Ecological Impact Assessment
and
Biodiversity Net Gain Assessment

Brook Farm, Daws Heath, Hadleigh, Essex

On Behalf of:

Countryside Partnerships

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Site assessments / surveys (where required) have been restricted to a level of detail required to achieve the stated objectives of the work.

Due to the temporal nature of ecology, the findings of this report should not be relied upon if a significant amount of time has passed, as defined by the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines.

Executive Summary

1. This report presents the findings and recommendations of ecological surveys undertaken on behalf of Countryside Partnerships for Land at Brook Farm, Daws Heath, Hadleigh, Essex. The proposal for the site is for residential development of 173 dwellings with associated landscape and access infrastructure.

2. The site was approximately 18.9ha in extent and comprised mainly of improved grassland fields used for horse paddocks bordered by hedgerows. Also within the site were scattered trees, dense scrub and ponds. A residential building and farm buildings were present in the southwest corner. Residential development associated with Daws Heath lies to the north, Great Wood and Dodd's Grove Site Special of Scientific Interest (SSSI) lies to the south, Pound Wood Local Wildlife Site (LWS) to the north. The wider landscape consists of urban developments with a mosaic of farmland and woodland.

3. The site falls within the ZoI of Benfleet and Southend Marshes SPA and Ramsar which form part of the Essex Estuaries SAC and is within the Natural England SSSI Impact Risk Zone (IRZ) for residential development of 100+ units. The site is located adjacent to a network of statutory and non-statutory designated sites which are characterised by ancient woodland and species rich grassland including Great Wood and Dodd's Grove SSSI immediately adjacent to the southern boundary, Garrold's Meadow SSSI to the northeast and Pound Wood LWS to the north. Likely impacts in the absence of mitigation include direct effects during the construction and operational phase for nearby SSSIs and LNR, damage or loss of functionally linked land, air and water quality effects, disturbance (activity, noise and lighting), increases in recreational pressure and introduction of non-native invasive species. A CEMP will be required to avoid and mitigate impacts during construction. A suitable sustainable drainage strategy will also be necessary for both the construction and operational phases. Potential recreational impacts will be mitigated via a financial contribution per dwelling to the Essex RAMs, in tandem with provision of on-site semi-natural open space with circular walking routes, promotion of suitable offsite walking routes to new residents, buffering of adjacent SSSI and LWS by 15-20m at minimum, a sensitive lighting scheme, and access management/educational measures (including information boards and welcome packs).

4. Habitats of ecological value on site include the network of species rich hedgerows, trees, ditches and ponds. In general, these habitats were associated with the boundaries of the site and were also of greatest value to associated protected and notable species including; badger, bats, birds, hazel dormice, notable invertebrates (cinnabar moth and heath fritillary), reptiles, harvest mouse, common toad, pole cat and hedgehog. The great majority of the site was however occupied by improved grassland of relatively low ecological value.

5. Due to the relatively low ecological value of the majority of existing habitat on site, it was possible to demonstrate that a measurable biodiversity net gain is achievable post-development through sensitive landscape design, using the latest DEFRA Biodiversity Net Gain Metric. The site is valued as a connecting landscape providing substantial opportunity for ecological enhancements and a positive contribution towards local ecological networks. The landscaping scheme has been designed to be beneficial to the notable features/species associated with the adjacent SSSIs and LWS. Key measures include the enhancement and buffering of retained hedgerows, creation of new hedgerows, creation of 'stepping stone' habitats such as patches of scrub to increase connectivity, and planting of species rich wildflower meadows. Further enhancements will include re-profiling the banks of ponds to increase structural diversity and planting of marginal vegetation, SUDs designed and managed for biodiversity with marginal vegetation and wetland species rich grassland, creation of a traditional orchard and additional native tree planting. These enhancements will be delivered as part of a long-term management plan set out within a LEMP.

6. Badger setts including a main sett were identified on site, a number of which are likely to be impacted to facilitate the development. Mitigation works will be required under a Natural England issued licence. Standard precautionary techniques will be implemented to avoid harm during construction and implemented through a CEMP. Additional areas within the POS will be allocated to deliver habitat enhancements for badger and managed as part of a long-term management plan to mitigate for the loss of foraging habitat.

