Hons) MSc CEnv MIEMA MCIEEM, director of Urban Edge Environmental Consulting, who has over 12 years' experience in leading survey and impact assessment teams for a wide range of ecological consultancy and environmental planning projects. Nick holds a Natural England Level 2 Class Licence to handle bats (WML-

[7] TSA Ecology (2020): *Land North West of Goring Station, Goring-by-Sea, West Sussex: Winter Bird Report.*

[8] Urban Edge Environmental Consulting (2020): *Land North West of Goring Station, Goring-by-Sea, West Sussex: Breeding Bird Survey.*

CL18) and a Level 1 Class Licence to trap and handle great crested newt (WML-CL08). Nick was assisted by Becci Bond BSc(Hons) MCIEEM and Anna Douglas BSc(Hons) MSc GradCIEEM.

2.8.2 Becci is a Senior Ecologist with over seven years' experience in professional practice. Becci specialises in dormouse surveys and mitigation and has extensive experience in surveying for other taxa, particularly bats and great crested newt, and holds a Natural England Level 2 Class Licence to trap and handle great crested newts, and a Level 1 Class Licence to handle dormice.

2.8.3 Anna is a Graduate Ecologist who has three seasons' professional consultancy experience, has undertaken numerous bat surveys and translocations of great crested newt and reptiles. Anna holds a Natural England Level 2 Class Licence to trap and handle great crested newts and is currently working towards gaining a bat licence.

3 Results

3.1 Bat Activity Survey

Desk study

3.1.1 SxBRC returned 38 records of eight species of bat from within 2km of the survey area, including serotine *Eptesicus serotinus*, Daubenton's *Myotis daubentonii*, whiskered *M. mystacinus*, Natterer's *M. nattereri*, noctule *Nyctalus noctula*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, and brown long-eared *Plecotus auritus* bats. The records included roosts and droppings but there were no records of swarming or mating behaviour. The closest record was located approximately 420m south-east of the site and comprised sightings of a whiskered bat and an unidentified bat species. There are seven Sites of Special Scientific Interest (SSSI) and no Special Areas of Conservation (SAC) within 10km of the survey area. Bat populations do not feature among the notified features of any of these sites.

Habitat suitability

3.1.2 The intensively managed arable habitat which dominates the survey area is unlikely to host an abundant invertebrate fauna and is considered to have low suitability as foraging habitat for bats. The hedgerows and tree lines at the east and west boundaries, together with the rife running through the north of the site, may serve as navigation routes or foraging features for bats and are of moderate suitability.

Previous ecological surveys

3.1.3 WYG (2015c) reported that dusk activity surveys were carried out in the evenings of 6 June, 24 July and 1 October 2013. A dawn survey was conducted on 26 July 2013. Three species of bat, common pipistrelle, soprano pipistrelle and a *Myotis* species (likely to be Daubenton's) were recorded to be using the habitats within the site boundary. Bats were recorded foraging and commuting along all boundaries of the site, although the highest level of bat activity was recorded along the watercourse. The common pipistrelle was the most commonly recorded bat, followed by the soprano pipistrelle. The *Myotis* species (likely Daubenton's) was recorded during only one survey occasion. Varying levels of activity occurred with the highest levels of activity being noted during the 24 and 26 July 2013 dusk and dawn surveys. A low level of bat activity was recorded during the 6 June dusk survey and no activity was recorded during the 1 October dusk survey.

3.1.4 Automated bat detectors were left at the site for a minimum of four consecutive nights on three occasions during June, July and September 2013. Up to seven species of bat were recorded by the automated bat detectors, comprising common pipistrelle, soprano pipistrelle, noctule, brown long-eared bat, Nathusius' pipistrelle (*Pipistrellus nathusii*), Leisler's bat (*Nyctalus leisleri*) and a *Myotis* species (likely Daubenton's). The most frequently recorded bat calls were from common pipistrelle (up to 43 passes in one survey day) with soprano pipistrelle being the next

most frequently recorded (up to eight passes in one survey day) and only one to two passes recorded for the remaining species. This data suggests that bats were most active in June and September and less so in the dates that the automated recorder was set in July 2013; no surveys were undertaken in spring. The report concluded that the site was of district/local/parish value to foraging and commuting bats.

Bat activity survey: August 2018

3.1.5 Bat activity transect 1 took place on 30 August 2018 and followed the route plan shown at Appendix II, starting at transect point TP1 then running sequentially through to TP23. Full results are included at Appendix III; example sonograms recorded at the site are included at Appendix IV.

3.1.6 Sunset on 30 August was at 19.52. The survey started at 20.00 and ended at 22.01. Low levels of foraging and commuting activity were recorded (a total of 25 bat passes), predominantly along the Ferring Rife and along the eastern boundary of the site. Over half of this (56%) was common pipistrelle activity with the remainder consisting of soprano pipistrelle (36%) and Leisler's (8%) bats. Bat activity was recorded frequently from 20.36 to 20:50 between TP6 and TP9 along the eastern boundary of the site and the eastern portion of the rife, and infrequently from 21:30 to 21:56 (TP14 to T18) along the extent of the rife. The first bat recorded was a soprano pipistrelle at 20.36 (44 minutes after sunset) and the last bat recorded was a Leisler's bat at 21.56.

3.1.7 A Wildlife Acoustics SMZC bioacoustics recorder was installed on 28 August 2018 at a height of c.5m in the central north-east of the site, along the rife (see label "SM6 28/8/18" on the plan at Appendix II). A summary of the static detector data from 28 August to 1 September 2018 is presented in Table 3.1.

Table 3.1: Summary of bat passes, 28/8-1/9/18, east rife

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
28.08.18 **19.56 / 06.09**	20.38:Common pipistrelle	23.47: Soprano pipistrelle	▪ Noctule: 2 ▪ Common pipistrelle: 85 ▪ Brandt's/whiskered: 1 ▪ Soprano pipistrelle: 149
29.08.18 **19.54 / 06.09**	20.44: Soprano pipistrelle	22.57: Common pipistrelle	
30.08.18 **19.52 / 06.13**	20.36: Soprano pipistrelle	02.46: Common pipistrelle	
31.08.18 **19.50 / 06.14**	20.37: Soprano pipistrelle	23.53: Common pipistrelle	
01.09.18 **19.47/ 06.16**	20.35: Soprano pipistrelle	03.39: Common pipistrelle	

3.1.8 High levels (relative to the survey area) of bat activity were recorded in the eastern rife section of the survey area in August 2018, the majority (>98%) comprising common (85 passes) and

soprano (149 passes) pipistrelles, with the remainder made up of noctule and Brandt's or whiskered bat species. Bat passes peaked at peaked at c.65 passes per night on the first and fourth nights, passes were roughly half as frequent on the remaining three nights of the survey period shown on Figure 3.1. Over the course of the monitoring period bat activity was generally higher in the earlier part of the night, with the majority of the activity recorded in the first hour following sunset (Figure 3.2).

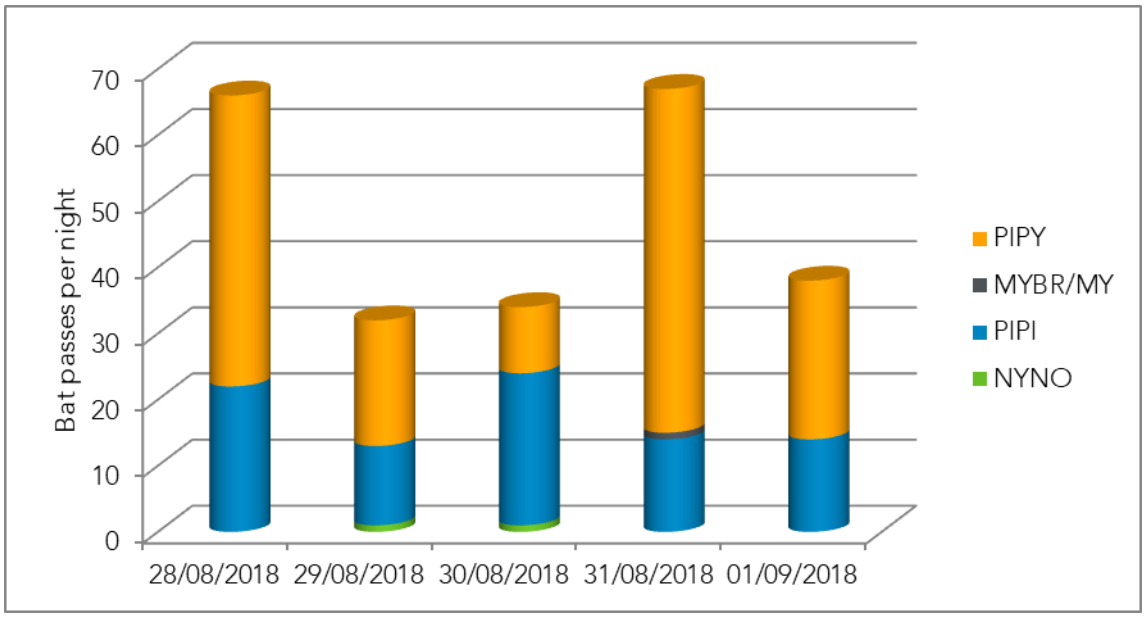


Figure 3.1: Bat passes per night, 28/8-1/9/18, east rife

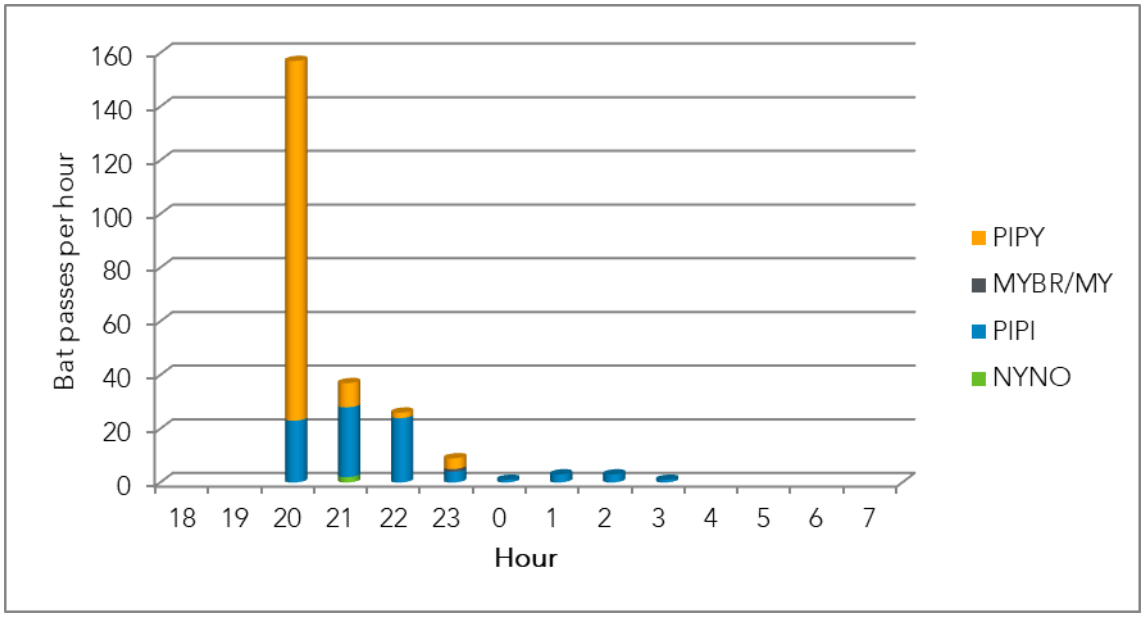


Figure 3.2: Bat passes per hour, 28/8-1/9/18, east rife

3.1.9 A second Wildlife Acoustics SMZC was installed on 28 August 2018 at a height of c. along the eastern boundary (see label "SM7 28/8/18" on the plan at Appendix II). A summary of the static detector data from 28/8-01/09/ 2018 is presented in Table 3.2.

Table 3.2: Summary of bat passes, 28/8-1/9/18, eastern boundary

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
28.08.18 **19.56 / 06.09**	20.48: Common pipistrelle	02.08: Common pipistrelle	▪ Serotine: 2 ▪ Common pipistrelle: 55 ▪ Brandt's/whiskered: 1 ▪ *Myotis sp.*: 1 ▪ Soprano pipistrelle: 18 ▪ Nathusius pipistrelle: 2 ▪ Brown long-eared: 1
29.08.18 **19.54 / 06.09**	20.29: Common pipistrelle	20.47: Common pipistrelle	
30.08.18 **19.52 / 06.13**	20.39: Common pipistrelle	02.27: Common pipistrelle	
31.08.18 **19.50 / 06.14**	20.31: Common pipistrelle	22.24: Common pipistrelle	
01.09.18 **19.47/ 06.16**	20.30: Common pipistrelle	20.20: Common pipistrelle	

3.1.10 Moderate levels of bat activity were recorded in the eastern boundary of the survey area in August 2018, the majority (>93%) comprising common (55 passes), soprano (18 passes) and Nathusius' (2 passes) pipistrelles, with the remainder made up of serotine, Brandt's or whiskered, *Myotis sp.* and brown long-eared bat species. Bat passes were broadly similar (averaging 19.5 passes per night) on all dates, apart from the second night of the survey period where only 2 passes were recorded, shown on Figure 3.3. Over the course of the monitoring period bat activity was generally higher in the earlier part of the night, with a peak in the second hour after sunset, then broadly tailing off thereafter (Figure 3.4).

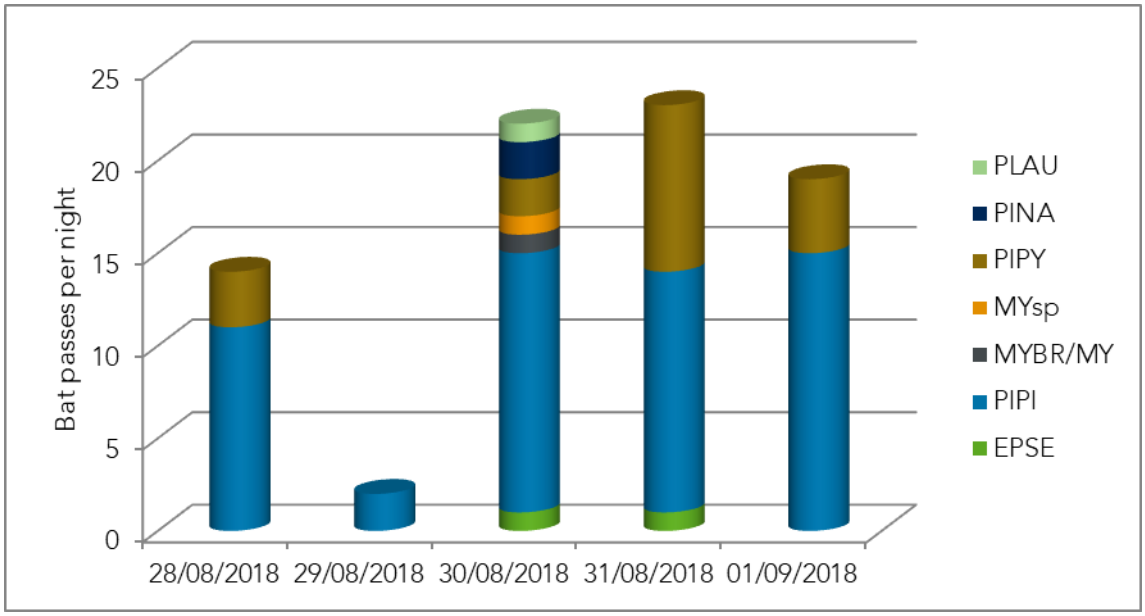


Figure 3.3: Bat passes per night, 28/8-1/9/18, eastern boundary

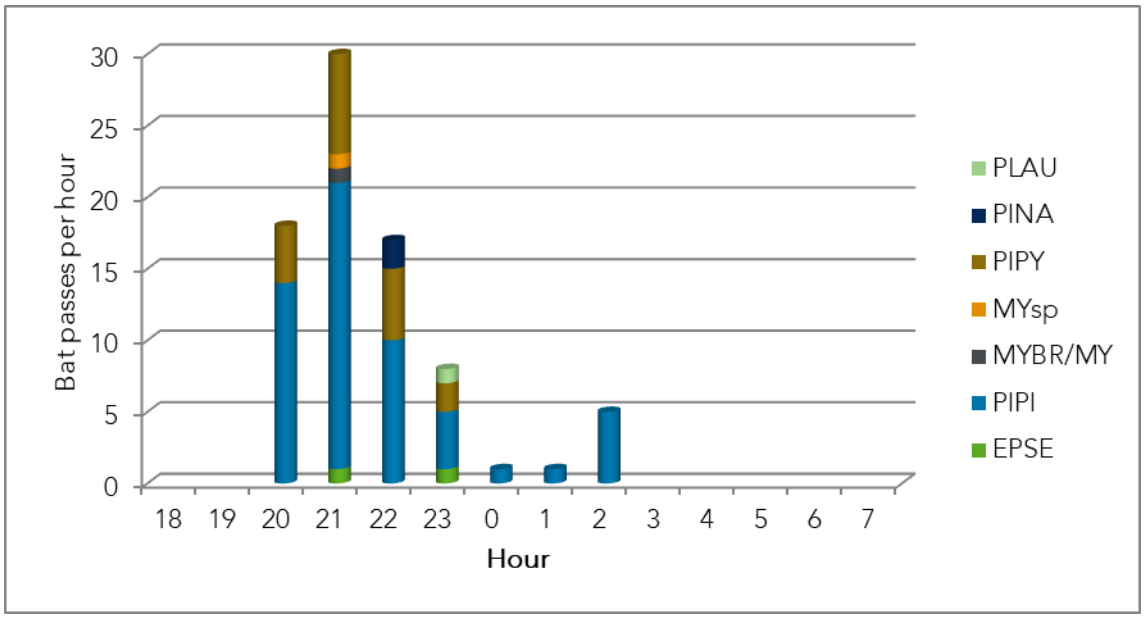


Figure 3.4: Bat passes per hour, 28/8-1/9/18, eastern boundary

Bat activity survey: September 2018

3.1.11 Bat activity transect 2 took place on 17 September 2018, starting at transect point TP19 and following the route in reverse sequence to TP1. Full results are included at Appendix III; example sonograms recorded at the site are included at Appendix IV.

3.1.12 Sunset on 17 September was at 19.10. The survey started at 19.10 and ended at 21.10. Low levels of foraging and commuting activity were recorded (a total of 11 bat passes); with some activity along the rife and much of the activity not being seen and likely offsite to the east. This was all common pipistrelle activity. The first bat recorded was at 19.52 (42 minutes after sunset) and the last bat recorded was at 21.07.

3.1.13 A Wildlife Acoustics SMZC bioacoustics recorder was installed on 18 September 2018 at a height of c.5m on the treeline in the south-west of the site (see label "SM6 18/9/18" on the plan at Appendix II). A summary of the static detector data from 18-22/09/18 is presented in Table 3.3.

Table 3.3: Summary of bat passes, 18-22/9/18, south-west treeline

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
18.09.18 19.08/ 06.43	19.40: Common pipistrelle	05.47: Common pipistrelle	▪ Bechstein's/Daubenton's: 1 ▪ Common pipistrelle: 20 ▪ Brandt's/whiskered: 1 ▪ Soprano pipistrelle: 1 ▪ Nathusius' pipistrelle: 1
19.09.18 19.05 / 06.45	21.57: Common pipistrelle	05.52: Common pipistrelle	
20.09.18 19.03/ 06.46	No bats recorded	No bats recorded	

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
21.09.18 19.01 / 06.48	20.14: Common pipistrelle	21.59: Bechstein's/ Daubenton's	
22.09.18 18.58/ 06.49	No bats recorded	No bats recorded	

3.1.14 Low levels of bat activity were recorded in the south-west of the survey area in September 2018, the majority (83%) comprising common pipistrelle, with the remainder made up of Nathusius' pipistrelle and M*yotis spp*. Bat passes peaked at 12 passes on the 18 September, with no bats recorded on the third or fifth night of survey, as shown on Figure 3.5. The temperatures at dusk were stable at around 18°C for the first three nights then dropped to around 13°C for the remainder of the survey period; there was a small amount of rain on the last day of the survey. Over the course of the monitoring period bat activity was generally higher in the earlier part of the night, peaking in the second hour after sunset, becoming intermittent thereafter (Figure 3.6).