7. The presence of hazel dormice was identified on site and given the loss of suitable nesting habitat (hedgerows) a EPSM Licence will be required to enable vegetation clearance. Mitigation during construction will include retained vegetation being protected with suitable fencing and a sensitive lighting strategy, implemented through a CEMP. Mitigation will also include new species rich hedgerow planting to achieve a no net loss and will increase connectivity with offsite populations at Belfair's Wood LNR/Great Wood and Dodd's Grove SSSI.

8. Through implementing the recommended mitigation and enhancements, it is considered that all significant negative impacts as a result of the proposed development upon protected and notable habitats and species will be fully mitigated in line with relevant wildlife legislation and national and local planning policies related to biodiversity.

Contents

Appendices

1.0 Introduction

1.1 Southern Ecological Solutions Ltd. (SES) were commissioned by Countryside Partnerships to undertake an Ecological Impact Assessment (EcIA) at the proposed development site at the Land at Brook Farm, Daws Heath, Hadleigh, Essex (the site). The site is located centrally at Ordnance Survey Grid Reference TQ 81588 88318 and is approximately 18.9ha in extent. The site location plan can be found in Appendix 1.

1.2 This report presents the findings and recommendations of ecological surveys undertaken to inform the planning application for the construction of a residential development of 173 new dwellings including public open space, landscaping, drainage, parking, servicing, utilities and all associated infrastructure. The site was allocated within the 2019 Draft Local Plan for Castle Point Borough Council (CPBC), however this was subsequently withdrawn following examination in 2022. Work on a new local plan is underway but until that point saved policies will apply from the current Local Plan (CPBC, 1998).

1.3 The site comprised mainly of improved grassland fields used for horse paddocks bordered by hedgerows. Also within the site were scattered trees, dense scrub and ponds. A residential building and farm buildings were present in the southwest corner. Residential development associated with Daws Heath lies to the north, Great Wood and Dodds Grove Site Special of Scientific Interest (SSSI) lie to the south, and Pound Wood Local Wildlife Site (LWS) to the north. The wider landscape consists of urban developments with a mosaic of farmland and woodland.

1.4 Previous ecological surveys of the site were undertaken in 2015 by SES. Due to the time elapsed since the initial survey work, an updated ecological assessment was considered to be necessary to assess any changes in the ecology of the site, to support the planning application and allow for appropriate mitigation measures to be recommended.

1.5 The updated Phase 1 habitat survey was conducted in April 2022 by SES. This survey aimed to:

- Map the main ecological features within the site and compile a plant species list for each habitat type
- Make an updated assessment of the presence or likely absence of species of conservation concern
- Identify any legal and planning policy constraints relevant to nature conservation which may affect the development (see Appendix 2)
- Determine any potential further ecological issues
- Determine the need for further surveys and mitigation; and
- Make recommendations for minimising impacts on biodiversity and providing net gains in biodiversity where possible in accordance with Chapter 15: *Conserving and Enhancing the Natural Environment*, of the National Planning Policy Framework (MHCLG, 2021), relevant saved policies of the currently adopted local plan (CPBC, 1998), the withdrawn draft Local Plan and relevant nature conservation policies.

1.6 The following phase 2 surveys were completed in 2022:

- Badger *meles meles* scoping and monitoring surveys
- Bat - tree ground level tree assessment; buildings assessment; activity survey; static survey
- Bird - Wintering and breeding bird surveys
- Great crested newt (GCN) *Triturus cristatus* - eDNA survey
- Hazel dormouse *Muscardinus avellanarius* survey
- Invertebrate survey
- Reptile presence and likely absence survey

1.7 This report sets out the results of the surveys. Features are evaluated using the evidence from the desk study, field surveys and relevant literature. A Shadow Habitats Regulation Assessment (HRA) (SES, 2022) was also

prepared by SES to support the planning application, this should be read in conjunction with the current document. The proposals for development are set out and the impacts on features are assessed. Mitigation proposals in relation to legal and planning policy obligations and suitable enhancements to be implemented are discussed, allowing likely residual effects to be determined.