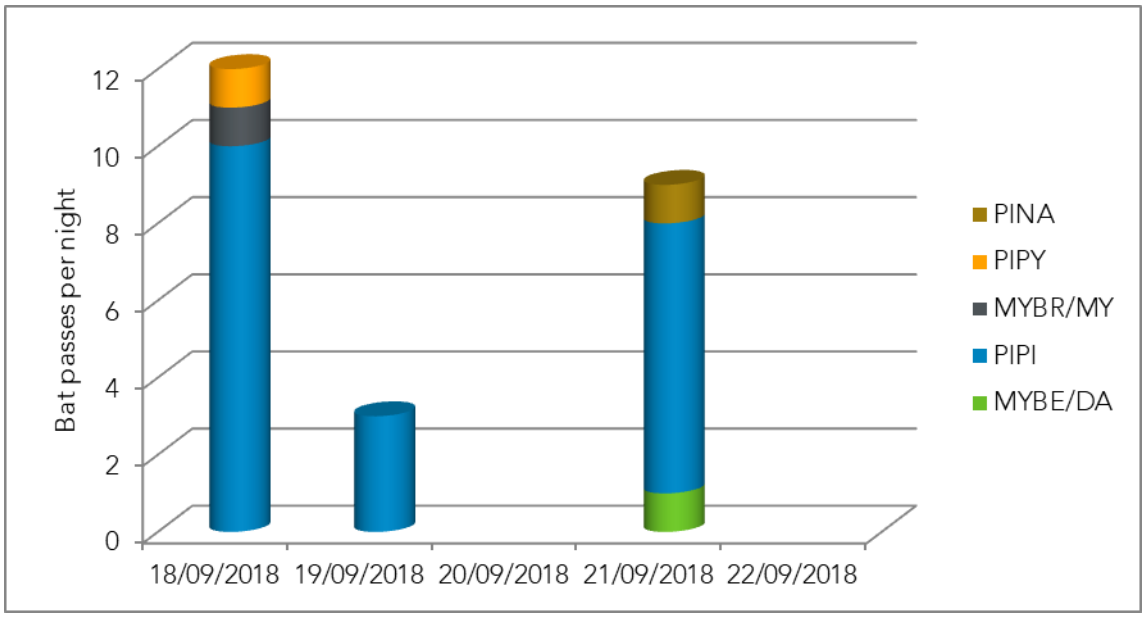


Figure 3.5: Bat passes per night, 18-22/9/18, south-west treeline

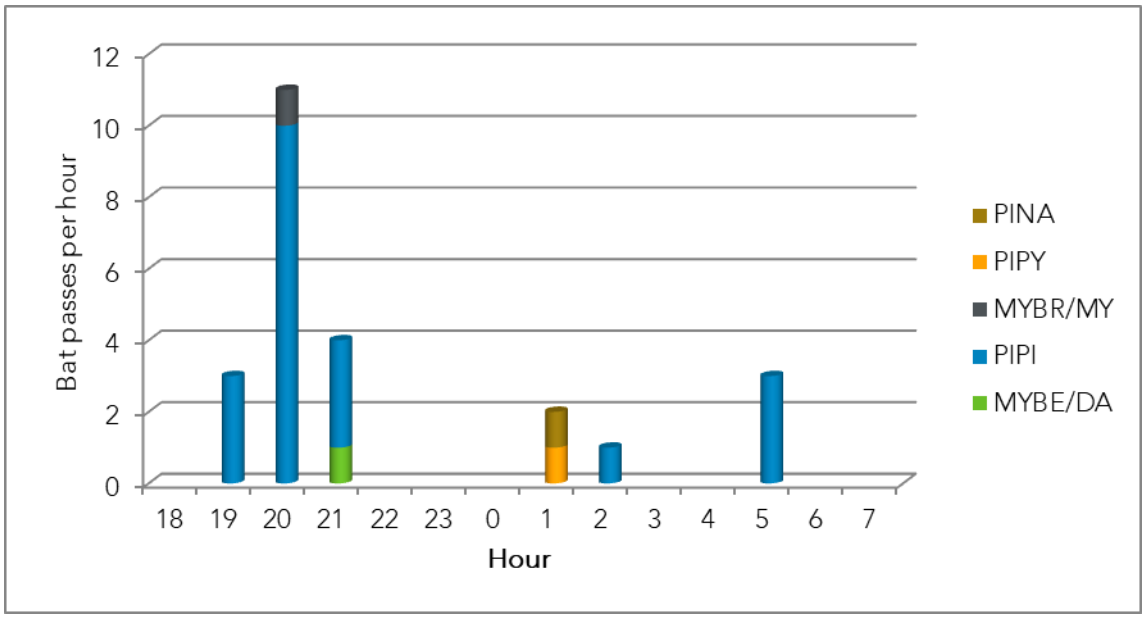


Figure 3.6: Bat passes per hour, 18-22/9/18, south-west treeline

3.1.15 A second Wildlife Acoustics SMZC was installed on 18 September 2018 at a height of c.5m in the treeline at the north end of the western site boundary (see label "SM7 18/9/18" on the plan at Appendix II). A summary of the static detector data from 18-22/09/18 is presented in Table 3.4.

Table 3.4: Summary of bat passes, 18-22/9/18, north-western boundary

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
18.09.18 19.08/ 06.43	20.41: Common pipistrelle	06.04: Common pipistrelle	▪ Serotine: 2 ▪ Noctule: 4 ▪ Common pipistrelle: 28 ▪ Brandt's or whiskered: 12 ▪ Soprano pipistrelle: 1 ▪ Nathusius pipistrelle: 2 ▪ *Myotis* sp.: 2 ▪ Brown long eared: 1
19.09.18 19.05 / 06.45	19.42: Common pipistrelle	04.16: Common pipistrelle	
20.09.18 19.03/ 06.46	20.27: Common pipistrelle	05.59: Common pipistrelle	
21.09.18 19.01 / 06.48	20.01: Common pipistrelle	21.25: Common pipistrelle	
22.09.18 18.58/ 06.49	No bats recorded	No bats recorded	

3.1.16 Low levels of bat activity were recorded at the north-west boundary of the survey area in September 2018, around half (54%) being made up of common pipistrelle calls. The next most abundant were Brandt's/whiskered bats (23%), with less than five calls each from serotine, noctule, soprano pipistrelle, Nathusius' pipistrelle, *Myotis sp.* and brown long eared bats. Bat activity was broadly similar on the first, second and fourth night with 92% of the activity spread across these nights. No bats were recorded on the last night of the survey period, as shown on Figure 3.7. Over the course of the monitoring period bat activity was recorded irregularly

throughout the night, but most activity was recorded in the hour after sunset and the hour preceding sunrise (Figure 3.8).

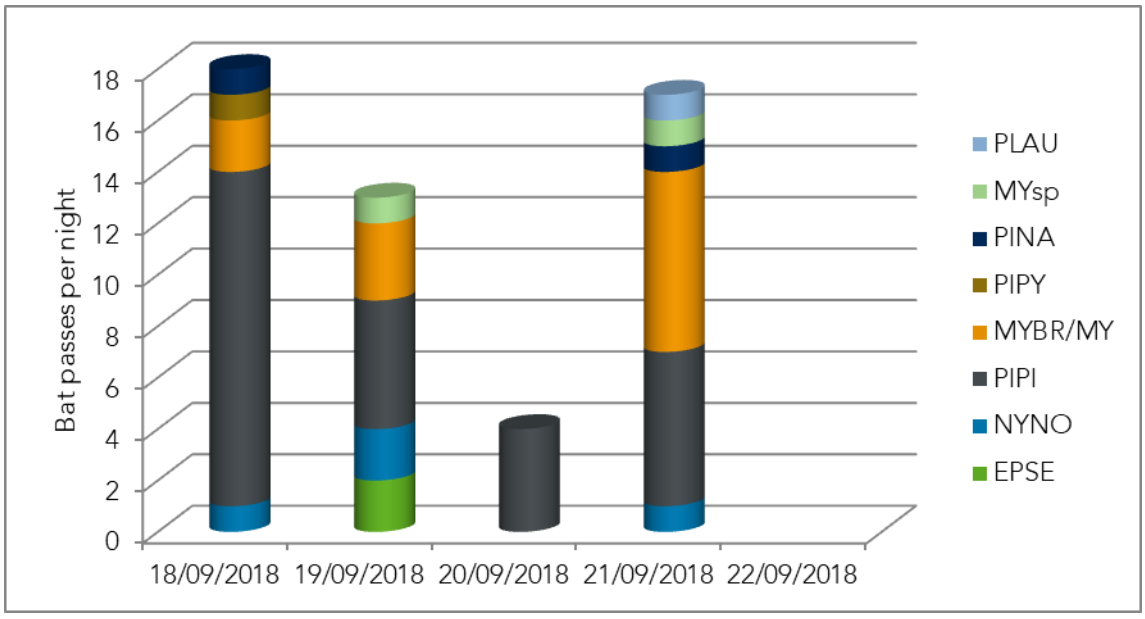


Figure 3.7: Bat passes per night, 18-22/9/18, north-western boundary

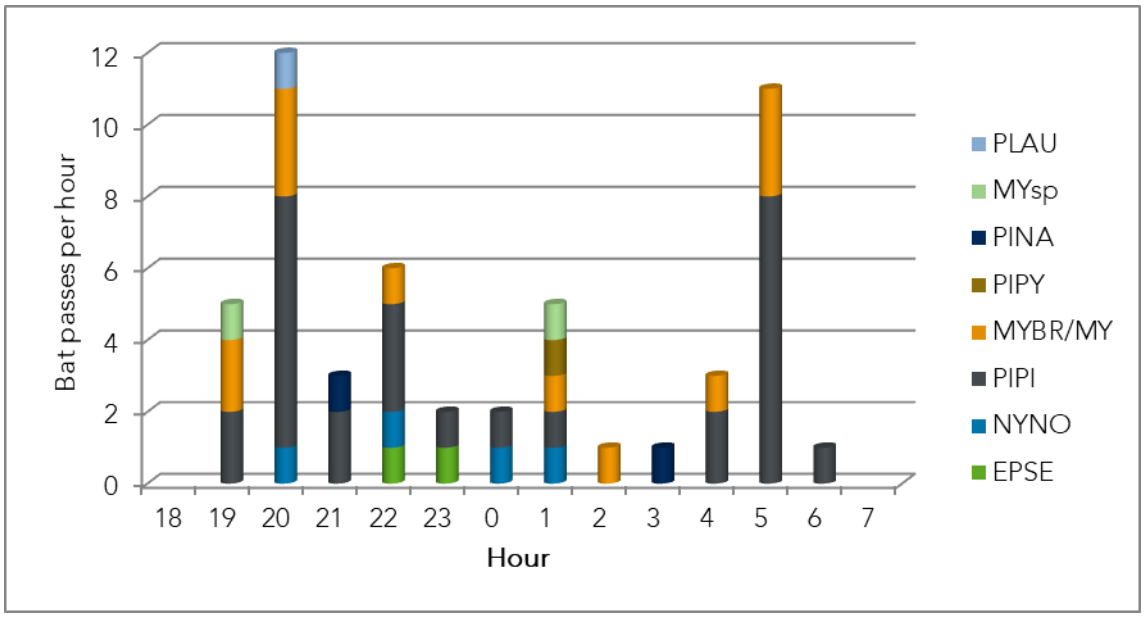


Figure 3.8: Bat passes per hour, 18-22/9/18, north-western boundary

Bat activity survey: October 2018

3.1.17 Bat activity transect 3 took place on 2 October 2018, starting at transect point TP14 in the west, then running consecutively through to TP7, then north along the eastern boundary to TP1, then running consecutively through to TP6, before crossing the rife to TP19 then running consecutively along the rife and finishing on TP15. Full results are included at Appendix III; example sonograms recorded at the site are included at Appendix IV.

3.1.18 Sunset on 2 October was at 18.30. The survey started at 18.30 and ended at 20.30. Low levels of foraging and commuting activity were recorded; there were nine passes recorded in total, all between the times of 19.32 and 19.36. Species composition consisted of four serotine passes, four *Myotis sp*. Passes, and two brown long-eared bat passes. The first bat recorded was a brown long-eared bat at 19.32 and the last bat recorded was a serotine at 19.36.

3.1.19 A Wildlife Acoustics SMZC bioacoustics recorder was installed on 3 October at a height of c.5m along the southern boundary of the site towards the east (see label "SM6 3/10/18" on the plan at Appendix II). A summary of the static detector data from 3-7 October 2018 is presented in Table 3.5.

Table 3.5: Summary of bat passes, 3-7/10/18, southern boundary

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
03.10.18 18.34/ 07.07	19.20: Common pipistrelle	01.12: Noctule	▪ Serotine: 1; ▪ Noctule: 8 ▪ Common pipistrelle: 58 ▪ Nathusius pipistrelle: 9 ▪ Soprano pipistrelle: 6 ▪ Brown long eared: 3
04.10.18 18.32/ 07.08	19.18: Common pipistrelle	21.42: Common pipistrelle	
05.10.18 18.30/ 07.10	19.04: Common pipistrelle	22.15: Noctule	
06.10.18 18.27 / 07.12	No bats recorded	No bats recorded	
07.10.18 18.25 / 07.13	19.27: Serotine	01.02: Noctule	

3.1.20 Moderate levels of bat activity were recorded along the southern boundary of the survey area in October 2018. More than 85% of the activity was from the three pipistrelle species (common, soprano and Nathusius'), the remainder consisting of serotine, noctule, and brown long eared bats. Bat activity peaked at 34 passes on the first night of the survey period, and no bats were recorded on the fourth night, as shown on Figure 3.9. Over the course of the monitoring period bat activity was generally higher in the earlier part of the night, peaking in the first hour after sunset (53 passes), then 10 or fewer calls in every hour after that (Figure 3.10).

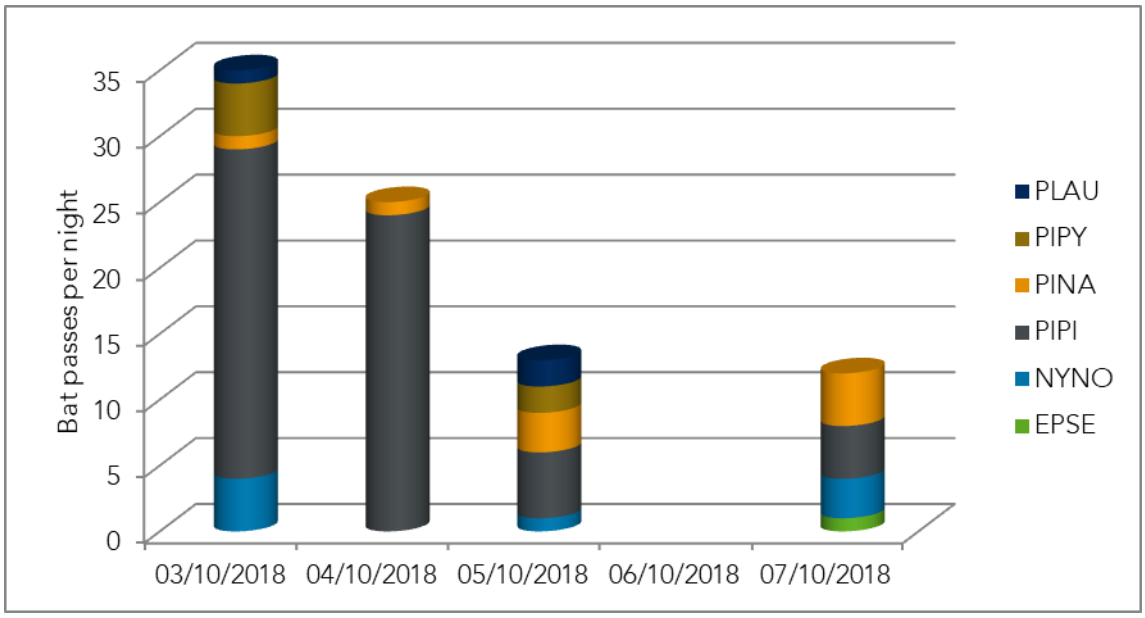


Figure 3.9: Bat passes per night, 3-7/10/18, southern boundary

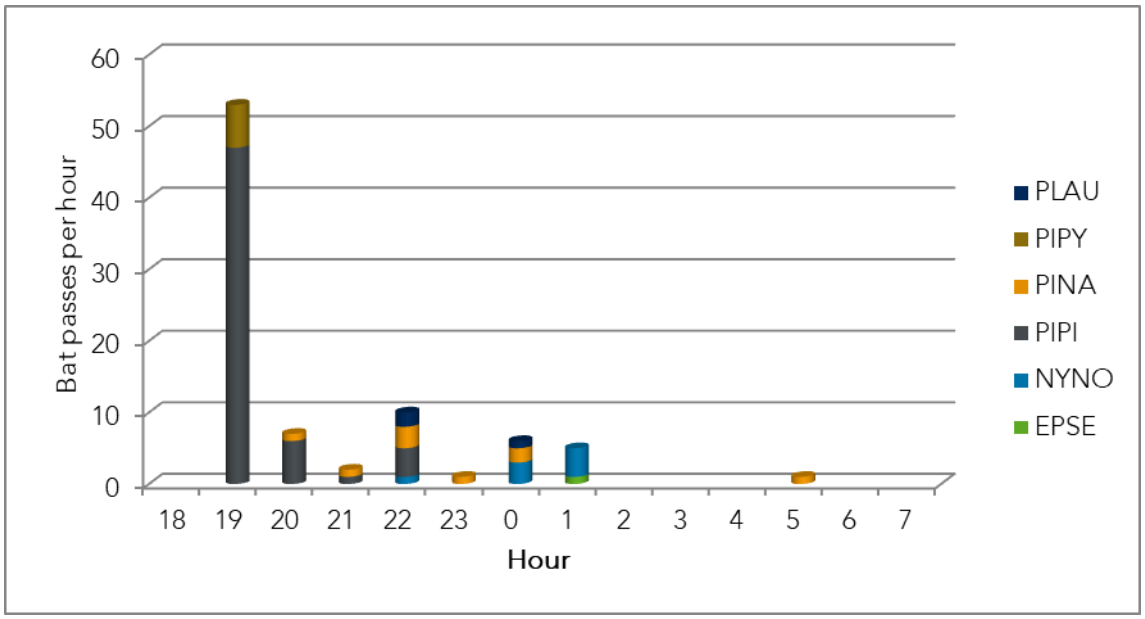


Figure 3.10: Bat passes per hour, 3-7/10/18, southern boundary

3.1.21 A second Wildlife Acoustics SMZC was installed was installed on 3 October at a height of c.5m in the middle of the western site boundary (see label "SM7 3/10/18" on the plan at Appendix II). A summary of the static detector data from 3-7 October 2018 is presented in Table 3.6.

Table 3.6: Summary of bat passes, 3-7/10/18, western boundary

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
03.10.18 **18.34/ 07.07**	19.10: Common pipistrelle	03.13: Noctule	▪ Bechstein's/ Daubenton's: 10

Date Sunset / Sunrise	First record (time / sp.)	Last record (time / sp.)	Species recorded / total passes
04.10.18 18.32/ 07.08	18.54: Common pipistrelle	20.08: Common pipistrelle	▪ Noctule: 6 ▪ Common pipistrelle: 85 ▪ Soprano pipistrelle: 2 ▪ Brown long eared: 4 ▪ Myotis sp.:1 ▪ Brandt's/whiskered: 5
05.10.18 18.30/ 07.10	18.54: Common pipistrelle	20.49: Noctule	
06.10.18 18.27 / 07.12	No bats recorded	No bats recorded	
07.10.18 18.25 / 07.13	18.55 Common pipistrelle	21.08: Bechstein's/ Daubenton's	

3.1.22 Moderate levels of bat activity were recorded along the western boundary of the survey area in October 2018. Most activity was from common pipistrelle (75%), the remainder consisting of *Myotis* species, noctule, soprano pipistrelle and brown long eared bats. Bat activity peaked at 59 passes on the third night of the survey period, but no bats were recorded on the fourth night, as shown on Figure 3.11. Over the course of the monitoring period bat activity was generally higher in the earlier part of the night, peaking in the first hour after sunset, then tailing off significantly (Figure 3.12).

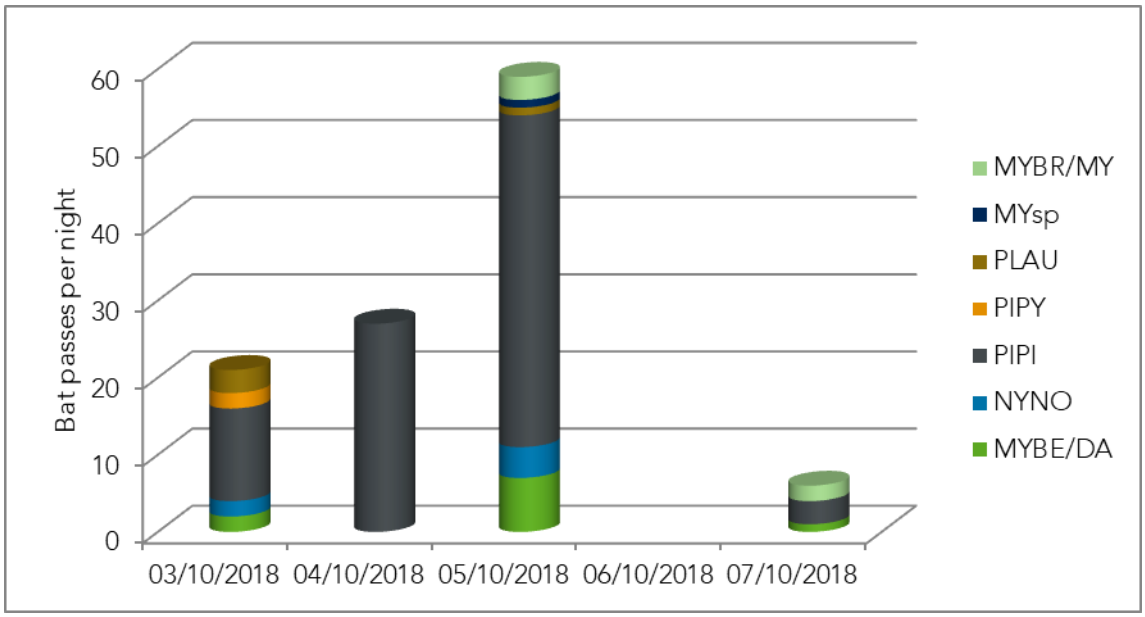


Figure 3.11: Bat passes per night, 3-7/10/18, western boundary

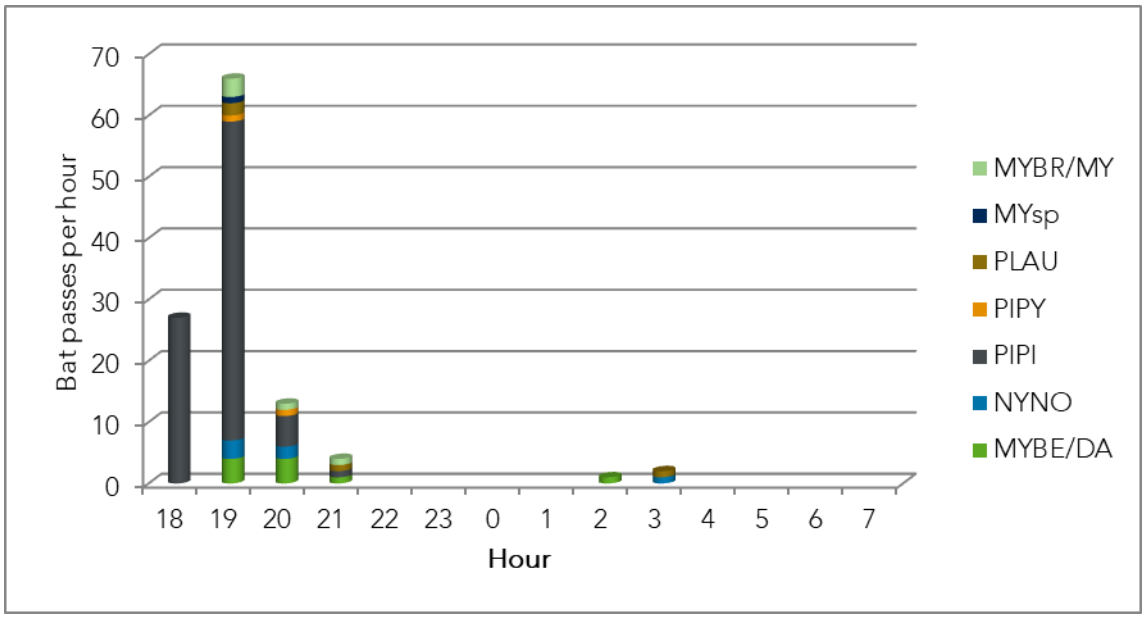


Figure 3.12: Bat passes per hour, 3-7/10/18, western boundary

3.2 Badger Survey

Desk study

3.2.1 SxBRC does not supply records of badger *Meles meles*, but they are widespread in the county including in suburban areas.