2.0 Methods

2.1 The approach taken follows guidance and methods as prescribed by the Chartered Institute for Ecology and Environmental Management (CIEEM), specifically the Guidelines for Ecological Appraisal 2nd edition (2017) and the Guidelines for Ecological Impact Assessment (2019). Following these methods, a baseline of rare and/or noted ecological receptors (species and habitats) was established and valued. Predicted significant impacts upon these receptors and constraints and opportunities have then been identified. This stepwise assessment process has informed proposed mitigation and enhancement measures. Phase 2 ecological surveys were conducted to fully inform the predicted impacts of the scheme in accordance with the National Planning Policy Framework (NPPF) (MHCLG, 2021), relevant saved policies within the currently adopted local plan (CPBC, 1998), the withdrawn draft Local Plan and relevant wildlife legislation as summarised in Appendix 2.

2.2 CIEEM guidelines for Ecological Assessment in the United Kingdom (2019) have been utilised to assess the impacts upon habitats within the zone of influence of the site. CIEEM suggests that it is best to use the geographical scale (i.e., international, national, regional etc.) at which a feature (i.e. a habitat, species or other ecological resource) may or may not be important as the appropriate measure of value. As such, data from the data search, extended Phase 1 Habitat survey and subsequent species-specific surveys has been reviewed and the likely occurrence of protected and notable species/species groups assessed. This has allowed predictions of impacts to be made along with recommendations for mitigation, compensation and enhancement.

2.3 The following geographical scale categories are considered appropriate:

- International
- National (*i.e.* England)
- Regional (East of England)
- County (Essex)
- District (Castle Point)
- Local or Parish (Hadleigh)
- Within the site or zone of influence only

Desk Study

2.4 SES commissioned a data search for records of protected and notable species from Essex Environmental Records Centre (EERC). The data search encompassed the study area, and up to 2km from the boundary. This data was received in May 2022.

2.5 Hazel dormouse records were also sought from the National Biodiversity Network (NBN) Atlas www.nbnatlas.org, which holds data from the People's Trust for Endangered Species (PTES). As dormouse are particularly under-recorded, the data search for this species encompassed an area of up to 10km from the site boundary.

2.6 A web-based search was undertaken for national statutory designated sites via the Multi Agency Geographic Information for the Countryside (MAGIC) spatial data resource www.magic.gov.uk was undertaken in April 2022 (5km from the site boundary). MAGIC was also used to view the network of public footpaths links in the vicinity of the site.

2.7 SES also requested details of non-statutory designated sites within 2km of the site boundary from EERC. This data was received in May 2022.

2.8 Maps of the site and wider area, using the MAGIC online spatial data resource and aerial photographs on Google Earth (Google Inc., 2011), were examined to determine the possible habitats present on and adjacent to the area of assessment and their context in the surrounding landscape, searching in particular for waterbodies (within

250m of the site boundary), watercourses and other landscape features that may be of ecological significance to protected species, notably great crested newt and mobile species such as bats and birds.

2.9 In addition, the Natural England Essex GCN Risk Zones map, developed for the Essex GCN district licensing scheme, was referred to in order to determine the likelihood of great crested newt presence within the local landscape.

Extended Phase 1 Habitat Survey

2.10 An extended Phase 1 habitat survey was carried out on 20 April 2022 by suitably qualified ecologist Pete Scott-Norris BSc (Hons). This is a standard technique for obtaining baseline ecological information for areas of land, including proposed development sites. Phase 1 Habitat Survey methods are set out in the *Handbook for Phase 1 Habitat Survey* (Joint Nature Conservation Committee (JNCC), 2010). Habitat mapping was undertaken using the standard classification to indicate habitat types.

2.11 The dominant and readily identifiable higher plant species identified in each of the various habitat parcels were recorded and their abundances assessed on the DAFOR scale:

- D - Dominant
- A - Abundant
- F - Frequent
- O - Occasional
- R - Rare

2.12 These scores represent the abundance within the defined area only and do not reflect national or regional abundances. Plant species nomenclature follows Stace (2019).

2.13 All impacts upon ecological features have been considered for the purposes of this survey following industry best practice guidance. Only relevant protected and notable species have been discussed within this report to keep its contents concise and relevant to the works being undertaken and for ease of application.