Habitat suitability

3.2.2 The survey area provides extensive suitable foraging habitat for badger, including arable land and grassland field margins, but limited sett creation potential. Possible sett building habitats were restricted: to a patch of scrub in the centre of the west site boundary and the adjacent off-site copse; a patch of scrub close to the centre of the east site boundary, the north-south treeline in the south-west of the site; and sections of bankside vegetation along the rife towards the north-east and middle of the site.

Previous ecological surveys

3.2.3 Separate surveys for badger were not undertaken by WYG, however, a search for badger setts and field signs was undertaken as part of the Phase 1 survey (WYG, 2015a). This reported that grassland field boundaries, scrub and arable fields provided high potential for foraging and commuting badgers. Two outlier badger setts were identified within the site boundary, each comprising one hole. One sett was located along the western boundary of the site and was considered to be active (TN4 on the Phase 1 map at Appendix I), with a clear path leading to the sett. The other badger sett was located along the eastern boundary of the site, adjacent to an area of scrub (TN5). This sett was assessed as being disused as the hole was somewhat infilled, indicating that there had been no recent badger occupation.

Field sign surveys 2018

3.2.4 A re-assessment of the site's potential for badger was carried out on 17 September 2018, and repeated on 26 October and 27 November 2018 as the vegetation died back. This recorded a possible snuffle hole along the northern boundary of the site, along with a push through under the fence on the southern boundary. No latrines were recorded in the survey area, indicating that the site is not a core part of badger territory. No other field signs of badger were recorded in or adjacent to the survey area during any of the 2018 surveys.

3.2.5 The setts found in 2013 were no longer present during the 2018 surveys, but a different potential sett was recorded further north on the eastern boundary of the site; refer to label C1 on the plan at Appendix VI. The hole at C1 was covered with bedding substrate at the time of September survey, but also contained cobwebbing suggesting it had not been recently used and no other signs of badger activity were recorded in the vicinity of the hole. A second mammal hole was recorded in the west of the site in November 2018 (C2 at Appendix VI), not far from the 2013 location. The hole at C2 did not appear to have been created by badger, being too small and of uncharacteristic shape. It was also largely choked with vegetation growth and did not appear to be in frequent use. A third location, this time a series of nine mammal holes, was recorded in the east of the site (C3 at Appendix VI) in December 2018 following vegetation die-back. The holes at C3 did not appear to have been created by badger either, some being too small and most of uncharacteristic shape. They were also largely collapsed and choked with leaf litter and did not appear to be in frequent use.

Camera trap monitoring

3.2.6 The mammal hole at C1 was subject to a period of camera trap monitoring, the results of which are summarised in Table 3.7. Over a period of 41 nights, camera C1 on the map at Appendix VI did not record any instances of badger using the hole in the north-east as a sett, however, it did record a fox *Vulpes vulpes* entering the hole.

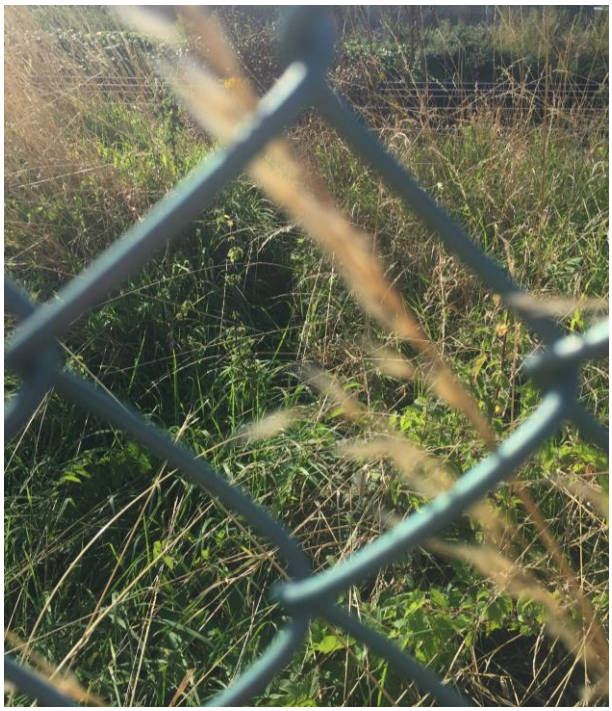
3.2.7 The second camera in the west of the site (C2 on the map at Appendix VI) was initially positioned to gain a view of animals entering and exiting the off-site copse because the sett recorded in the vicinity in 2013 was no longer present. Over a period of 30 nights species recorded on camera C2 included fox and rat *Rattus norvegicus*. During a re-assessment of the site on 27 November following vegetation die-back a small mammal hole was recorded not far from the 2013 location. This was considered unlikely to have been dug by badger but was monitored in any case between 27 November and 11 December 2018. Over a period of 15 nights no badgers were recorded using the hole as a sett, however, a fox was recorded exiting the hole. Overall, species recorded on camera C2 included fox, rat, squirrel *Sciurus carolinensis* and domestic cat *Felis catus*.

3.2.8 The third camera in the east of the site (C3 on the map at Appendix VI) was positioned to gain a wide angle view of most of the nine holes in the group. Over a period of 37 nights to 17 January 2019 no data were recorded, but the camera was left in position to continue monitoring C3. The camera was checked again in February 2019 but had been stolen; a replacement camera was not deployed.

Table 3.7: Summary of camera trap monitoring results for badger

Date	Time	Species	Activity
Camera position 1: 17 Sep to 28 Oct 2018 (map ref C1 at Appendix VI)			
23/10/2018	00.11	Fox	Walking in front of camera, not seen to enter or exit hole
Camera position 2: 28 Oct to 27 Nov 2018 (map ref C2 at Appendix VI)			
08/11/2018	06.53	Fox	Exiting copse
13/11/2018 -20/11/2018	n/a	Rat	Singular rats caught on the camera over the course of a week
20/11/2018	19.00 – 19.57	Fox	Roaming in front of camera
22/11/2018	18.55	Fox	Roaming in front of camera
23/11/2018	03.14	Rat	Foraging in front of camera
23/11/2018	09.58	Squirrel	Foraging in front of camera
24/11/2018	07.16	Fox	Roaming in front of camera
Camera position 2a: 27 Nov to 11 Dec 2018 (map ref C2 at Appendix VI)			
30/11/2018	06.56	Fox	Fox coming out of hole
11/12/2018	07.57	Fox	Fox going towards hole
Camera position : 11 Dec 2018 to 17 Jan 2019 (map ref C3 at Appendix VI)			
-	-	-	No data recorded

Possible snuffle hole along north boundary



Mammal push-through at south boundary

Potential sett entrance C1 in north-east of site

Potential sett entrance C1, view from above

Potential sett entrance C2 in west of site

Potential sett entrance C2, view from above

Potential sett entrance C3 in east of site

C3: collapsing mammal holes with leaf litter

C2: Fox exiting copse to west of site 08/11/2018

C2: Fox in copse to west of site on 20/11/2018

3.3 Otter and Water Vole Survey

Desk study

3.3.1 SxBRC does not supply records of otter *Lutra lutra*, but they are rarely encountered in the county since the population declines and range contraction of the 20th century. SxBRC returned two records of water vole *Arvicola amphibius* from 1998, the closest being located within the site, the other from c.1.7km south-west also along Ferring Rife.

Habitat suitability

3.3.2 The survey area is centred on Ferring Rife and included c.100 metres off site both upstream and downstream.

3.3.3 Ferring Rife which runs from east to west across the northern part of the site is of moderate suitability for otter due the absence of bankside boulders or fallen trees and limited scrub vegetation which could form a holt or couch site. The general absence of cover habitats or linked watercourses within the wider area is also likely to be a limiting factor, but the rife could still be used as part of a wider range.

3.3.4 Ferring Rife provides moderate to high suitability habitat for water vole, with broadly homogenous habitat and morphological characteristics throughout its extent within the site boundary. At the time of survey in September 2018 there was a slow westerly flow, steep vegetated banksides (>45°) with a soft clayey substrate and small shelves at the base of the banks suitable for burrowing and foraging. The rife measured between 3-4 metres along its width, with a water depth of 300-900mm along its length; the top of the bank was c.1.5-2m above the water level. In-channel vegetation included occasional sedge *Carex spp.*, soft rush *Juncus effuses* and emergent water starwort *Callitriche spp.* but was generally sparse except where dominated by reed *Phragmites australis* along portions of the banks. Bankside vegetation was dominated by coarse grasses including cock's foot *Dactylis glomerata* and Yorkshire fog *Holcus lanatus*, with occasional brooklime *Veronica beccabunga* and willowherb *Epilobium spp.*. Patches of bramble *Rubus fruticosus agg* and hawthorn *Crataegus monogyna* scrub occurred intermittently along with sapling sycamore *Acer pseudoplatanus*, ash *Fraxinus*

excelsior and willow *Salix spp*. but the proportion of shading was mainly low. There was some evidence of recent management and vegetation removal along the upper extents of both banks, but otherwise sources of disturbance were absent. The bank profile was generally steep, and the substrate was mainly of earth. Adjacent land use was dominated by arable land.

3.3.5 At the western site boundary a sluice gate is present beyond which the rife is canalised for at least 100m as it passes downstream through adjacent residential areas. Adjacent downstream off-site habitats are therefore unsuitable for water vole and sub-optimal for otter. At the eastern site boundary is a confluence between the Ferring Rife main channel from the east and a field drain from the north. The field drain follows inside the site boundary to the north until it reaches a culvert under the A259 Littlehampton Road, but does not appear to resume on the other side. The main channel enters the site via a culvert under the A259 Goring Street, and a second culvert under Goring Chase, beyond which (c.60m from the site) the rife passes upstream through adjacent residential areas. Here it appears to be of similar form and vegetation characteristics as within the site but this section was backed by residential gardens and fenced off, preventing further access.

Previous ecological surveys

3.3.6 Ferring rife contained evidence of water vole along its full extent within the site boundary during the September 2013 survey, in the form of burrows, latrines and feeding stations. No evidence of otter was identified along the rife during the survey (WYG, 2015d).

Field sign surveys 2018

3.3.7 A re-assessment of the banksides within the survey area was undertaken during the 2018 survey to search for signs of otter and water vole. No resting sites for otters (holts, couches or lying-up sites) were found despite extensive land-based searches in areas of dense scrub and tree cover adjacent to the rife, and no field signs (spraints, footprints, pathways, slides or feeding remains) were found despite extensive searches of the banksides during the 2018 surveys.

3.3.8 A summary of the September 2018 water vole survey results is displayed in Table 3.8, and plans indicating the location of field signs are presented at Appendix VII. No water voles were directly observed during the surveys, but a total of 121 burrow entrances were recorded, of which 35 were considered to be conclusive water vole burrows, exhibiting several foot prints and runways. These field signs were spread along the length of the rife within the site. However, only two latrine sites were recorded (towards the eastern end of the site, c.40 droppings and c.10 droppings respectively), together with four feeding stations also towards the eastern end of the site. The remaining 86 burrows were inconclusive of water vole with no foot prints or lawned areas in front of the burrows. The low number of latrines and distribution of other field signs along the rife suggests a low water vole population density focused on the eastern end of the site. The inconclusive burrow entrances may be disused burrows created by previous year's populations or may have been created by rats.

Table 3.8: Summary of water vole survey results, September 2018

Location	Latrines / droppings	Feeding stations	Burrows / lawns	Nests	Footprints	Runways	Sightings
Ferring Rife	2	4	35	0	50+	21	0

Ferring rife close to eastern site boundary

Ferring rife in north-east of site

Ferring rife in the centre of the site

Ferring rife approaching the western site boundary, sluice gate in distance

Ferring rife just off-site in residential area to west, now canalised

Ferring rife further off-site in residential area to west, canalised

Water vole burrows in bank of rife

Water vole burrows in bank of rife

3.4 Reptile Survey

Desk study

3.4.1 SxBRC returned 29 records of four species of reptile (slow worm *Anguis fragilis*, common lizard *Zootoca vivipara*, grass snake *Natrix natrix* and adder *Vipera berus*) from within 2km of the survey area during a date range of 1983 to 2010, the closest record being of grass snake located approximately 580m northwest of the site in 1991.

Habitat and site suitability

3.4.2 The survey area is located within the known range of widespread reptiles, and is dominated by arable fields bordered with semi-improved rough grassland, scattered scrub and treeline, and well managed species poor hedgerows located along the western boundary.

3.4.3 The arable fields contain a poor species and structural variation which is sub-optimal for reptiles, and are unlikely to support a rich invertebrate food source, but may occasionally be used for foraging or basking especially where in close proximity to hedgerows or outcrops of scrub and grassland. The field margins are predominantly formed of rough grassland with a longer sward height and greater structural variation, providing opportunities for shelter and foraging. The margins are variable in width from narrow in the south-west corner to broad in the north-east; the field margin at the southern boundary along the footpath running parallel to the rail line takes on a more amenity grassland character. The banks of Ferring Rife running through the survey area are both formed mainly of rough grassland and also feature patches of scrub which provide further sheltering and foraging habitats, while the rife itself offers grass snakes suitable hunting habitat.

3.4.4 There is a short extent of managed hedgerows located along the western boundary of the site. The hedgerows comprise native and non-native species, including beech *Fagus sylvatica*, elder *Sambucus nigra*, bramble, willow, honeysuckle *Lonicera* sp., Leyland cypress *Cypress* x *leylandii* and privet *Ligustrum* spp.. These hedgerows provide habitat suitable for reptile dispersal, shelter and possibly hibernation. The north-south treeline in the south-west of the site has a well developed rough grassland ground flora and provides foraging, shelter, dispersal and hibernation potential.

3.4.5 Taken together, the grassland, scrub, rife, hedgerow and treeline habitats within the survey area are suitable for reptiles such as slow worm, common lizard and grass snake. However, these features are limited in extent and concentrated towards the site boundaries and banks of the rife.

Rough grassland margin to arable field, eastern site boundary

Uniform crop stubble dominated survey area during August to October 2018

Ferring rife south bank looking west, rough grassland on both banks

Narrow rough grassland field margin in south-west corner of survey area

Field margin at south boundary adjacent to rail line with amenity grassland character

Treeline in south-west of site with rough grasses at ground layer

Previous ecological surveys

3.4.6 Two species of reptile, slow worm and common lizard, were recorded at the site during the 2014 surveys. The maximum number of adults recorded on a single survey occasion for both slow worms and common lizards was three. However common lizards were recorded across four separate survey occasions compared to slow worms which were recorded on only two separate survey occasions. There were no juveniles of either species recorded during the suite of surveys conducted at the site.

Field surveys 2018

3.4.7 The Visual Encounter Surveys and Artificial Refuge Surveys (including natural/pre-existing refuges) recorded only adult common lizard and slow worm throughout the survey period. Their recorded distribution within the survey area was restricted to two locations: within the north-east bank of the rife and adjacent to the train line along the southern boundary of the site. The majority of reptiles (eight individuals) were recorded along the southern boundary of the site. No other reptile species or signs of their presence (e.g. skin sloughs, eggs/egg-cases) were observed during the survey. A summary of the survey results is displayed in Table 3.9, accompanied by the weather conditions at the time of each visit. Peak adult counts for each species are highlighted in bold.

Table 3.9: Summary of reptile survey results and environmental variables

Survey	1	2	3	4	5	6	7
Date	11 Sep	13 Sep	17 Sep	19 Sep	21 Sep	25 Sep	05 Oct
Start	10.00	17.00	10.00	08.30	16.30	16.00	16.00
End	11.00	18.00	11.00	09.30	17.30	17.00	17.00
Start air temp °C	17.7	17.6	17.8	18.1	16.5	15.2	17.8
End air temp °C	18.1	16.5	18.2	18.6	15.6	14.7	16.7
Ground conditions	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Cloud cover %	30	70	30	50	80	70	30
Wind dir./ speed	B3 E	B2-3 E	None	B4 N	B2 NE	B1-2 NW	B1-2 W
Precipit-ation	None	None	None	None	None	None	None
Common lizard	1 adult	3 adult	0	0	3 adult	0	1 adult
Slow worm	1 adult male	0	0	1 adult male	0	1 adult female	1 adult female
Grass snake	0	0	0	0	0	0	0
Adder	0	0	0	0	0	0	0
Other	0	0	2 common vole	0	0	0	0

SA = sub-adult; juv = juvenile

3.5 Winter and Breeding Bird Survey

3.5.1 A total of 14 bird species of which seven were considered to be of particular conservation importance, including peregrine *Falco peregrinus*, herring gull *Larus argentatus*, skylark *Alauda arvensis*, starling *Sturnus vulgaris*, mallard *Anas platyrhynchos*, kestrel *Falco tinnunculus* and lesser black-backed gull *Larus fuscus*. A breeding bird survey is due to be carried out during spring/summer 2020.

3.5.2 A breeding bird survey carried out separately between April and June 2020 recorded ten probable breeding species within the site, as well as eight possible breeding species, most notably populations of skylark, breeding in the arable, and house sparrow *Passer domesticus*, breeding in boundary vegetation in the south west of the site.

4 Evaluation

4.1 Introduction

4.1.1 This section evaluates the survey area in terms of the protected species present or potentially present on site or its immediate vicinity, in the context of relevant legislation and planning policy. See Appendix XI for a review of the legislation and planning context.

4.2 Foraging and Commuting Bats

Species assemblage

4.2.1 Species diversity recorded during the bat activity surveys included up to ten species. Their local and national conservation status is listed in Table 4.1 (BCT, 2010; Mathews *et al.*, 2018; Russ, 2012; Sussex Bat Group[9]). All of these species have previously been recorded within 2km of the site, either within the desk study stage or the 2013 survey (WYG, 2015a/c).

4.2.2 *Myotis* bat call parameters overlap significantly and it is not normally possible to conclusively identify them to species level unless they are in the hand. The low number of *Myotis* bat calls recorded within the survey area were most closely matched to the call parameters of Brandt's *M. brandtii*, Bechstein's *M. bechsteinii*, Daubenton's *M. daubentonii* and whiskered *M. mystacinus* bats. The survey area falls broadly within the known distribution of all four species, but Bechstein's bat is extremely rare and found almost exclusively within woodland habitat which is absent within the survey area; Bechstein's are hence unlikely to have been recorded.

Table 4.1: Conservation status of recorded bat species (abundance and distribution)

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Serotine	Uncommon, widespread	Uncommon, widespread, southern England	Vulnerable
Brandt's/whiskered	Scarce, widespread / Scarce, widespread	Widespread, scarce in England & Wales / Scarce, widespread, absent in Scotland	Data deficient
Daubenton's	Fairly abundant, widespread	Widespread, fairly abundant	Least concern
Leisler's bat	Rarely recorded	Scarce but widespread to southern Scotland	Near threatened
Noctule	Uncommon, widespread	Uncommon, widespread, absent in Scotland	Least concern

[9] Sussex Bat Group website: Bats in Sussex. Accessed online [12/11/18] at: http://www.sussexbatgroup.org.uk/batsinsussex

Species	Sussex abundance/distribution	UK abundance/distribution	UK status
Nathusius' pipistrelle	Scarce, widespread	Scarce, widespread, includes migrants	Near threatened
Common pipistrelle	Abundant, widespread	Widespread, abundant	Least concern
Soprano pipistrelle	Fairly common, widespread	Fairly common, widespread	Least concern
Brown long-eared	Relatively abundant, widespread	Widespread, relatively abundant	Least concern

Species abundance and distribution

4.2.3 Figure 4.1 summarises species composition recorded during passive monitoring at different locations within the survey area over the course of the survey period. The data is expressed as average bat passes per hour (BPPH) and gives an index of relative bat activity within the site. It is important to note that this is not the same as total number of bats, as a single bat might pass the detector on multiple occasions when foraging up down a feature. This shows that the majority (88.3%) of bat calls recorded were from pipistrelle bats, with common pipistrelles registering an average of 5.92 BPPH, soprano pipistrelles registering an average of 3.50 BPPH, and Nathusius' pipistrelles registering an average of 0.24 BPPH. Of the remaining bat passes, those of Brandt's/whiskered were the next most frequently recorded (3.4% or 0.35 BPPH), closely followed by noctule (3.4% or 0.33 BPPH). This means that 91.7% of all bats recorded were of the genus *Nyctalus* or *Pipistrellus*. These results are consistent with those recorded during the transect surveys.

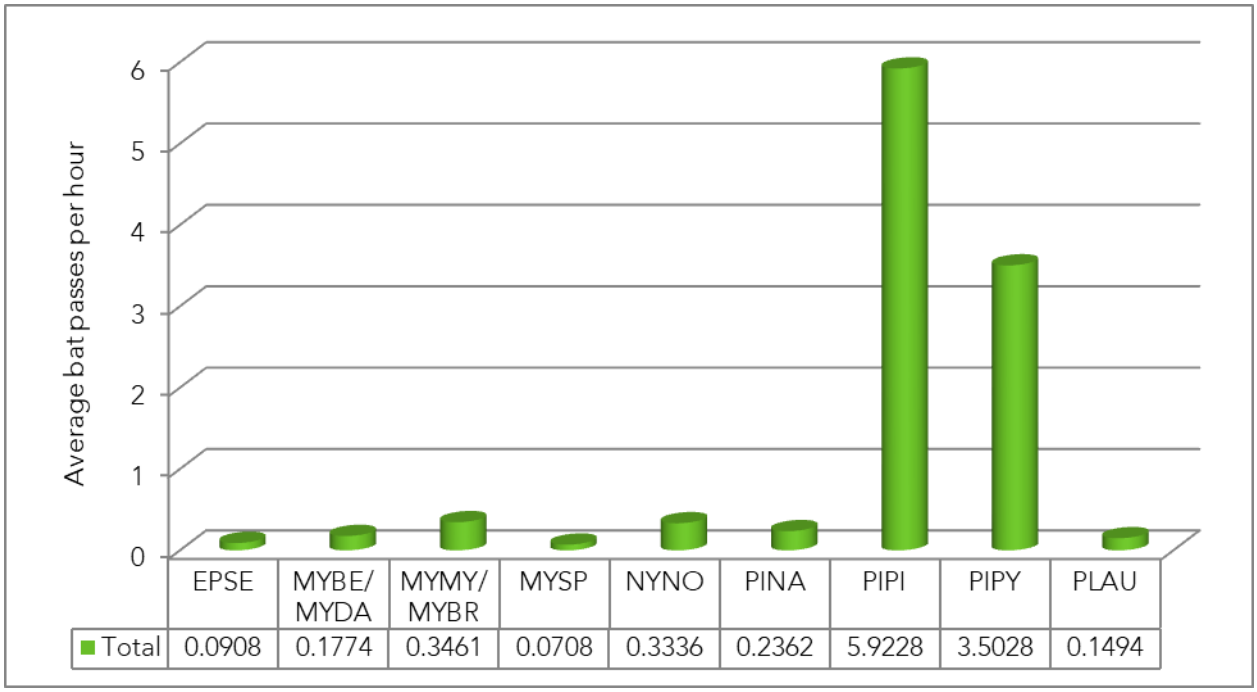


Figure 4.1: Bat pass species composition at each passive detector location

4.2.4 Figure 4.2 summarises changes in bat activity at different locations within the site over the course of the survey period, as recorded during passive monitoring. The data are also plotted onto a map of the site at Appendix II. The highest levels of bat activity were recorded along the rife in August 2018. Figure 4.3 sums the bat passes per hour recorded by both automated detectors in each month to give a representation of changing activity levels over the course of the monitored season.

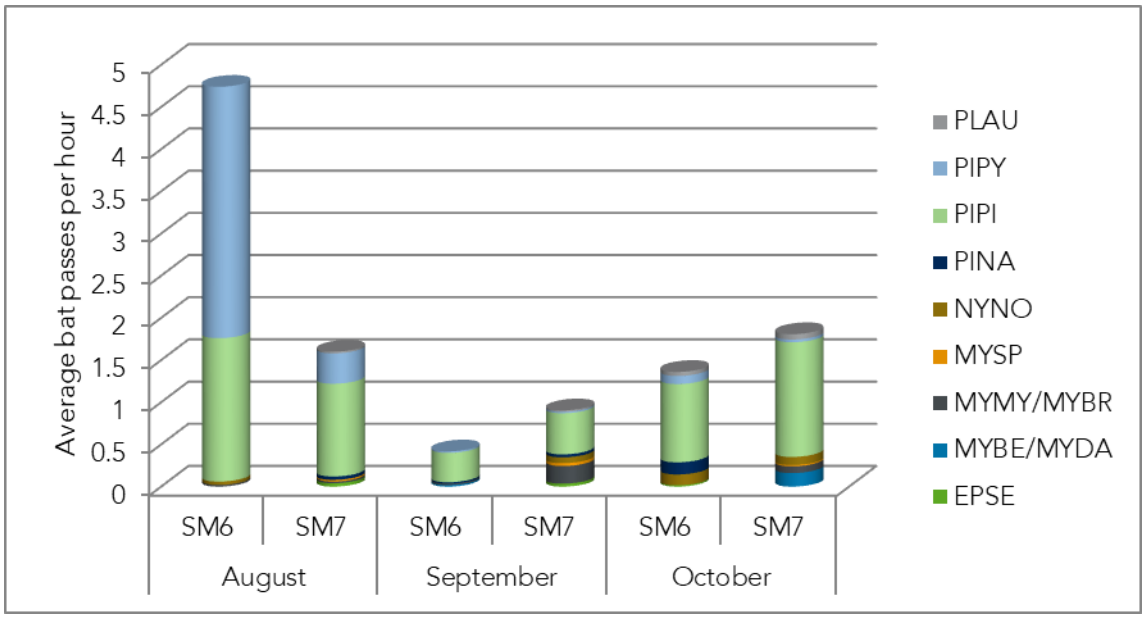


Figure 4.2: Average bat passes per hour at each passive detector location by month

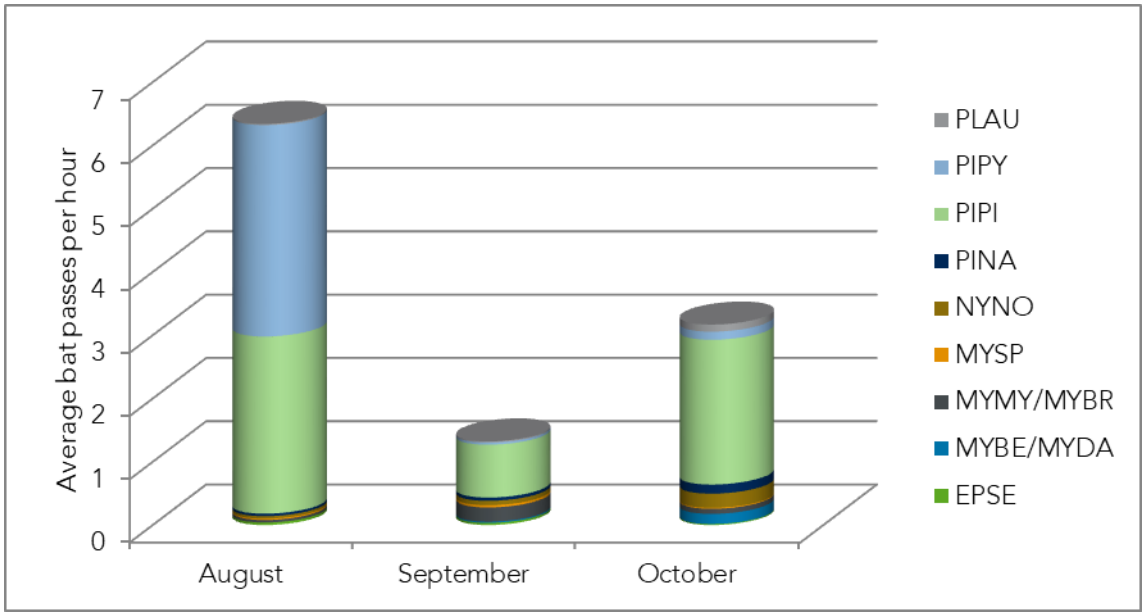


Figure 4.3: Average bat passes per hour by month

Impact assessment

Habitat losses and land use changes

4.2.5 High levels (relative to the survey area) of bat activity were recorded by detector SM6 in August 2018, located in the eastern rife section of the survey area and registering an average of 4.74 BPPH, suggesting that the rife running from east to west through the survey area is frequently used by foraging and commuting bats. This result is consistent with observations during the transect surveys where (mainly pipistrelle) bats were frequently recorded foraging up and down the eastern stretch of the rife. The indicative layout plan at Figure 1.2 shows that development proposals in this location include retention of the rife with agricultural land to the north and open space and attenuation ponds to the south. These proposals are unlikely to affect bats' usage of the area.

4.2.6 Moderate levels of bat activity were recorded by detector SM7 in August 2018, located on the eastern boundary of the survey area, registering an average of 1.60 BPPH. This detector was positioned on a tree just outside the site boundary and adjacent proposed land uses include the new access road and a small area of open space fronting residential development. However, the majority (93.7%) of bats recorded here during passive monitoring were pipistrelles, findings which were consistent with the transect surveys during which pipistrelles were observed foraging along the south-eastern boundary treeline outside of the site. Pipistrelle species are frequently found foraging in urbanised areas and are not thought to be highly sensitive to sources of artificial light (e.g. Stone, 2013; ILP/BCT, 2018). No significant impacts are predicted in this location.

4.2.7 Low levels of bat activity were recorded by detectors SM6 (0.42 average BPPH) and SM7 (0.90 average BPPH) in September 2018, located at the southern end of the treeline in the south west of the site, and at the northern end of the north-west boundary hedgerow, respectively. Development proposals in the north-west include retention of agricultural land with open space, proposals which are unlikely to affect bats' usage of the area. Development proposals in the south-west include retention of agricultural land to the west and residential development to the north-east, with the treeline itself being retained within a landscape and ecological corridor. No significant impacts are predicted in this location.

4.2.8 Moderate levels of bat activity were recorded by detectors SM6 (1.36 average BPPH) and SM7 (1.81 average BPPH) in October 2018, located in the middle of the southern survey area boundary, and the middle of the western boundary, respectively. Development proposals in the west include open space and attenuation ponds, proposals which are unlikely to affect bats' usage of the area. Development proposals in the south include residential development to the north and structural planting along the boundary. These proposals may displace bats using this area to other parts of the site, however, the majority (85.9%) of bats recorded here were pipistrelles which are frequently found foraging in residential areas; significant impacts are not predicted.

Increases in artificial light

4.2.9 Overall, although proposed habitat losses and changes in land use within the survey area are not predicted to result in significant impacts to foraging and commuting bats, the development is likely to increase artificial light levels. Stone (2013) presents a detailed summary of the potential impacts of artificial light on bat behaviour. Impacts differ between species, and complex interactions exist between potential beneficial effects (such as exploiting concentrations of invertebrate prey abundance) and adverse effects such increased exposure to predation, increased risk of mortality through collision with vehicles (when feeding around street lights), reduced invertebrate abundance in unlit areas reducing the availability of prey to light-intolerant bats, and fragmentation of habitats as a result of intolerant species avoiding light sources.

4.2.10 Increased foraging opportunities may result for some bat species which actively forage close to lights due to a greater abundance of insects, especially moths, being attracted to short wave (ultraviolet) or high blue spectral content light sources e.g. some types of street lights. Such light tolerant species include serotine *Eptesicus serotinus*, Leisler's *Nyctalus leisleri*, noctule *N. noctula*, and pipistrelle *Pipistrellus spp.* bats (ILP/BCT, 2018). For example, Rydell & Racey (1995) recorded common pipistrelle at densities ten times greater in lit areas than unlit.

4.2.11 Reduced foraging is caused by certain species avoiding or quickly passing through lit areas, perhaps attempting to evade predation, or by disrupting the composition, abundance or time of emergence of insect prey. Light intolerant species include the slower-flying broad winged species such as barbastelle *Barbastella barbastellus*, *Myotis spp.*, (including *M. bechsteinii, M. brandtii, M. daubentonii, M. mystacinus* and *M. nattereri*), greater horseshoe *Rhinolophus ferrumequinum* and lesser horseshoe *R. hipposideros* bats. Species less tolerant of light are at a competitive disadvantage and less able to forage effectively which can have a significant impact on fitness and breeding success. The development proposals may displace the low numbers of light-intolerant bats using the southern part of the survey area, but relatively large areas of the site (north of the rife) will remain undeveloped and are unlikely to be subject to additional light sources.

4.2.12 Recent guidance from the Institute of Lighting Professionals (ILP/BCT, 2018) describes a number of possible methods of mitigating the impacts of light on bats, including:

- Use of dark buffers, illuminance limits and zonation;
- Appropriate luminaire specifications;
- Sensitive site configuration;
- Screening;
- Glazing treatments;
- Creation of alternative valuable bat habitats (as a compensation measure); and
- Dimming and part-night lighting.

4.2.13 Details of the lighting proposals are not yet available; however, Stone (2013) presents a summary of the anticipated impact of artificial light on each UK species by behaviour. The

impact of light on foraging and commuting bats is classified as low for *Eptesicus serotinus* and individuals of the genus *Nyctalus* and *Pipistrellus* –which includes 92.5% of all bats recorded during passive monitoring at the site. These species are unlikely to be significantly affected by proposals for the site. Light intolerant species recorded at the site, including individuals of the genus *Myotis* and brown long-eared bats, together comprised 7.4% of activity recorded during passive monitoring, and each registered less than one bat pass per hour on average. Use of the site by these species may be reduced by the development proposals, however, it is likely that the overall development quanta proposed can be accommodated without significant impacts on the abundance and distribution of bats within the survey area, or adverse effects on the conservation status of local bats populations within their natural range. Recommendations to avoid and mitigate predicted impacts are set out in Chapter 5.

4.3 Badger

Presence or absence of badger

4.3.1 The results show that badger was not actively using the mammal holes within survey area during the monitored period in 2018, and the low number and restricted distribution of field signs indicate that the site is not a core part of their territory. Signs of foraging (a potential snuffle hole) were observed on the northern boundary of the survey area, and a mammal push-through was located on the southern boundary, with a mammal run leading from the railway land onto site. No evidence of badger was recorded elsewhere in the site.

Sett evaluation

4.3.2 The three mammal burrows which were monitored at locations C1, C2 and C3 did not record any evidence of use by badgers. The size and shape of C1 indicated potential use by badger, and old bedding material was found in its entrance, but no camera trap evidence of badger was captured. There were no noticeable spoil heaps associated with any of the monitored locations and the burrows at C2 and C3 were not characteristic of badger. The burrows at C1, C2 and C3 are not considered to be actively used by badger, with most of the recordings showing foxes and cats walking through the site, but C3 was discovered more recently than C1 and C2. A camera was left in position to continue monitoring this burrow but was subsequently stolen.

4.3.3 An outlier sett was recorded close to location C2 during the 2013 surveys (WYG, 2015a) and was considered to be active at that time. This sett was no longer present during the 2018 surveys, but the historical presence of an active sett suggests that badgers may be present in the local area and could therefore re-establish a sett prior to the start of construction works.

Impact assessment

4.3.4 Badger is a legally protected species but is not of conservation significance, being common and widespread in the UK. No negative impacts on badger are predicted because no currently active setts were identified within the survey area. There is hence a negligible risk of killing, injury or disturbance to badgers while occupying a sett, or destruction/damage/obstruction of a sett. However, precautionary measures are recommended at section 5.2 to manage the risk of a sett being re-established within the site prior to the start of construction works, and to ensure

an offence under the Wildlife and Countryside Act 1981 (as amended) and Protection of Badgers Act 1992 is avoided.

4.4 Otter and Water Vole

Presence or absence of otter and water vole

4.4.1 No resting sites for otters (holts, couches or lying-up sites) were found despite extensive land-based searches in areas of dense scrub and tree cover adjacent to the rife during the 2013 and 2018 surveys. No field signs (spraints, footprints, pathways, slides or feeding remains) were found despite extensive searches of the banksides in both years. It is concluded that otter is likely to be absent from the site and is not considered to present a constraint to the development proposals. No further recommendations for this species are required.

4.4.2 Ferring rife contained evidence of water vole along its full extent within the site boundary during the September 2013 survey, in the form of burrows, latrines and feeding stations (WYG, 2015d). During the subsequent September 2018 survey feeding stations, latrines, prints and burrows were recorded. These field signs were spread along the length of the rife throughout within the site, however, signs of recent activity (latrines and feeding stations) were concentrated in the eastern end of the rife. The low number of latrines per 100 metres of bankside habitat and distribution of other field signs along the rife suggests a low water vole population density focused on the eastern end of the site.

4.4.3 The survey was carried out in suitable weather conditions at an appropriate time of year for water vole surveys. However, surveys could only be completed in the second half of the breeding season. This is unlikely to constitute a significant limitation to the results because field signs would normally be expected at greater density during the second half of the season.

Impact assessment

4.4.4 Water voles are considered to be using the whole length of the rife within the site boundary, albeit that activity appears to be focused on the eastern half of the site. However, the burrows made by this species do not normally extend inland further than 5m from the top of the bank. The indicative layout plan at Figure 1.2 shows that the residential development areas will be contained within the southern part of the survey area, approximately 50m from the bank of the rife at the nearest extent, which is a prudent means of avoiding development impacts on water voles. However, although land adjacent to the rife to the northern part of the survey area will remain in agricultural use (and therefore unlikely to impact on water vole), land to the south of the rife will be converted to open space. Additionally, although not shown on the plan at Figure 1.2 it is possible that a new viewing deck would be installed overlooking the rife and South Downs National Park beyond.

4.4.5 Construction works within close proximity to Ferring rife are therefore likely to involve groundworks associated with open space landscaping, and creation of viewing deck foundations. Together these activities could result in a short term construction-phase risk of killing, injury or disturbance to water voles present during the works, and damage/destruction to their burrows. Long term negative impacts are not predicted and it is likely that the

population of water voles would continue to use habitats along the rife following construction. Conversely the proposed water attenuation features may provide new habitats suitable for water vole leading to positive effects in future. Recommendations to avoid and mitigate predicted negative impacts are set out in Chapter 5 to ensure that an offence under the Wildlife and Countryside Act 1981 (as amended) during construction is avoided.

4.5 Reptiles

Presence or absence of reptiles

4.5.1 The survey findings indicate that low populations of common lizard (peak count of 3 adults) and slow worm (peak count of 1 adult) were present within the survey area during the 2018 survey season. These results are consistent with the 2014 surveys which also recorded low populations of common lizard and slow worm (WYG, 2015e).

4.5.2 Surveys were carried out in suitable weather conditions at an appropriate time of year for reptile surveys and the density of refuges exceeded the recommended level (130 refuges were used across approximately 5.8ha of suitable habitat). The survey results are therefore considered to provide an accurate account of the reptile assemblage on site. However, the aim of this survey was to establish presence or likely absence and a greater level of survey effort would be required in order to obtain a reliable population estimate.

Site evaluation

4.5.3 The survey area provides a range of habitats suitable for widespread species such as slow worm, common lizard and grass snake, including rough grassland field margins, patches of scrub, hedgerows, and running water, but is dominated by arable fields which contain a low structural variation and are sub-optimal for reptiles. There are some further areas of suitable reptile habitat in the local area including residential gardens, the railway corridor and hedgerows, albeit that the site is somewhat isolated in the landscape by the adjacent A259.

4.5.4 Site location (in relation to the species' range), insolation, aspect, topography and surface geology are mostly favourable for reptiles, but prey abundance within arable land is likely to be limited. In addition, the suitable habitat within survey area is currently subject to relatively low levels of disturbance, mainly from local dog walkers using the footpath along the rife. However, the relatively (in relation to site size) limited opportunities for refuge, hibernation or egg-laying are likely to be limiting the survey area's potential for reptiles.

4.5.5 Common lizard and slow worm were found to be present in low numbers throughout the survey period, with only adults recorded. In total there were 8 records of common lizard, with a maximum adult count of 3, indicating that the survey area supports a low population. There were 4 records of slow worm, with a maximum adult count of 1, indicating that the survey area supports a low population. No other species of reptile or signs of their presence were recorded during the survey and it is likely that they are absent from the site. Overall, the survey area achieves a site score of 2 and does not meet the criteria for a Key Reptile Site (Froglife, 1999; see Table 2.6).

Impact assessment

4.5.6 The recorded distribution of reptiles within the survey area was restricted to two locations: along the west bank of the rife within the north-east of the site, and adjacent to the train line along the southern boundary.

4.5.7 Reptiles recorded in the north-east include three observations of a single adult common lizard and one observation of a single adult slow worm. Proposed land uses in the vicinity include the retention of agricultural land. As such no development impacts are predicted for reptiles recorded in the north-east of the survey area.

4.5.8 The greatest concentration of records was along the southern boundary of the site within a narrow band of amenity grassland associated with a public footpath running parallel to the rail line. Three observations of common lizard were noted along the southern boundary (two counts of a single adult and one count of three adults), with three observations of single adult slow worms. The proposed residential development is focused on the southern half of the survey area close to these reptile records, however, the majority of the construction zone is dominated by arable land unsuitable for reptiles. An open space buffer of c.10m would be maintained between the railway boundary fence and the developed area to maintain the public right of way and reduce the railway noise impact on future residents, and it was in this location that reptiles were recorded. The proposed treatment of this open space buffer is currently unclear but re-grading or other groundworks cannot be ruled out.

4.5.9 Construction works could hence involve ground clearance, creation of access tracks and materials storage compounds, vehicle movements and groundworks associated with open space landscaping. Together these activities could result in a short term construction-phase risk of killing or injury to reptiles present in these locations during the works. Long term impacts are not predicted and it is likely that the populations of common lizard and slow worm would continue to use habitats along the southern site boundary following construction. Recommendations to avoid and mitigate predicted impacts are set out in Chapter 5 to ensure that an offence under the Wildlife and Countryside Act 1981 (as amended) during construction is avoided.

4.6 Overwintering Birds

4.6.1 Overall, a low number (14) of wintering bird species was recorded at the site, of which seven were of conservation concern, and two were species of waterbirds associated with the Ferring Rife. Numbers of other species such as songbirds were low, with birds largely confined to the site boundaries where some boundary hedging and bushes and young trees were present. The site itself comprised largely arable fields which were little used by birds, and when a species present it was in low numbers; for example there were no gamebirds (such as pheasant *Phasianus colchicus* and grey partridge *Perdix perdix*) observed and no wintering flocks of finches, thrushes, larks and buntings etc. The presence of several skylark on the fourth survey was suggestive of the commencement of breeding activity. The Ferring Rife itself supported low numbers of moorhen *Gallinula chloropus* and also mallard, so does have more potential as wintering habitat. Much of the use of the site by species of conservation concern (e.g. the gulls) is considered to be opportunistic.

4.7 Breeding Birds

4.7.1 The proposed development will result in the loss of c.18.1ha of arable habitat in the southern part of the site, between the Ferring Rife and the railway line, as well as c.0.2ha of tree and scrub habitat on the eastern edge of the site. Loss of the arable habitat in the south of the site would have a significant negative impact on the breeding skylark population as more than half of the existing population is located in this area. Loss of scrub and trees on the eastern edge of the site would probably result in the loss of small numbers of territories of, for example, greenfinch and robin and wren and possibly song thrush, great tit and woodpigeon.

4.7.2 It is currently understood that boundary vegetation elsewhere on the eastern and western edges of the site, as well as the Ferring Rife corridor, the area north of the Ferring Rife, and the south-west corner of the survey area would be retained and protected as part of the development proposals. These offer opportunities, in combination with the creation of new greenspace within and adjoining the proposed development, for mitigating the impacts of development and enhancing the site for breeding birds.

5 Recommendations

5.1 Introduction

5.1.1 Recommendations are made below for the avoidance and/or mitigation of impacts to protected species, to prevent an offence under the relevant legislation from occurring and to reduce the risk of development proposals resulting in significant effects on the population and distribution of species recorded during the surveys. Recommendations are also made for the protection of important ecological features, and to enhance the ecology of the site post-construction, with the aim of achieving an overall net gain for biodiversity in line with the requirements of local and national policy and guidance.

5.1.2 Recommendations which are conducive to being shown spatially are depicted on the Ecological Mitigation Plan (EMP) at Appendix X.

5.2 Species-specific Mitigation Measures

5.2.1 The following species/groups (Table 5.1) require specific measures to be adhered to prior to and during construction to ensure that an offence under the relevant legislation is avoided.

Table 5.1: Recommended species-specific measures

#	Species-specific mitigation measures
R1	Mature trees at TN1 and TN2 (Appendix I) were assessed by WYG (2015c) as of moderate suitability for roosting bats. It is currently understood that these trees will be retained and no specific roosting surveys were carried out. However, if these trees are to be felled or lopped to facilitate the proposals, then further presence/absence surveys for bats will be required during the roosting season (May to August/September).
R2	Negative impacts on foraging and commuting bats and other nocturnal species should be prevented, during both construction and operation of the proposed development, by avoiding light spill falling onto retained hedgerows and tree lines or directed towards the Ferring rife.
R3	A repeat badger sett search and field sign survey should be undertaken prior to commencement of development works in order to determine if any new badger setts have been established at the site. The survey area should include the construction zone plus a 30 metre buffer to ensure that disturbance to badgers occupying a sett does not occur during the works.
R4	Secure fencing will be installed to protect retained habitats and in areas where it is important to exclude badgers for safety reasons e.g. fuel storage areas. The boundaries of the site should remain unlit in order to maintain commuting and foraging areas for badgers. At the end of each working day excavations should be covered over and open pipework should be capped to prevent badger entrapment.
R5	A water vole mitigation strategy is required for any construction works within 10m of Ferring rife. Dependent on the length of bankside affected, this is likely to focus on displacement of

#	Species-specific mitigation measures
	water voles from the working area under the direction of a Natural England Low Impact Class Licence holder, must be carried out between 15 February and 31 March, and must achieve a net conservation. If more than a 50m stretch of watercourse will be affected a project-specific licence is likely to be required.
R6	If a viewing deck over Ferring rife is required, this should be designed to minimise losses of bankside habitat. A Construction Environmental Management Plan (CEMP) will be required to ensure that no contaminants or effluent are released into the aquatic environment and to prevent impacts to the water course from changes in morphology, turbidity or flow regime.
R7	Where works are not required within 10m of Ferring rife, impacts will be prevented by implementing a fenced buffer zone at least 10m from the top of the bank within which construction activities and access by site personnel and machinery will be prohibited and enforced through appropriate fencing and signage.
R8	Undertake a habitat manipulation exercise followed by a destructive search prior to commencement of construction, to encourage the reptile population to leave the construction zone of its own accord.

Foraging and commuting bats

5.2.2 Negative impacts on foraging and commuting bats and other nocturnal species should be prevented, during both construction and operation of the proposed development, by avoiding light spill falling onto retained tree lines and woodland or directed towards the Ferring rife. The lighting design strategy should refer to guidance from the Institute of Lighting Professionals on bats and artificial lighting, and take account of the following recommended specifications (ILP/BCT, 2018):

- All luminaires should lack UV elements when manufactured. Metal halide, fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white spectrum (ideally <2700Kelvin) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill.
- The use of specialist bollard or low-level downward directional luminaires to retain darkness above should be considered. However, this often comes at a cost of unacceptable glare, poor illumination efficiency, a high upward light component and poor facial recognition, and their use should only be as directed by the lighting professional.
- Column heights should be carefully considered to minimise light spill.
- Only luminaires with an upward light ratio of 0% and with good optical control should be used (refer to ILP guidance for the reduction of obtrusive light).

- Luminaires should always be mounted on the horizontal, i.e. no upward tilt.
- Any external security lighting should be set on motion-sensors and short (1min) timers.
- As a last resort, accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only to where it is needed.

Badger

5.2.3 No active setts were identified during the 2018 surveys, but there remains the possibility that a new sett could be established within 30m of the construction zone prior to the start of works. Any badgers occupying such a sett would be at risk of killing, injury, disturbance, or sett damage during the works. A repeat badger survey is recommended to manage the risk of this occurring. Precautionary measures are also recommended to enable any badgers present in the wider area to continue using suitable adjacent habitats without being at risk of injury or entrapment.

Water vole

5.2.4 Construction works within close proximity to Ferring rife may include installation of a new viewing deck and groundworks associated with open space landscaping. A water vole mitigation strategy is required for any construction works within 10m of Ferring rife. Dependent on the length of bankside affected, this is likely to focus on displacement of water voles from the working area under the direction of a Natural England Low Impact Class Licence holder, must be carried out between 15 February and 31 March[10], and must achieve a net conservation benefit. If more than a 50m stretch of watercourse will be affected a project-specific licence is likely to be required.

5.2.5 As the proposals for the site have not yet been finalised the following recommendations provide an indicative outline of what is likely to be necessary under the Low Impact Class Licence to protect the water vole population known to be using the rife:

- ***Appointment of Ecological Clerk of Works***: An Ecological Clerk of Works (ECoW) who holds a Low Impact Class Licence will be appointed to oversee operations which could negatively affect water vole and other ecological features of value.
- ***Timing of the works***: Displacement of water voles will be carried out between 15 February and 31 March[11] but not during periods of very cold weather (i.e. maximum daytime temperature of <5°C or when there is lying snow or heavy frost).
- ***Manipulation of vegetation***: Habitats on both banks of the stretch of watercourse to be affected by construction will be manipulated to encourage water voles to leave the area. Vegetation will be cleared within the working area, plus 3m up- and downstream, as well as 3m from the bank top. Vegetation will be strimmed down to bare earth, and

[10] Appendix 1 to Dean *et al.* (2016) includes a Water Vole Displacement Protocol. This states that the ordinary season for water vole displacements in England is 15 February to 15 April, but recommends that displacement does not continue beyond 31 March in south-east England because breeding is likely to have started by early April. Converse seasonal adjustments are also recommended for northern counties.

[11] *Ibid.*

emergent aquatic vegetation cut back to water level. Water draw-down will be used in parallel with vegetation removal if necessary to ensure displacement from all burrows within the working area.

- ***Removal of vegetation***: Following clearance, arisings will be raked-off and burrow entrances checked to ensure they have not become blocked. Evidence of water voles (latrines, feeding stations, etc) will be removed. The cleared area will be left bare of vegetation for at least 5 days and not more than 10 days to allow any remaining animals to relocate.
- ***Destructive search***: Following habitat manipulation, the cleared area will be re-surveyed for signs of water vole activity. If there is no evidence that water voles are still present, a destructive search of burrows within the construction zone will be undertaken, working towards retained habitats, under the direction of the licensed ecologist. If fresh evidence is found the monitoring period will be extended and/or vegetation removal will be repeated and/or the destructive search will be undertaken by hand.
- ***Other species***: Appropriate precautions will be taken to prevent impacts to other protected species which may be present e.g. badger, nesting birds, otter, reptiles or white-clawed crayfish.
- ***Commencement of works***: Following the destructive search, construction works should be undertaken within 5 days. If this is not possible, it will be necessary to maintain the working area as bare ground until the work is complete.
- ***Restriction on extent***: Displacement of animals is suitable only if the works will affect no more than 50m of the watercourse. If more extensive works become necessary a translocation may be required. This would involve the erection of exclusion fencing and the trapping of animals within the construction zone under a project specific licence. Trapped animals would then be removed to a suitable receptor site for the duration of construction.
- ***Conservation benefit***: In order to achieve conservation benefits it will be necessary to implement a habitat creation or enhancement strategy. This could include creating new areas of wetland habitat as part of the surface water attenuation scheme and/or enhancing existing sub-optimal habitat through scrub removal and planting of suitable marginal and bankside cover and forage plants.

5.2.6 If a viewing deck over Ferring rife is required, this should be designed to minimise losses of bankside habitat. A Construction Environmental Management Plan (CEMP) will be required to ensure that no contaminants or effluent are released into the aquatic environment and to prevent impacts to the water course from changes in morphology, turbidity or flow regime.

5.2.7 For the remainder of the site, impacts will need to be prevented by implementing a fenced buffer zone at least 10m from the top of the bank of Ferring rife. Within the buffer zone construction activities and access by site personnel and machinery should be prohibited and enforced through appropriate fencing and signage.

Reptiles

5.2.8 The populations of common lizard and slow worm recorded in the survey area are concentrated on two locations; in the north-east on the west bank of Ferring rife, and along the southern boundary of the site. Those on the south boundary are at risk of killing or injury during construction (maximum counts of three common lizard and one slow worm). The majority of the construction zone is dominated by arable land unsuitable for reptiles. Capturing and translocating a small population present at low densities on the fringes of a large site is not considered to be a proportionate or efficient means of avoiding the risk of killing/injury. Instead a habitat manipulation approach is recommended to encourage the reptile population to leave the construction zone of its own accord, and move into adjacent areas of suitable habitat within the railway corridor and adjacent residential gardens.

5.2.9 The following mitigation strategy is recommended and should be implemented in accordance with a Method Statement which has been agreed with the Local Planning Authority and relevant wildlife organisations:

- ***Appointment of Ecological Clerk of Works***: An Ecological Clerk of Works (ECoW) will be appointed to oversee operations which could negatively affect reptiles and other ecological features of value.
- ***Timing of the works***: The habitat manipulation and destructive search will be programmed to take place during the active season for reptiles to reduce the physiological impact of disturbance and ensure they are capable of moving away from the construction zone of their own volition. The active season for reptiles usually occurs between late March and early October and when daytime temperatures are consistently >8°C.
- ***Toolbox talks***: All site operatives will receive a briefing from the ECoW to explain the legal protection for reptiles, the precautionary methods to be followed, tips on identifying reptiles, and the procedure to be followed should a reptile be found at any stage during the works.
- ***Hand search and dismantling of refuges***: Sites of potential refuge within the working area (e.g. log/rubble piles or compost heaps) will be deconstructed using hand tools, under the supervision of the ECoW.
- ***Manipulation and removal of vegetation***: Tall vegetation within the working area will be progressively cut to a height of 15-20cm above ground level under the direction of the ECoW. Cutting will be directional, undertaken from north to south towards the railway corridor to encourage any animals present to move out of the construction zone into suitable adjacent habitats. 24 hours after initial cutting, a secondary phase of directional vegetation clearance will be carried out, cutting vegetation to ground level in order to ensure that no suitable habitat remains within the working area.
- ***Destructive search***: Following the completion of habitat manipulation, and only to the extent deemed necessary by the ECoW, a destructive search will be undertaken focused on locations within the construction zone where reptiles were recorded. The top soil will be carefully and systematically excavated and removed from site. Machinery to be used

during this part of the work will be equipped with a toothed bucket. Clearance will be carried out slowly and methodically under the direction of the ECoW.

- ***Maintenance in unsuitable condition***: The working area will be maintained in this manipulated condition until ground works commence to ensure that the area remains unattractive for reptiles to return in the interim. If vegetation in the work area is not maintained in this manipulated condition, the measures outlined above will need to be repeated.
- ***Erection of reptile exclusion fencing***: The measures described above are intended to push the reptile population southwards out of the construction zone into retained habitats on adjacent land outside of the site. As a precautionary measure, the southern boundary of the construction zone should be fenced-off from retained habitats using reptile exclusion fencing. This should be left in-situ following the completion of the manipulation exercise, to ensure that reptiles do not re-colonise prior to or during construction. Its condition should be periodically checked by the ECoW during the works to ensure that an effective barrier is maintained.
- ***Procedure if reptiles are encountered***: If reptiles are found within the construction zone during the works, site operatives will be advised to cease activity in its vicinity while advice from the ECoW is sought. The ECoW will then assess the most appropriate course of action which may include removing the individual(s) from the site and moving it to an area of suitable habitat outside of the construction zone.
- ***Site check for nesting birds***: As a result of the precautionary timing of site clearance stipulated above, the works may be carried out during the nesting bird season which runs from early March to late August. The ECoW will carry out a survey for active bird nests immediately prior to clearance and, if an active nest is found, it will be cordoned off and works adjacent to the nest must be delayed until such time that the chicks have fledged from the nest.

5.3 Ecological Protection Measures

5.3.1 The following protection measures (Table 5.2) should be carried out as part of the proposed scheme.

Table 5.2: Recommended ecological protection measures

#	Recommended ecological protection measures
R9	Suitable bird nesting habitat occurs throughout the site in trees, hedgerows, scrub and open habitats. Negative impacts on breeding birds should be avoided by undertaking clearance and demolition works which would result in removal of potential nesting habitats outside of the bird nesting season, which runs from 1 March to 31 August. Removal of nesting bird habitats should therefore be carried out between September and February. Any construction works undertaken within the bird breeding season where suitable bird nesting habitat exists will require a site check for nesting birds by a suitably qualified ecologist. This should take place no more than two days prior to works commencing. This is to ensure that no disturbance to active bird nests occurs. If a nest is found it must be cordoned off and works adjacent to the nest must be delayed until such time that the chicks have fledged from

#	Recommended ecological protection measures
	the nest. This should be supervised by a suitably qualified ecologist.
R10	Sections of hedgerow, treeline and the rife at the site boundaries form a network of interconnected habitats of comparatively greater ecological value. These features provide habitats suitable for a range of protected species, are of value in their own right and should be retained and protected during construction, and could also provide a focus for ecological enhancement measures (see below). As far as possible retain and protect existing woody vegetation on the western and eastern boundaries of the site for the benefit of breeding birds.
R11	Construction works (including ground works and vegetation clearance) should be carried out in accordance with a Construction Environmental Management Plan (CEMP: Biodiversity). The CEMP should specify: potentially damaging construction activities; "biodiversity protection zones"; measures to avoid or reduce impacts during construction (including protective fences, exclusion barriers, pollution control and methodological or seasonal restrictions); location and timing of sensitive works; periods during which ecological supervision is required; and the role & responsibilities of an Ecological Clerk of Works (ECoW).
R12	Standard site procedures, as recommended by NetRegs GPP5 (*Works and Maintenance in or Near Water;* 2017*),* will be required to ensure that no contaminants or effluent are released into nearby aquatic environments.
R13	British Standard BS 5837:2012 and/or National Joint Utilities Group Guidelines (NJUG, 1995) should be followed at all times during construction when working in close proximity to trees or shrubs which are to be retained. According to NJUG Guidelines the root protection zone or precautionary area is 4x the circumference of the trunk (circumference is measured around the trunk at a height of 1.5m above ground level). The distance is measured from the centre of the trunk to the nearest part of any excavation or other work. If a separate tree survey is carried out for the proposed development, works should be undertaken in accordance with the recommendations therein.
R14	All excavations left overnight should either be covered over, or provided with a ramp to enable easy escape of badgers, small mammals, amphibians and other fauna, and inspected each morning prior to recommencement. Open pipework greater than 150mm outside diameter should be blanked off at the end of each working day.
R15	Where rabbit warrens are to be damaged or destroyed as part of the proposed works, this should be done in accordance with the Mammals Act 1996 by a registered pest control company.

5.4 Ecological Enhancement

5.4.1 The following biodiversity enhancements (Table 5.3) could be considered for the site to achieve an overall net gain for biodiversity in line with the requirements of local and national policy and guidance. Spatially specific enhancements are shown on the EMP at Appendix X.

Table 5.3: Recommendations for ecological enhancement

#	Recommendations for ecological enhancement
R16	Areas of rank grassland, scrub and marginal vegetation along the rife should be retained and managed in rotation to support wintering / breeding mallard and other waterbirds, and also to

#	Recommendations for ecological enhancement
	support the prey populations of kestrel (chiefly voles, but also small birds and insects). Enhance the Ferring Rife for breeding birds, for example by widening the channel in places to create larger areas of emergent and marginal vegetation for nesting waterbirds, such as moorhen and mallard. Create high quality breeding habitat for skylarks, comprising appropriately managed permanent grassland with a variety of structures and heights, in the undeveloped area between the edge of development and Ferring Rife, and between the rife and the A259.
R17	It is recommended that new green spaces are sown with a locally-sourced native wildflower and grass seed mix (i.e. wildflower meadow). This should be particularly targeted towards retained habitat features such as hedgerows, treelines and the rife, but should also be extended to public realm areas such as road verges, and if possible be included towards the margins of private gardens. A wildflower meadow treatment would provide a greater botanical diversity than currently present, and will benefit local populations of invertebrates such as butterflies and bees and their predators. Even if planted only at the margins of areas of amenity grassland, particularly if adjacent to other features such as hedgerows, this would provide a habitat enhancement for reptiles, small mammals and invertebrates.
R18	Hedgerow creation and/or restoration as part of the landscaping plan for the site could use a wide range of native shrub species of local provenance. Fruit, seed, nut and nectar-bearing species should be used preferentially when selecting a palette of species for landscape planting, so that food sources are available throughout most of the year (e.g. hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, rowan *Sorbus aucuparia* and honeysuckle *Lonicera periclymenum*). If an evergreen hedge is required for landscape screening, suitable native species include holly *Ilex aquifolium*, holm oak *Quercus ilex* although both can be rather slow growing, ivy *Hedera helix* and privet *Ligustrum vulgare*. Beech *Fagus sylvatica* and hornbeam *Carpinus betulus* are also widely used as hedging plants and, although not evergreen, these will keep their brown leaves through winter if trimmed in late summer.
R19	New wetland habitats could be considered within the proposed development as part of the drainage strategy; this would improve the aquatic resource of the area and enhance ecological connectivity for species such as water vole, grass snake *Natrix natrix*, amphibians and invertebrates such as dragonflies. Newly created wetland habitats should be profiled to incorporate a variety of depths, with a combination of shallow sloping sides providing access points for wildlife and steep banks suitable for burrowing, and planted with appropriate native vegetation. A planting scheme could include plants suitable for damp margins, such as; amphibious bistort *Persicaria amphibian,* marsh marigold *Caltha palustris,* reed canary grass *Phalaris arundinacea,* brooklime *Veronica beccabunga,* wild angelica *Angelica sylvestris,* purple loosestrife *Lythrum salicaria*, greater bird's-foot trefoil *Lotus uliginosus,* and gypsywort *Lycopus europaeus.* Aquatic vegetation could include native species such as water crowfoot *Ranunculus aquatilis*, lesser spearwort *R. flammula,* water mint *Mentha aquatic*, water forget-me-not *Myosotis scorpioides* and branched bur-weed *Sparganium erectum*, all of which can be used by newts for egg laying. Drainage engineers and landscape architects should be involved in specifying the mix of species as their suitability is dependent on how frequently wetland areas will be inundated.
R20	Within the site's landscaping plans, use plant species which encourage bats. The table at Appendix IX lists suggested species of plants that can provide benefit for bats either by providing a food source for insects on which bats feed, or providing additional roosting

#	Recommendations for ecological enhancement
	opportunities (Gunnell *et al.*, 2012). The plant species are predominantly native to Britain, but not all species will be suitable in all situations. The aim is to encourage a diverse range of invertebrate food sources and increased bat roost potential.
R21	Buffers of less intensively managed vegetation (e.g. rough grassland or wildflower meadow planting, including the use of tussock-forming grass species such as cock's foot *Dactylis glomerata*, Yorkshire fog *Holcus lanatus* and tufted hair-grass *Deschampsia cespitosa*) should be maintained within soft landscaped areas within the development, towards the survey area boundaries and alongside the boundary hedgerows and woodland. This will help to maintain ecological connectivity through the site for reptiles, amphibians and other wildlife.
R22	Creation of one or more hibernacula and compost heaps within areas of retained rough grassland or marginal vegetation, at the edges of the site close to boundary hedgerows, treelines and the rife. These would provide additional hibernation, shelter and egg-laying resources for reptiles, amphibians and a range of other wildlife. Hibernacula can be created by partially burying logs and stones in sheltered areas away from flood risk, and covering over with earth or turf. Breeding habitats can be created by collecting grass clippings and other prunings arising from landscape management of the site, and composting them in a secluded corner of the site.
R23	To enable dispersal of hedgehogs (which require large territory sizes) and other small mammals across the site and within the local area following development, small access gaps to measure c.13x13cm are recommended to be provisioned at the base of new fence boundaries. These will allow easy passage for small mammals to continue foraging in the area while still being small enough to contain pets.
R24	The value of the site for birds could be enhanced by installing a range of artificial nest boxes. It is recommended that these are placed on retained mature trees within the development or hedgerow/woodland at the site boundaries, or incorporated within building facades. For instance: ▪ New buildings: nest boxes could be installed under the eaves for birds that utilise buildings for nesting, e.g. house martin *Delichon urbica*, house sparrow *Passer domesticus*, and swift *Apus apus*. These species are of principal importance, of conservation concern and/or are notable in Sussex. ▪ Trees: nest boxes with entrance holes suitable for tit species, and open-fronted boxes suitable for spotted flycatcher *Muscicapa striata* or song thrush *Turdus philomelos*, and treecreeper *Certhia familiaris* boxes. ▪ An artificial nest boxes for kestrel *Falco tinnunculus*, which was recorded on site during the winter bird survey, should be erected in the area of public open space, with appropriate habitat management regimes adopted along the rife to maintain corridors of foraging habitat for this species.
R25	The value of the site for bats could be enhanced by installing a range of artificial roost boxes. It is recommended that these are placed on retained mature trees within the development or woodland/hedgerows at the site boundaries, or incorporated within buildings facades. Boxes suitable for a wide range of species should be used, for instance: ▪ New buildings: integral bat tubes could be installed within buildings which face vegetated areas. Bat tubes can be incorporated into the design of the building so that only the access holes are visible from the exterior of the building. The Schwegler 1FR or 2FR Bat Tube is designed to meet the characteristic requirements of the types of bats that inhabit buildings such as pipistrelles *Pipistrellus spp.* or serotines *Eptesicus*

#	Recommendations for ecological enhancement
	serotinus. It is designed to be installed on the external walls of buildings, either flush or beneath a rendered surface. ▪ Pipistrelles *Pipistrellus sp.*: bat boxes suitable to install on mature trees either within or at the edges of the development include the Schwegler 1FF Flat Bat Box, or other manufacturer's equivalent. ▪ Noctules *Nyctalus spp.* and brown long eared bats *Plecotus auritus:* bat boxes suitable to install on mature trees either within or at the edges of the development include the Schwegler 2F General Purpose Bat Box or the 2FN Woodland Bat Box, or other manufacturer's equivalent. ▪ Bat boxes should ideally be located south-facing (between south-east and south-west) and above 4m from ground level. If possible they should be installed facing vegetation features such as mature hedgerows or trees, but with a clear line of flight for bats entering or leaving the roost, and away from sources of artificial light.

6 Conclusions

6.1 Summary

6.1.1 Protected species surveys for foraging and commuting bats, badger, otter, water vole and reptiles were undertaken for the site of a proposed mixed use development at Land North West of Goring Station, Goring-by-Sea, West Sussex. The study was undertaken to identify and evaluate the potential impacts of development on protected species, and make recommendations accordingly. Protected species surveys were undertaken initially between 2013 and 2014 and were updated in 2018.

6.2 Results

6.2.1 The desk study data search returned the following records of target species from within 2km of the survey area: 38 records of eight species of bat, including serotine, Daubenton's, whiskered, Natterer's, noctule, common pipistrelle, soprano pipistrelle, and brown long-eared bats; two records of water vole, the closest being located within the site; and 29 records of four reptile species, comprising slow worm, common lizard, grass snake and adder. SxBRC does not supply records for badger or otter.

6.2.2 Species diversity recorded during the bat activity surveys included up to ten species. The majority (88.3%) of bat calls recorded were from pipistrelle bats, with common pipistrelles registering an average of 5.92 BPPH, soprano pipistrelles registering an average of 3.50 BPPH, and Nathusius' pipistrelles registering an average of 0.24 BPPH. Of the remaining bat passes, those of Brandt's/whiskered were the next most frequently recorded (3.4% or 0.35 BPPH), closely followed by noctule (3.4% or 0.33 BPPH). Serotine, other *Myotis* species, Leisler's, and brown long-eared bats each accounted for less than 2% of bats recorded. This means that 91.7% of all bats recorded were of the genus *Nyctalus* or *Pipistrellus*. The highest levels of bat activity were recorded along the rife in August 2018.

6.2.3 The results show that badger was not actively using the mammal holes within survey area during the monitored period in 2018, and the low number and restricted distribution of field signs indicate that the site is not a core part of their territory. Signs of foraging (a potential snuffle hole) were observed on the northern boundary of the survey area, and a mammal push-through was located on the southern boundary, with a mammal run leading from the railway land onto site. No evidence of badger was recorded elsewhere in the site.

6.2.4 However, an outlier sett was recorded close to location C2 during the 2013 surveys (WYG, 2015a) and was considered to be active at that time. This sett was no longer present during the 2018 surveys, but the historical presence of an active sett suggests that badgers may be present in the local area and could therefore re-establish a sett prior to the start of construction works.

6.2.5 No otter holts, couches, laying-up sites or field signs were recorded within the survey area in either 2013 or 2018. Evidence of water voles, including burrows, latrines and feeding stations were identified along the whole length of Ferring rife within the site boundary during the 2013 surveys (WYG, 2015d). During the subsequent September 2018 survey feeding stations, latrines, prints and burrows were recorded. The low number of latrines per 100 metres of bankside habitat and distribution of other field signs along the rife in 2018 suggests a low water vole population density focused on the eastern end of the site.

6.2.6 The survey findings indicate that low populations of common lizard (peak count of 3 adults) and slow worm (peak count of 1 adult) were present within the survey area during the 2018 survey season. No other species of reptile or signs of their presence were recorded during the survey and it is likely that they are absent from the site. These results are consistent with the 2014 surveys which also recorded low populations of common lizard and slow worm (WYG, 2015e).

6.2.7 A wintering bird survey carried out separately between December 2019 and February 2020 recorded a total of 14 bird species of which seven were considered to be of particular conservation importance, including peregrine, herring gull, skylark, starling, mallard, kestrel and lesser black-backed gull. A breeding bird survey is due to be carried out during spring/summer 2020.

6.2.8 A breeding bird survey carried out separately between April and June 2020 recorded ten probable breeding species within the site, as well as eight possible breeding species, most notably populations of skylark, breeding in the arable, and house sparrow *Passer domesticus*, breeding in boundary vegetation in the south west of the site.

6.3 Evaluation

6.3.1 High levels (relative to the survey area) of bat activity were recorded in August 2018 along the eastern rife section of the survey area (4.74 BPPH). Moderate levels were recorded in August 2018 (1.60 BPPH) on the eastern boundary of the survey area, and in October 2018 on the southern (1.36 BPPH) and western (1.81 BPPH) boundaries of the survey area. These locations were also frequently used by foraging bats during the transect surveys. However, the majority of bats recorded using these features were common and soprano pipistrelles which are frequently found foraging in urbanised areas and are not thought to be highly sensitive to sources of artificial light. Low levels of bat activity were recorded elsewhere in the site. Overall, proposed habitat losses and changes in land use within the survey area are not predicted to result in significant impacts to foraging and commuting bats.

6.3.2 The impact of light on foraging and commuting bats is classified as low for *Eptesicus serotinus* and individuals of the genus *Nyctalus* or *Pipistrellus* –which includes 92.5% of all bats recorded at the site. These species are unlikely to be significantly affected by proposals for the site. Light intolerant species recorded at the site, including individuals of the genus *Myotis* and brown long-eared bats, together comprised 7.4% of activity recorded during passive monitoring, and each registered less than one bat pass per hour on average. Use of the site by these species may be reduced by the development proposals, however, it is likely that the overall development quanta proposed can be accommodated without significant impacts on

the abundance and distribution of bats within the survey area, or adverse effects on the conservation status of local bats populations within their natural range.

6.3.3 Badger is a legally protected species but is not of conservation significance, being common and widespread in the UK. No negative impacts on badger are predicted because no currently active setts were identified within the survey area. There is hence a negligible risk of killing, injury or disturbance to badgers while occupying a sett, or destruction/damage/obstruction of a sett. However, precautionary measures are recommended to manage the risk of a sett being re-established within the site prior to the start of construction works.

6.3.4 Otter is not considered to present a constraint to the development proposals and no further recommendations for this species are required. Water voles are considered to be using the whole length of the rife within the site boundary, albeit that activity appears to be focused on the eastern half of the site. However, the burrows made by this species do not normally extend inland further than 5m from the top of the bank. The majority of proposed development is positioned much further away but construction works within close proximity to Ferring rife may include groundworks associated with open space landscaping, creation of viewing deck foundations. Together these activities could result in a short term construction-phase risk of killing, injury or disturbance to water voles present during the works, and damage/destruction to their burrows. Long term negative impacts are not predicted and it is likely that the population of water voles would continue to use habitats along the rife following construction if recommended mitigation is adopted. Conversely the proposed water attenuation features may provide new habitats suitable for water vole leading to positive effects in future.

6.3.5 The recorded distribution of reptiles within the survey area was restricted to two locations: along the west bank of the rife within the north-east of the site, and adjacent to the train line along the southern boundary. Proposed land uses in the north-east include the retention of agricultural land and no development impacts are predicted for reptiles in this location.

6.3.6 The proposed residential development is focused on the southern half of the survey area close to the other reptile records, however, the majority of the construction zone is dominated by arable land unsuitable for reptiles. An open space buffer of c.10m would be maintained between the railway boundary fence and the developed area but the proposed treatment of this open space buffer is currently unclear and re-grading or other groundworks cannot be ruled out. Construction works could hence result in a short term construction-phase risk of killing or injury to reptiles present in these locations during the works. Long term impacts are not predicted and it is likely that the populations of common lizard and slow worm would continue to use habitats along the southern site boundary following construction if recommended mitigation is adopted.

6.3.7 Overall, a low number (14) of wintering bird species was recorded at the site, of which seven were of conservation concern, and two were species of waterbirds associated with the Ferring Rife. Numbers of other species such as songbirds were low, with birds largely confined to the site boundaries where some boundary hedging and bushes and young trees were present. The site itself comprised largely arable fields which were little used by birds, and when a species present it was in low numbers; for example there were no gamebirds (such as pheasant *Phasianus colchicus* and grey partridge *Perdix perdix*) observed and no wintering flocks of

finches, thrushes, larks and buntings etc. The presence of several skylark on the fourth survey was suggestive of the commencement of breeding activity. The Ferring Rife itself supported low numbers of moorhen *Gallinula chloropus* and also mallard, so does have more potential as wintering habitat. Much of the use of the site by species of conservation concern (e.g. the gulls) is considered to be opportunistic.

6.3.8 Breeding birds included Red and Amber listed and Section 41 species, most notably populations of skylark and house sparrow (both Red Listed/section 41). The other probable breeding species was dunnock (Amber listed/section 41) and possible breeding species were starling and song thrush (both Red Listed/section 41), mallard (Amber listed) and reed bunting (Amber listed/section 41). Seven and four BoCC Green Listed bird species were also identified as probable or possible breeding species respectively. The survey area is considered to be of Local Importance for its breeding bird populations and assemblage

6.4 Recommendations

6.4.1 Recommendations are made for the avoidance and/or mitigation of impacts to protected species, to prevent an offence under the relevant legislation from occurring and to reduce the risk of development proposals resulting in significant effects on the population and distribution of species recorded during the surveys; these are summarised in Table 6.1. Recommendations are also made for the protection of important ecological features, and to enhance the ecology of the site post-construction, with the aim of achieving an overall net gain for biodiversity in line with the requirements of local and national policy and guidance.

Table 6.1: Summary of recommendations

#	Summary of recommendations
Species-specific mitigation measures	
R1	Mature trees at TN1 and TN2 (Appendix I) were assessed by WYG (2015c) as of moderate suitability for roosting bats. It is currently understood that these trees will be retained and no specific roosting surveys were carried out. However, if these trees are to be felled or lopped to facilitate the proposals, then further presence/absence surveys for bats will be required during the roosting season (May to August/September).
R2	Negative impacts on foraging and commuting bats and other nocturnal species should be prevented, during both construction and operation of the proposed development, by avoiding light spill falling onto retained hedgerows and tree lines or directed towards the Ferring rife.
R3	A repeat badger sett search and field sign survey should be undertaken prior to commencement of development works in order to determine if any new badger setts have been established at the site. The survey area should include the construction zone plus a 30 metre buffer to ensure that disturbance to badgers occupying a sett does not occur during the works.
R4	Secure fencing will be installed to protect retained habitats and in areas where it is important to exclude badgers for safety reasons e.g. fuel storage areas. The boundaries of the site should remain unlit in order to maintain commuting and foraging areas for badgers. At the end of each working day excavations should be covered over and open pipework should be capped to prevent badger entrapment.

#	Summary of recommendations
R5	A water vole mitigation strategy is required for any construction works within 10m of Ferring rife. Dependent on the length of bankside affected, this is likely to focus on displacement of water voles from the working area under the direction of a Natural England Low Impact Class Licence holder, must be carried out between 15 February and 31 March, and must achieve a net conservation. If more than a 50m stretch of watercourse will be affected a project-specific licence is likely to be required.
R6	If a viewing deck over Ferring rife is required, this should be designed to minimise losses of bankside habitat. A Construction Environmental Management Plan (CEMP) will be required to ensure that no contaminants or effluent are released into the aquatic environment and to prevent impacts to the water course from changes in morphology, turbidity or flow regime.
R7	Where works are not required within 10m of Ferring rife, impacts will be prevented by implementing a fenced buffer zone at least 10m from the top of the bank within which construction activities and access by site personnel and machinery will be prohibited and enforced through appropriate fencing and signage.
R8	A habitat manipulation exercise will be undertaken, followed by a destructive search prior to commencement of construction, to encourage the reptile population to leave the construction zone of its own accord.
Ecological protection measures	
R9	Removal of nesting bird habitats should be undertaken outside of the bird nesting season, which runs from 1 March to 31 August. It should therefore be carried out between September and February.
R10	Sections of hedgerow, treeline and the rife at the site boundaries form a network of interconnected habitats of comparatively greater ecological value. These features provide habitats suitable for a range of protected species, are of value in their own right and should be retained and protected during construction, and could also provide a focus for ecological enhancement measures (see below). As far as possible retain and protect existing woody vegetation on the western and eastern boundaries of the site for the benefit of breeding birds.
R11	Construction works should be carried out in accordance with a Construction Environmental Management Plan.
R12	Standard site procedures to prevent impacts on nearby aquatic environments should be adhered to during construction.
R13	Standard site procedures to prevent impacts on trees should be adhered to during construction.
R14	At the end of each working day excavations should be covered over and open pipework should be capped to prevent impacts on mammals, amphibians and other fauna.
R15	Rabbit warrens should be destroyed in accordance with the Mammals Act 1996 by a registered pest control company.
Enhancement measures	
R16	Areas of rank grassland, scrub and marginal vegetation along the rife should be retained and managed in rotation to support wintering / breeding mallard and other waterbirds, and also to support the prey populations of kestrel. Enhance the Ferring Rife for breeding birds, for example by widening the channel in places to create larger areas of emergent and marginal vegetation for nesting waterbirds, such as

#	Summary of recommendations
	moorhen and mallard. Create high quality breeding habitat for skylarks, comprising appropriately managed permanent grassland with a variety of structures and heights, in the undeveloped area between the edge of development and Ferring Rife, and between the rife and the A259.
R17	Green spaces should be sown with a locally-sourced native wildflower and grass seed mix.
R18	Hedgerow creation and/or restoration should use a range of native fruit, seed, nut and nectar-bearing species shrub species of local provenance.
R19	New wetland habitats could be considered within the proposed development as part of the drainage strategy.
R20	Within the site's landscaping plans, use plant species which encourage bats by providing additional food sources or roosting opportunities.
R21	Buffers of less intensively managed vegetation (including the use of tussock-forming grass species) should be maintained within soft landscaped areas to maintain ecological connectivity through the site.
R22	Hibernacula and compost heaps for reptiles and amphibians could be created within areas of retained rough grassland or marginal vegetation.
R23	Small access gaps should be provisioned at the base of new fence boundaries to enable dispersal of small mammals across the site.
R24	The value of the site for birds could be enhanced by installing a range of artificial nest boxes onto new buildings and retained trees.
R25	The value of the site for bats could be enhanced by installing a range of artificial roost boxes onto new buildings and retained trees.

6.5 Conclusions

6.5.1 The proposed development will result in negative impacts to breeding birds, foraging and commuting bats, water vole and reptiles, however, long-term adverse effects on the conservation status of these species are not predicted. Mitigation methods are recommended to reduce and offset the predicted impacts on a proportionate basis. Measures to enhance the ecology of the site post-construction which are conducive to being shown spatially are depicted on the Ecological Mitigation Plan at Appendix X. A biodiversity net gain assessment has been carried out separately to demonstrate the overall value of the site for ecology after development.

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WYG (2015d): *Land at Goring Station: Otter and Water Vole Survey*.

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Appendix I: Phase 1 Habitats Map

Please see following page.

Target notes:

- TN1: dead willow tree considered to be of high bat roost suitability in 2013
- TN2: mature sycamore tree considered to be of moderate bat roost suitability in 2013
- TN3: not specified in WYG (2015a)
- TN4: outlier badger sett considered to be active in 2013
- TN5: outlier badger sett considered to be inactive in 2013

For further details refer to WYG (2015a).

N

Legend

- Site boundary
- Target note
- Intact species poor hedgerow
- Scattered trees
- Scattered scrub
- A — Amenity grassland
- A — Arable land
- SI — Semi-improved grassland
- Watercourse
- Dry ditch

0 40 80 160 Metres

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 2348100
Fax: 0116 2348002
email: midlands.ecology@wyg.com

WYG Environment

creative minds safe hands

Project

Land by Goring station

Drawing Title:

Extended Phase 1 Habitat Survey

	Drawn by: Date:	Checked By: Date:	Approved By: Date:
	VC 13/03/15	DW 13/03/15	CH 13/03/15

Project No:	Office	Type	Drawing No.	Revision
A080495	45	94	Figure 1	

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Appendix II: Bat Activity Plan

Please see following page.

Land North West of Goring Station

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Ordnance Survey 0100031673

0 0.07 0.14 Kilometers

N

UE Environmental Consulting
Unit 5 Westergate Business Centre
Brighton
BN2 4QN

Scale	Date
1:3,500	Dec2018
Created by	Reviewed by
NP	NP

Drawing number
UE0284ECO-Bats181205

Appendix III: Bat Activity Survey Results

Abbreviations:

BABA	Barbastelle	EPSE	Serotine	MYBE	Bechstein's
MYBR	Brandt's	MYDA	Daubenton's	MYMY	Whiskered
MYNA	Natterer's	MYsp	Myotis sp.	NYLE	Leisler's
NYNO	Noctule	PINA	Nathusius' pipistrelle	PIPI	Common pipistrelle
PIPY	Soprano pipistrelle	PIsp	Pipistrelle sp.	PLAU	Brown long-eared
RHFE	Greater horseshoe	RHHI	Lesser horseshoe		

Survey 1: Dusk, 30/08/18			
Sunset/sunrise:	**Start time:**	**End time:**	**Precipitation:**
19.52	20.00	22.01	None
Air temp start:	**Air temp end:**	**Wind:**	**Cloud cover:**
15.8	14.1	B1 N	90%
Equipment:			
Wildlife Acoustics EchoMeter Touch handheld detector			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats

No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Survey 1 (NP): Start at TP1, follow all TP in sequence, finishing at TP19									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
1	20.00-20.03								
2	20.06-20.09								
3	20.12-20.15								
4	20.18-20.21								
5	20.25-20.28								
6	20.32-20.35								
6-7	20.36	PIPY	1	1		C		HNS	Brief
7	20.39-20.42								
7	20.37-20.42	PIPI	1	7		F			Back and forth between field gate and streetlight, continuous
8	20.46-20.49	PIPI PIPY	2+	2 8		F F	N Y		Up down tree line.
8-9	20.50	PIPI	1	2		C		HNS	
9	20.53-								

Survey 1 (NP): Start at TP1, follow all TP in sequence, finishing at TP19									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
	20.56								
10	21.01-21.04								
11	21.07-21.10								
12	21.14-21.17								
13	21.21-21.24								
14	21.27-21.30								
14-15	21.30	NYLE		1		C		HNS	On tree line
15	21.37-21.40								
16	21.44-21.47 21.47	PIPI	1	1		C		HNS	Brief
17	21.50-21.53 21.50	PIPI	1	2		F		HNS	Brief
18	21.54-21.56	NYLE	1	1		C		HNS	
19	21.58-22.01								PIPI still going when back at car at TP7

Survey 2: Dusk, 17/09/18			
Sunset/sunrise: 19.10	**Start time:** 19.10	**End time:** 21.10	**Precipitation:** None
Air temp start: 19.2	**Air temp end:** 18.3	**Wind:** B1-2 SE	**Cloud cover:** 0%
Equipment: Wildlife Acoustics EchoMeter Touch handheld detector			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats

No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls

S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

Survey 2 (NP): Start at TP19, follow in reverse sequence to TP1									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
19	19.10-19.13								
17	19.18-19.21								
18	19.23-19.26								
16	19.29-19.32								
15	19.35-19.38								

Survey 2 (NP): Start at TP19, follow in reverse sequence to TP1									
TP	**Time**	**Spp.**	**No.(I)**	**No.(P)**	**E/R**	**F/C**	**Soc.**	**S/NS**	**Comment**
14	19.42-19.45								
13	19.47-19.50								
13-12	19.52	PIPI	1	1		C			S-N along W boundary
12	19.54-19.57 19.57	PIPI	1	1		C		HNS	
11	20.02-20.05								
10	20.08-20.11								
9	20.15-20.18								
9-8	20.19-20.21	PIPI	?	6		F		HNS	Suspect up down tree line outside of site under street lights
8	20.22-20.25								
7	20.27-20.30								
6	20.32-20.35								
5	20.40-20.43								
4	20.46-20.49								
3	20.53-20.56								
2	20.58-21.01								
1	21.03-21.06								
1 - car	21.07	PIPI	1	3		F			Up and down rife

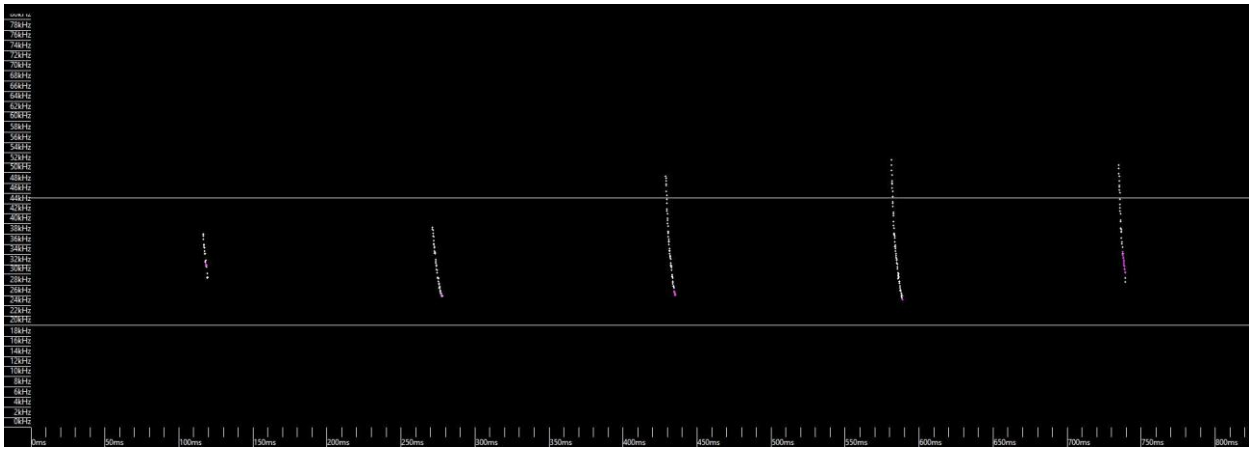
Survey 3: Dusk 02/10/18			
Sunset/sunrise: 18.30	**Start time:** 18.30	**End time:** 20.30	**Precipitation:** None
Air temp start: 14.3	**Air temp end:** 14.0	**Wind:** B2 E	**Cloud cover:** 80%
Equipment: Wildlife Acoustics EchoMeter Touch handheld detector			

TP: Transect point Time: of recording and/or time at transect point No.(I): Number of bats
No.(P): Number of passes E/R: emergence/re-entry F/C: Foraging/commuting Soc.: Social calls
S/NS/SNH: Seen / not seen / seen not heard Comment: e.g. location of roost, direction of flight, behaviour, frequency, call shape

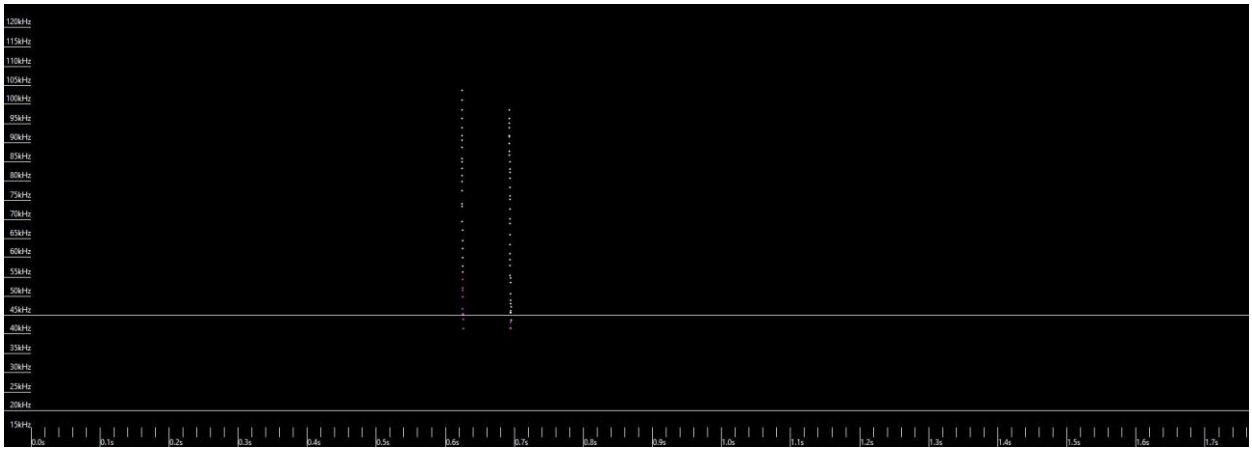
Survey 3 (AD): Start at TP14 in the west, then consecutively through to TP7, then north along the eastern boundary to TP1, then consecutively through to TP6, across the rife to TP19, then consecutively along the rife and finishing on TP15.

TP	Time	Spp.	No.(I)	No.(P)	E/R	F/C	Soc.	S/NS	Comment
14	18.30-18.33								
13	18.35-18.38								
12	18.40-18.43								
11	18.45-18.48								
10	18.51-18.54								
9	18.57-19.00								
8	19.02-19.05								
7	19.07-19.10								
1	19.13-19.16								
2	19.18-19.21								
3	19.24-19.27								
4	19.31-19.34	BLE Myotis sp. EPSE	1 1 1	1 4 2		C C C		NS NS NS	Very loud call
5	19.36-19.39	EPSE	1	2		C		NS	Harmonic
6	19.43-19.46								
19	19.49-19.52								
17	19.55-19.58								
18	20.00-20.03								
15	20.05-20.08								

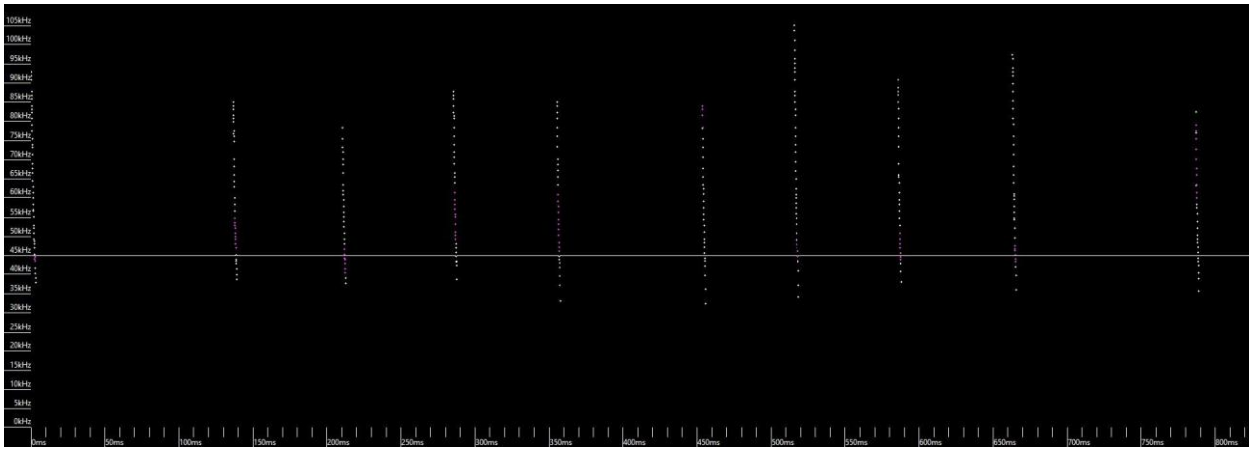
Appendix IV: Bat Sonograms



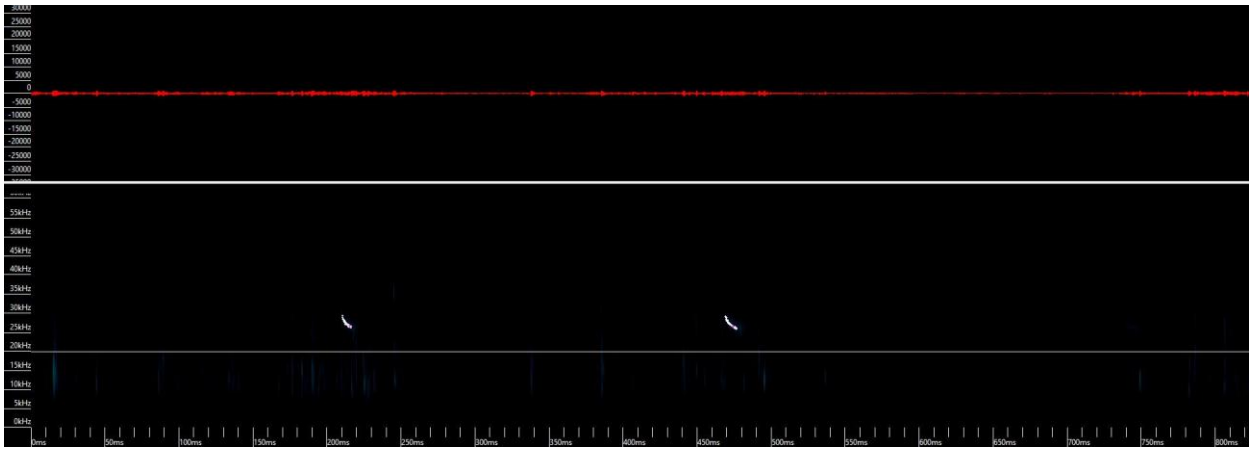
EPSE recorded at the site at 21.41 on 31/8/18



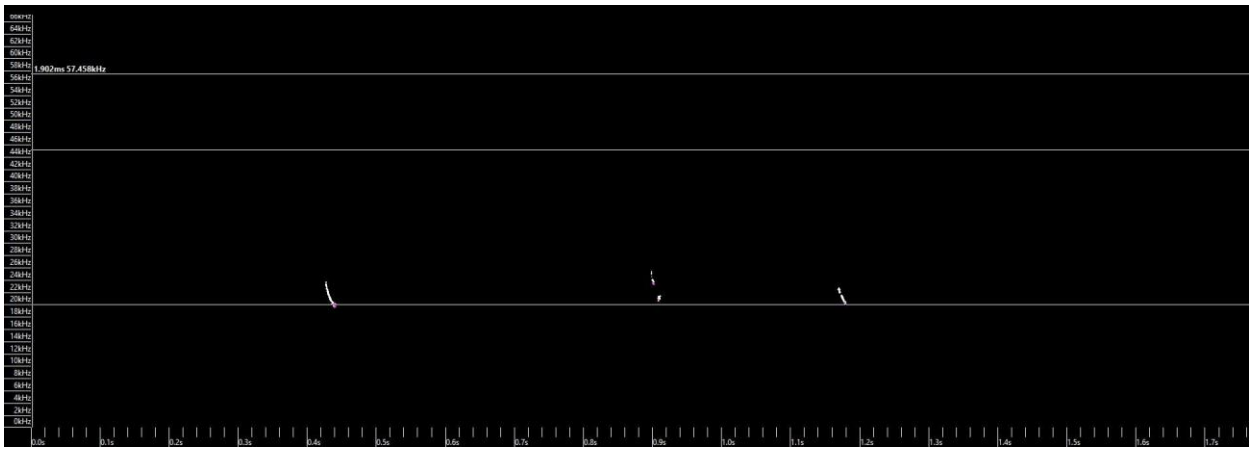
MYBR recorded at the site at 20.22 on 8/9/18



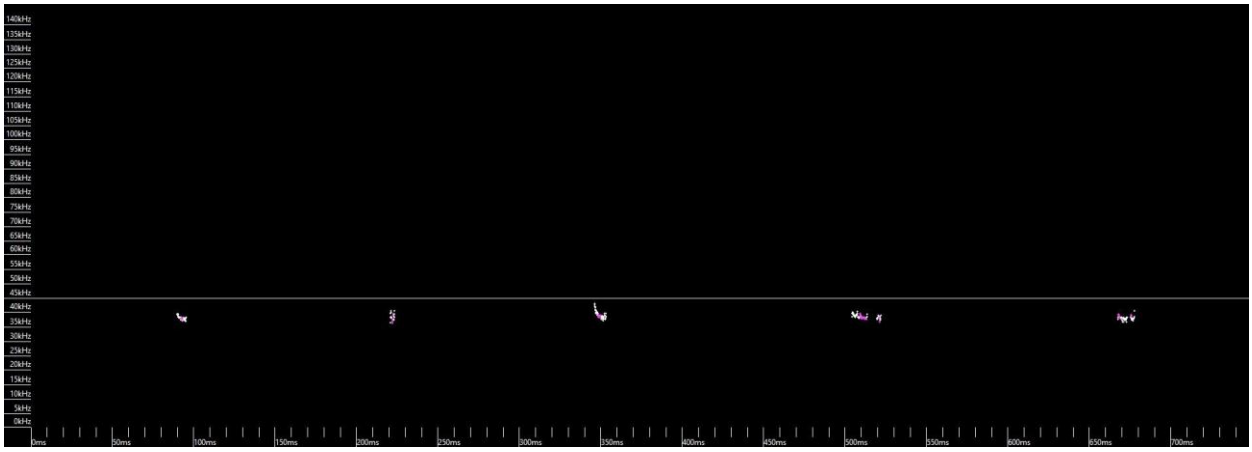
MYDA recorded at the site at 19.09 on 5/10/18



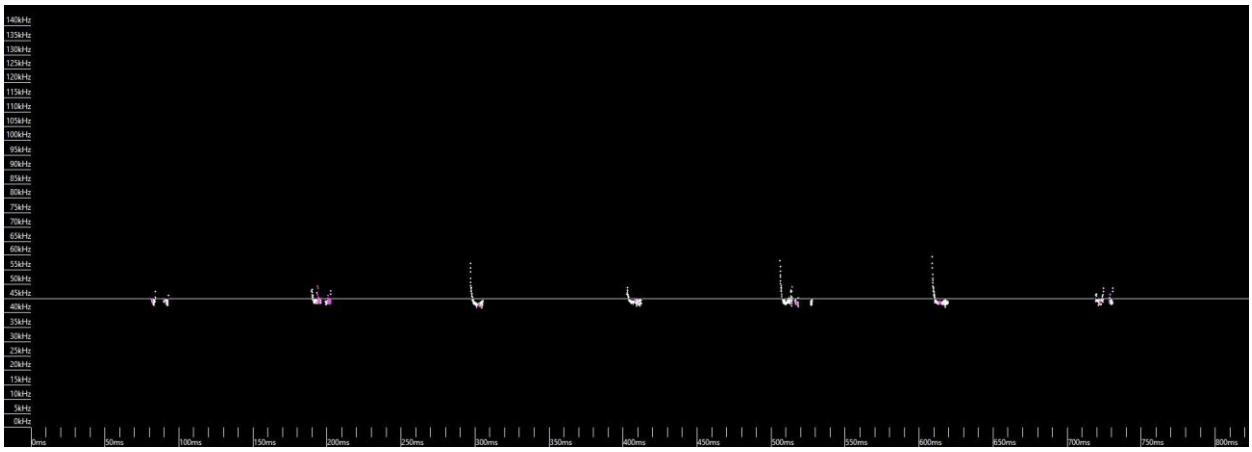
NYLE recorded at the site at 21.30 on 30/8/18



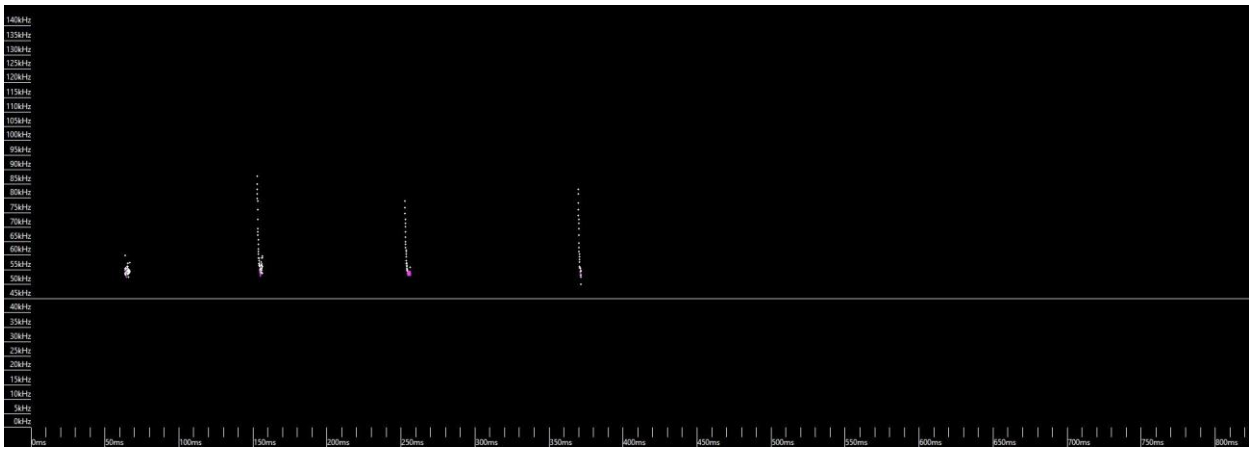
NYNO recorded at the site at 20.12 on 23/9/18



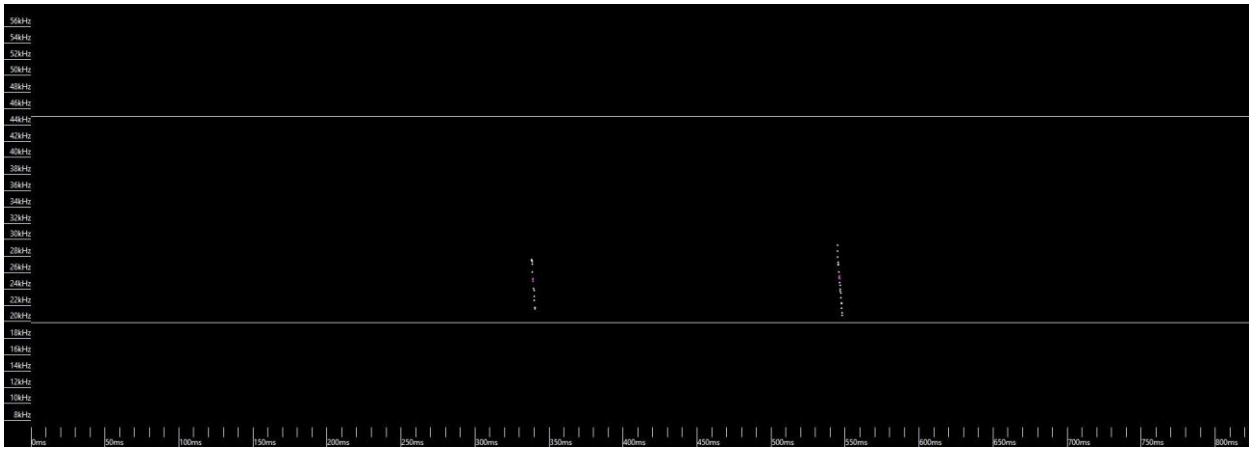
PINA recorded at the site at 21.46 on 7/9/18



PIPI recorded at the site at 21.44 on 3/9/18



PIPY recorded at the site at 20.40 on 1/9/18



PLAU recorded at the site at 20.56 on 21/9/18

Appendix V: Weather Data

Date	Temperature	Precipitation	Wind Direction and Speed
28.08.18	16°C	0	Easterly, less than 5 knots
29.08.18	15 °C	0	North westerly, less than 5 knots
30.08.18	15 °C	0	0
31.08.18	15 °C	0	North easterly, less than 10 knots
01.09.18	16 °C	0	North easterly, less than 10 knots
18.09.18	18	0	South westerly less than 5 knots
19.09.18	18	0	South westerly, less than 10 knots
20.09.18	19	0	Southerly, less than 20 knots
21.09.18	13	0	Westerly, less than 5 knots
22.09.18	12	0.5	North Easterly, less than 5 knots
03.10.18	15	0	Westerly, less than 5 knots
04.10.18	14	0	0
05.10.18	17	0	south westerly, less than 5 knots
06.10.18	9	0	North easterly, less than 10 knots
07.10.18	10	0	0

Temperature, precipitation and wind data at 21.00 were obtained from Davisworthing WOW Weather observation Station (approx. 4km east of site) as reported on Met Office Weather Observation Website: http://wow.metoffice.gov.uk/home [accessed 28/11/2018].

Appendix VI: Badger Survey Plan

Please see following page.

Land North West of Goring Station

- Mammal hole
- Mammal push-through
- Snufflehole
- Survey area

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0 0.07 0.14 Kilometers

N

UE ENVIRONMENTAL CONSULTING
Unit 5 Westergate Business Centre
Brighton
BN2 4QN

Scale	Date
1:3,500	Dec2018
Created by	Reviewed by
NP	NP

Drawing number
UE0284ECO-Badger181205

Appendix VII: Otter & Water Vole Survey Plan

Please see following pages.

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Land North West of Goring Station

- Burrow
- Burrow/footprints
- Feeding station
- Footprints
- Latrine
- Runway
- Survey area

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0 0.03 0.06 Kilometers

N

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Scale	Date
1:1,576	Dec2018
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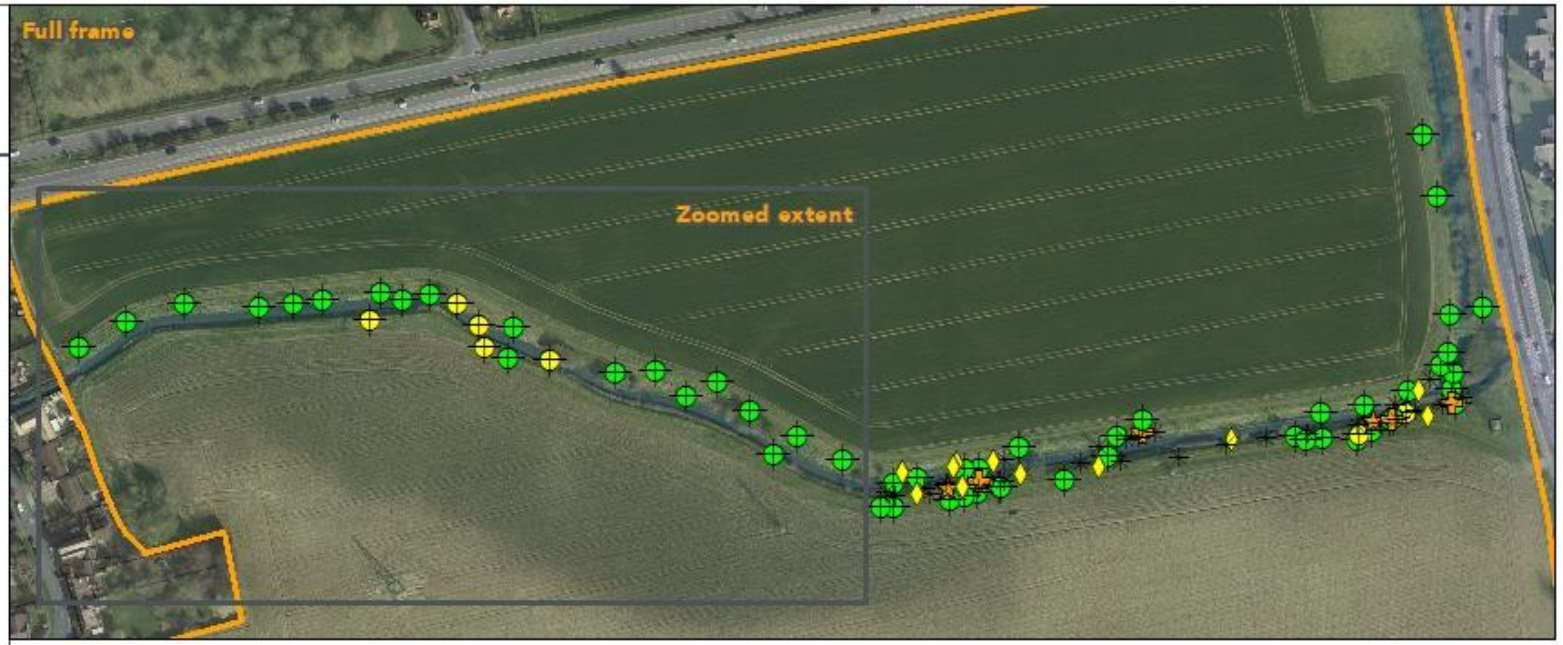
NP	NP

Drawing number
UE0284ECO-WV-Otter181205a

Land North West of Goring Station

- Burrow
- Burrow/footprints
- Feeding station
- Footprints
- Latrine
- Runway
- Survey area



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0 0.03 0.06 Kilometers

N

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Scale	Date
1:1,579	Dec2018
Created by	Reviewed by
NP	NP

Drawing number
UE0284ECO-WV-Otter181205b

Appendix VIII: Reptile Survey Plan

Please see following page.

Land North West of Goring Station

- Common lizard
- Slow worm
- Slow worm & Common lizard
- Reptile transect
- Survey area

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0 0.07 0.14 Kilometers

N

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Brighton
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Scale	Date
1:3,500	Dec2018
Created by	**Reviewed by**
NP	NP

Drawing number
UE0284ECO-Reptiles181205

Appendix IX: Plant Species which encourage Bats

Please see following pages which are drawn from Gunnell *et al*. (2012).

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Plant Species	Common name	Native	Type	Benefit	Soil	Light	Extensive green roofs	Living walls	Rain Gardens	Hedges/trees	Beds/borders
Acer campestre	Field maple	N	T/S	C	Any	Sun / shade				Y	
Acer platanoides	Norway maple		T	S	Well drained / alkaline	Sun / shade				Y	
Acer saccharum	Sugar maple		T	S	Any	Sun / shade				Y	
Achillea millefolium	Yarrow	N	HP	C,F	Well drained	Sun	Y				
Ajuga reptans	Bugle	N	HP	C,F	Any	Sun / shade	Y				
Anthyllis vulneraria	Kidney vetch	N	HP	F	Well drained	Sun	Y				
Aubrieta deltoidea	Aubrieta		H	F	Well drained	Sun / shade		Y			
Betula pendula	Silver birch	N	T	C	Sandy / Acid	Sun				Y	
Cardamine pratensis	Cuckoo-flower	N	HP	F	Moist	Sun / shade					Y
Carpinus betulus	Hornbeam	N	T	C	Clay	Sun				Y	
Centaurea nigra	Common knapweed	N	HP	C,F	Dry, not acid	Sun	Y				Y
Centranthus ruber	Red valerian		HP	F	Well drained / alkaline	Sun	Y				Y
Clematis vitalba	Old man's beard	N	C	F	Well drained / alkaline	Sun				Y	
Corylus avellana	Hazel	N	S	C	Any dry	Sun / shade		Y		Y	
Crataegus monogyna	Hawthorn	N	S	S,C	Any	Sun / shade				Y	
Daucus carota	Wild carrot	N	Bi	S,C,F	Any	Sun	Y				Y
Dianthus spp.	Pinks	N	A-Bi	F	Well drained	Sun	Y	Y			Y
Digitalis purpurea	Foxglove	N	Bi	C	Well drained	Shade / partial shade				Y	Y
Erica cineria	Bell heather	N	S	F	Sandy	Full sun					Y
Erysimum cheiri	Wallflower		Bi-P	F	Well drained	Sun		Y			
Eupatorium cannabinum	Hemp agrinomy	N	H	F	Moist	Sun / shade					Y
Fagus sylvatica	Beech	N	T	C,R	Well drained / alkaline	Sun / shade				Y	
Foeniculum vulgare	Fennel		H	F	Well drained	Sun					Y
Fraxinus excelsior	Common ash	N	T	C,R	Any	Sun / shade				Y	
Hebe spp.	Hebe species		S	F	Well drained	Sun / shade				Y	Y
Hedera helix	Ivy	N	C	F,C	Any	Sun / shade		Y		Y	Y
Hesperis matrionalis	Sweet rocket		H	F	Well drained / dry	Sun / shade					Y
Hyacinhoides non-scripta	Bluebell	N	B	F	Loam	Shade / partial shade		Y		Y	Y
Ilex aquifolium	Holly	N	T	C	Any	Sun / shade				Y	
Jasminum officinale	Common jasmine		C	F	Well drained	Sun		Y			Y
Lavandula spp.	Lavander species		S	F	Well drained / sandy	Sun		Y			Y
Linaria vulgaris	Toadflax	N	HP	C	Well drained / alkaline	Sun	Y				Y
Lonicera periclymenum	Honeysuckle	N	C	F	Well drained	Sun		Y		Y	
Lotus corniculatus	Bird's foot trefoil	N	HP	F	Well drained / dry	Sun	Y				Y
Lunaria annua	Honesty		Bi	F	Any	Sun / partial shade	Y				
Malus spp.	Apple		T	C	Any	Sun				Y	
Matthiola longipetala	Night-scented stock		A	F	Well drained/ moist	Sun			Y		
Myosotis spp.	forget-me-not	N	A	F	Any	Sun	Y	Y			
Nicotiania alata	Ornamental tobacco		A	F	Well drained/ moist	Sun / partial shade			Y		
Oenothera spp.	Evening primrose species		Bi	F	Well drained/ dry	Sun	Y				
Origanum vulgare	Marjoram	N	HP	F	Well drianed/ dry	Sun	Y	Y			
Populus alba	White poplar	N	T	C	Clay loam	Sun				Y	
Primula veris	Cowslip	N	HP	F	Well drained/moist	Sun / partial shade	Y				
Primula vulgaris	Primrose	N	HP	F	Moist	Partil shade	Y	Y		Y	
Prunus avium	Wild cherry	N	T	C	Any	Sun				Y	

Plant Species	Common name	Native	Type	Benefit	Soil	Light	Extensive green roofs	Living walls	Rain Gardens	Hedges/trees	Beds/borders
Prunus domestica	Plum		T	C	Well drained/ moist	Sun				Y	
Prunus spinosa	Blackthorn	N	S	C	Any	Sun / partial shade				Y	
Quercus petraea	Sessile oak	N	T	C,R	Sandy loam	Sun / shade				Y	
Quercus robur	Common oak	N	T	C,R	Clay loam	Sun / shade				Y	
Rosa canina	Dog rose	N	S	C	Any	Sun			Y	Y	
Salix spp.	Willow species	N	S	S,C	Moist	Sun / shade			Y	Y	
Sambucus nigra	Elder	N	T	C	Clay loam	Sun				Y	
Saponaria officinalis	Soapwort	N	HP	F	Any	Sun					
Saxifraga oppositifolia	Saxifrage	N	HP	C	Well drained	Sun	Y	Y			
Scabiosa columbaria	Small scabious	N	HP	F	Well drained/ alkaline	Sun	Y				
Sedum spectabile	Ice plant		HP	F	Well drained/ dry	Sun	Y				
Silene dioecia	Red campion	N	HP	F	Any	Shade / partial shade		Y	Y	Y	
Sorbus aucuparia	Rowan	N	T	C	Well drained	Sun				Y	
Stachys lanata	Lamb's ears		HP	F	Well drained/dry	Sun	Y				
Symphotrichum spp.	Michaelmas daisies		HP	F	Any	Sun					
Tegetes patula	French marigold		A	F	Well drained/moist	Sun					
Thymus serpyllum	Creeping thyme	N	HP/S	F	Well drained/dry	Sun	Y	Y			
Tilia x europaea	Common lime		Type	C	Any	Sun / shade				Y	
Trifolium spp.	Clover species	N	HP	F	Any	Sun	Y				
Veleriana spp.	Valerian species	N	HP	F	Moist	Sun / partial shade			Y		
Verbascum spp	Mulleins	N	Bi,HP	C	Well drained	Sun	Y				
Verbena bonariensis	Verbena		HP	F	Well drained/moist	Sun					
Viburnum lantana	Wayfaring tree	N	S	C	Any	Sun / shade				Y	
Viburnum opulus	Guelder rose	N	S	C	Moist	Sun / shade			Y	Y	
Viola tricolor	Pansy	N	A	F	Well drained/moist		Y	Y			

The table above is derived from the BCT publication Landscape and Urban Design for Bats and Biodiversity (Gunnell et al., 2012) and lists suggested plant species that can provide benefit for bats either by providing a food source for insects or roost potential. The plants listed are predominately native to Britain. The small group of non-native plants is included for their documented value for wildlife. This list has been checked against Natural England's list of invasive non-native plants.

HP: Herbaceous perennial		T: Tree		A: Annual		**Benefit:**					
Bi: Biennial		S: Shrub		B: Bulb		C: Moth caterpillar food plant		F: Flowers attract adult moths			
BiP: Biennial perennial		H: Herb		C: Creeper/climber		S: Sap sucking insects (e.g. whiteflies)		R: Good roost potential			

Appendix X: Ecological Mitigation Plan

Please see following page.

Land North West of Goring Station: Ecological Mitigation Plan

Ecological survey area

Trees with bat roost potential

- High
- Moderate

Reptiles

- Common lizard
- Slow worm
- Slow worm & Common lizard
- Reptile hibernacula

Water vole

- Burrow
- Burrow/footprints
- Feeding station
- Footprints
- Latrine
- Runway

10m water vole protection zone

0 100 200

Meters

N

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Scale: 1:3,000 **Created by:** NP

Date: Jul 2020 **Reviewed by:** NP

Drawing number:

UE0284ECO-EMP200723

URBAN EDGE ENVIRONMENTAL CONSULTING

Tel: 01273 686 766
Email: hello@ueec.co.uk
Web: www.ueec.co.uk

R16: New greenspaces sown with native wildflower meadow

R18: New wetlands sown with native marginal & aquatic plants

R5&R7: 10m bufer zone around Ferring Rife to protect water voles & feature of high value to foraging/commuting bats

R23: Bird nest boxes on new buildings

R24: Bat roost boxes on new buildings

R1: Trees suitable for roosting bats will be retained & protected

R8: Displacement of reptiles prior to landscape works

R17&R20: Hedgerow creation or restoration to use native fruit/seed/nut/nectar-bearing shrub species of local provenance. Buffers of less intensively managed tussocky grassland to be maintained alongside

R21: Hibernacula for reptiles, amphibians, invertebrates in areas of retained rough grassland & alongside hedgerows

103500

103000

510000

510500

Appendix XI: Legislation and Planning Context

Legislation

General

The main legislative instruments for ecological protection in England and Wales are the Wildlife and Countryside Act 1981 (WCA; as amended), Countryside and Rights of Way Act 2000 (CRoW; as amended), Natural Environment and Rural Communities Act 2006 (NERC) and the Conservation of Habitats and Species Regulations 2017 (the Habitats Regulations).

WCA 1981 consolidated and amended pre-existing national wildlife legislation in order to implement the Bern Convention and the Birds Directive. It complements the Habitats Regulations, offering protection to a wider range of species than the latter. The Act also provided for the designation and protection of nationally important conservation sites of value for their floral, faunal or geological features, termed Sites of Special Scientific Interest (SSSI). Schedules of the act list protected species of flora and fauna, as well as invasive species, and detail the possible offences that apply to these species.

The CROW Act 200 amended and strengthened existing wildlife legislation detailed in the WCA. It placed a duty on government departments and the National Assembly for Wales to have regard for biodiversity, provided increased powers for the protection and maintenance of SSSI, and created a right of access to parts of the countryside. The Act contained lists of habitats and species (Section 74) for which conservation measures should be promoted, in accordance with the recommendations of the Convention on Biological Diversity (Rio Earth Summit) 1992.

The NERC Act 2006 consolidated and replaced aspects of earlier legislation. Section 40 of the Act places a duty upon all local authorities and public bodies in England and Wales to promote and enhance biodiversity in all of their functions. Sections 41 (England) and 42 (Wales) list habitats and species of principal importance to the conservation of biodiversity (otherwise known as priority habitats/species as listed in the now superseded UK Biodiversity Action Plan). These lists supersede Section 74 of the CRoW Act 2000. These species and habitats are a material consideration in the planning process.

The Habitats Regulations 2017 consolidate and update the Conservation of Habitats and Species Regulations 2010 and all its various amendments. The Regulations are the principal means by which Council Directive 92/43/EEC (The Habitats Directive) is transposed into English and Welsh law, and place a duty upon the relevant authority of government to identify sites which are of importance to the habitats and species listed in Annexes I and II of the Habitats Directive. Those sites which meet the criteria are, in conjunction with the European Commission, designated as Sites of Community Importance, which are subsequently identified as Special Areas of Conservation (SAC) by the European Union member states.

The Habitats Regulations also place a duty upon the government to maintain a register of European protected sites designated as a result of Council Directive 2009/147/EC on the Conservation of Wild Birds (The Birds Directive). These sites are termed Special Protection Areas (SPA) and, in conjunction with SACs, form a network of sites known as Natura 2000. The Habitats Directive introduces for the first time for protected areas, the precautionary principle; that is that projects can only be permitted having ascertained no adverse effect on the integrity of the site. Projects may still be permitted if there are no alternatives, and there are imperative reasons of overriding public interest.

The Habitats Regulations also provide for the protection of individual species of fauna and flora of European conservation concern listed in Schedules 2 and 5 respectively (European Protected Species (EPS)). Schedule 2

includes species such as otter and great crested newt for which the UK population represents a significant proportion of the total European population. It is an offence to deliberately kill, injure, disturb or trade in these species. Schedule 5 plant species are protected from unlawful destruction, uprooting or trade under the regulations. Under the Habitats Regulations disturbance includes any activity which is likely to: impair the ability of a EPS to survive, breed, reproduce, or rear/nurture its young; impair the ability of a EPS to migrate or hibernate; or significantly affect the local distribution or abundance of the species.

Badgers (Meles meles)

Badgers are listed under Schedule 6 of the Wildlife and Countryside Act which grants them partial protection. This protection is extended by the Protection of Badgers Act 1992 (Badger Act) which makes it an offence to take, injure or kill a badger, interfere with a sett, sell or possess a live badger, or mark or ring a badger without a licence. Under the Act disturbance is illegal without a licence. Natural England has published guidelines to be adopted when determining whether an activity is 'disturbing' i.e. a licence is required when, for example, using heavy machinery (generally tracked vehicles) within 30m of any entrance to an active sett. Licences are not normally issued during the badger breeding season (December – June inclusive).

Bats (Chiroptera)

Bats and their roosts are fully protected by protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a bat.
- Possess or control a live or dead bat, any part of a bat, or anything derived from a bat.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a bat uses for shelter or protection. This is taken to mean all bat roosts whether bats are present or not.
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.
- Make a false statement in order to obtain a licence for bat work.

Birds

Birds are protected by the Wildlife and Countryside Act, 1981 (as amended). This legislation makes it an offence to intentionally kill, injure or take away any wild bird. It is also an offence to take, damage or destroy the nest of any wild bird while it is in use or being built or to take or destroy the egg of any wild bird. In addition, certain species are listed on Schedule 1 of the WCA (such as kingfisher *Alcedo atthis*). This makes it an additional offence to intentionally or recklessly disturb the adults while they are in and around their nest or intentionally or recklessly disturb their dependent young. Such species are considered to be in greater need of legal protection or of high nature conservation priority.

Birds of Conservation Concern ("BoCC4) are included on Red and Amber lists (Eaton *et al.*, 2015). Birds on the Red list are those of highest conservation priority due significant and sustained population decreases and/or range contractions (e.g. house sparrow *Passer domesticus* and starling *Sturnus vulgaris)*. Birds on the Amber list are the next most critical group and include species whose population/range have shown moderate declines, or which have recovered to some extent from historical decline, such as dunnock *Prunella modularis*.

Dormouse (Muscardinus avellanarius)

Dormouse is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*:

- Intentionally kill, injure or take a dormouse.
- Possess or control a live or dead dormouse, any part of, or anything derived from a dormouse.

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a dormouse uses for shelter or protection.
- Intentionally or recklessly disturb a dormouse while it is occupying a structure or place that it uses for shelter or protection.

Great crested newt (Triturus cristatus; GCN) (and natterjack toad Bufo calamita)

GCN is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a GCN (including its eggs).
- Possess or control a live or dead GCN, any part of, or anything derived from a GCN.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a GCN uses for shelter or protection.
- Intentionally or recklessly disturb a GCN while it is occupying a structure or place that it uses for shelter or protection.

Otter (Lutra lutra)

Otter is fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take an otter.
- Possess or control a live or dead otter, any part of, or anything derived from an otter.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that an otter uses for shelter or protection.
- Intentionally or recklessly disturb an otter while it is occupying a structure or place that it uses for shelter or protection.

Reptiles

The four common species (slow-worm *Anguis fragilis*, common lizard *Zootoca vivipara*, adder *Vipera berus* and grass snake *Natrix natrix*) are partially protected under the WCA. They are protected, *inter alia*, against intentional killing and injuring. The handling and translocation of these reptiles does not require a licence.

Smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis* are fully protected by the WCA and the Habitats Regulations. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a smooth snake or sand lizard.
- Possess or control a live or dead smooth snake or sand lizard, any part of, or anything derived from a smooth snake or sand lizard.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a smooth snake or sand lizard uses for shelter or protection.
- Intentionally or recklessly disturb a smooth snake or sand lizard while it is occupying a structure or place that it uses for shelter or protection.

Water vole (Arvicola amphibious)

Water vole is fully protected by the WCA. The legislation makes it an offence, *inter alia*, to:

- Intentionally kill, injure or take a water vole.
- Possess or control a live or dead water vole, any part of, or anything derived from a water vole.
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place that a water vole uses for shelter or protection.
- Intentionally or recklessly disturb a water vole while it is occupying a structure or place that it uses for shelter or protection.

Weeds Act 1959 / Ragwort Control Act 2003

This legislation provides for orders to be made for control where notifiable weed species such as ragwort are said to be a problem. The act does not make it illegal to have ragwort (or other weed species) on your land, make it illegal to allow ragwort to spread, or force landowners automatically to control it. However, if DEFRA is satisfied that there are injurious weeds to which this Act applies growing upon any land it may serve upon the occupier of the land a notice in writing requiring them, within the time specified in the notice, to take such action as may be necessary to prevent the weeds from spreading.

Planning context

National Planning Policy Framework (Section 15: Conserving and enhancing the natural environment)

The National Planning Policy Framework (NPPF), published in February 2019, outlines the Government's commitment to the conservation of wildlife and natural features. It is concerned with:

- *Protecting and enhancing valued landscapes, sites of biodiversity or geological conservation value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*
- *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;*
- *Maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*
- *Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current & future pressures;*
- *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*
- *Remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

The NPPF requires that local plans should distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scape across local authority boundaries.

To protect and enhance biodiversity and geodiversity, the NPPF states that planning policies should:

- *Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and*
- *Promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.*

When determining planning applications, local planning authorities should aim to protect and enhance biodiversity by applying the following principles:

- *if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*
- *development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;*
- *development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*
- *development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.*

The following wildlife sites should be given the same protection as habitats sites:

- *potential Special Protection Areas and possible Special Areas of Conservation;*
- *listed or proposed Ramsar sites; and*
- *sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.*

The presumption in favour of sustainable development does not apply where development requiring appropriate assessment because of its potential impact on a habitats site is being planned or determined. The policies within the NPPF (and additional guidance contained within Circular 06/2005) are a material planning consideration.

UK/Local Biodiversity Action Plan Designations and Birds of Conservation Concern and Red Data Book Listings

Note that BAP designations and status as RSPB Birds of Conservation Concern or Red Data Book species does not offer any further legal protection, but planning authorities are required to prevent these species from being adversely affected by development in accordance with National Planning Policy and the CROW and NERC Acts.

The United Kingdom Biodiversity Action Plan (UKBAP), first published in 1994 and updated in 2007, was a government initiative designed to implement the requirements of the Convention of Biological Diversity to conserve and enhance species and habitats. The UKBAP contained a list of priority habitats and species of conservation concern in the UK, and outlined biodiversity initiatives designed to enhance their conservation status.

However, as a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK BAP is now focussed at a country-level rather than a UK-level, and the UK BAP was succeeded by the 'UK Post-2010 Biodiversity Framework' in July 2012. The UK lists of priority habitats and species nonetheless remain an important reference source and were used to draw up statutory lists of priority habitats and species in England, Northern Ireland, Scotland and Wales. The priority habitats and species correlate with those listed on Section 41 and 42 of the NERC Act.

The UKBAP required that conservation of biodiversity be addressed at a County level through the production of Local BAPs. These are targeted towards species of conservation concern characteristic of each area. In addition, a number of local authorities and large organisations have produced their own BAPs. Where they exist, Local BAP targets with regard to species and habitats are a material consideration in the planning process.

Appendix XII: Legal and Technical Limitations

- This report has been prepared by Urban Edge Environmental Consulting Ltd (UEEC Ltd) with all reasonable skill, care and diligence within the terms of the contract made with the Client to undertake this work, and taking into account the information made available by the Client. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by us.
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- The advice provided in this report does not constitute legal advice. As such, the services of lawyers may also be considered to be warranted.
- Unless otherwise stated in this report, the assessments made assume that the sites and facilities that have been considered in this report will continue to be used for their current planned purpose without significant change.
- All work carried out in preparing this report has utilised and is based upon UEEC Ltd's current professional knowledge and understanding of current relevant UK standards and codes, technology and legislation. Changes in this legislation and guidance may occur at any time in the future and may cause any conclusions to become inappropriate or incorrect. UEEC Ltd does not accept responsibility for advising the Client or other interested parties of the facts or implications of any such changes;
- Where this report presents or relies upon the findings of ecological field surveys (including habitat, botanical or protected/notable species surveys), its conclusions should not be relied upon for longer than a maximum period of two years from the date of the original field surveys. Ecological change (e.g. colonisation of a site by a protected species) can occur rapidly and this limitation is not intended to imply that a likely absence of, for instance, a protected species will persist for any period of time;
- This report has been prepared using factual information contained in maps and documents prepared by others. No responsibility can be accepted by UEEC Ltd for the accuracy of such information;
- Every effort has been made to accurately represent the location of mapped features, however, the precise locations of features should not be relied upon;
- Populations of animals and plants are often transient in nature and a single survey visit can only provide a general indication of species present on site. Time of year when the survey was carried out, weather conditions and other variables will influence the results of an ecological survey (e.g. it is possible that some flowering plant species which flower at other times of the year were not observed). Every effort has been made to accurately note indicators of presence of protected, rare and notable species within and adjacent to the site but the possibility nonetheless exists for other species to be present which were not recorded or otherwise indicated by the survey;
- Any works undertaken as a consequence of the recommendations provided within this report should be subjected to the necessary health & safety checks and full risk assessments.

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