Biodiversity Net Gain (BNG)

BNG Assessment

2.14 A biodiversity net gain calculation was undertaken using the DEFRA metric 3.1 (Excel spreadsheet). This uses data on existing and proposed habitat areas. The calculator uses the UK Habitat classification system (Butcher *et al,* 2020), therefore, habitats as recorded onsite using the JNCC Phase 1 methodology were translated into the relevant habitat type under the UK Habitat Classification system. Once assigned a classification, the habitat areas are split between linear features, such as hedgerows, which are measured in kilometres (km) and non-linear habitats, which are measured in hectares (Ha). The measurements for these features are entered into the calculator along with other factors to calculate losses and gains within the DEFRA metric. These other key factors include:

- ***Distinctiveness*** - Each habitat in the UK Habitat Classification is automatically assigned a score for distinctiveness within the metric. Distinctiveness recognises the different characteristics of habitats in relation to their capacity for supporting species richness, their tendency to support species found rarely in other habitats, and the rarity of the habitat itself.
- ***Condition*** - The condition of each habitat is assessed separately using the methods set out in the Biodiversity Metric 3.1: Technical Supplement (Natural England, 2022). This approach details condition criteria for each habitat type, and then applies thresholds for how many of these criteria are met to establish the condition score. The condition score ranges between good, moderate, poor, or not

applicable. This latter category is given to habitats with a very low distinctiveness and/or features associated with agriculture.

- ***Strategic significance*** - This element is to assess the habitats on site in relation to the geographical location in which they are found. Information to determine the significance of a habitat within a specific landscape can be found in a variety of sources that include: local plans, local biodiversity records and National Character Areas. The strategic significance is based on three categories which equates to a different score, which are as follows: High – 1.15; Medium – 1.1 and Low - 1.

2.15 Calculations were undertaken by Chris Kelly MSc BSc (Hons). The Phase 1 habitat map was used to calculate existing linear and non-linear habitat areas and mapped using QGIS. Condition assessments for the baseline habitats were conducted by Pete Scott-Norris BSc (Hons) on the 17 and 18 May 2022. Proposed habitat areas were calculated from the Landscape Masterplan (Appendix 1) and mapped using QGIS.

Protected and Notable Species

Badger

Preliminary Assessment

2.16 An initial assessment was undertaken on 1st May 2015 by SES to identify areas that might be used by badger *Meles meles* for foraging, commuting and sett creation, such as earth banks, woodland, hedgerows and rough grassland. An updated survey was conducted on 20 May 2022 by SES. This assessment also included the recording of signs such paths, hairs, latrines and setts. The survey area comprised the red line as shown in Appendix 1) and within 30m of this boundary where open access was available.

Badger Monitoring

2.17 A likely main badger sett, one subsidiary and six outliers were identified on site, therefore monitoring of the setts for activity and to characterise the setts over a period of 21 days was conducted from the 24 May 2022 until the 15 June 2022. This was undertaken using guidance issued by Natural England and Department for Environment and Rural Affairs (2015); detailed methodology is provided in Appendix 3.

Bats

Preliminary Assessment

2.18 The site was initially assessed for its suitability to support roosting, foraging and commuting bats in 2015 by SES. An updated assessment was conducted by SES on the 10th May 2022. Habitats were assessed for suitability for bats using guidelines issued by the Bat Conservation Trust (Collins, 2016); detailed methodology is provided in Appendix 3.

2.19 All trees and buildings within and directly adjacent to the development site (red line area) were subject to detailed assessment from ground level external inspections to determine their suitability for roosting bats.

Ground Level Tree Assessment

2.20 Based on the updated site assessment an updated ground level tree assessment was conducted on the 24tMay 2022. The survey was conducted using guidelines issued by the Bat Conservation Trust (Collins, 2016); detailed methodology is provided in Appendix 3.

Activity Surveys

2.21 Bat activity surveys along transects were conducted in 2015 by SES. Updated bat activity transects were conducted once a month from April 2022 until October 2022 by experienced ecologists following best practice guidance (Collins, 2016) for a site of moderate suitability, see Appendix 3 for full methodology.

Automated Surveys

2.22 Automated bat surveys were conducted in parallel with the activity surveys in 2015 by SES. These surveys were repeated in 2022 from April until October 2022. Survey design was based on BCT guidelines (Collins, 2016). Static bat detectors are used to record bat activity over five consecutive nights per month between April and October at various locations within the site (see Appendix 3 for full methodology).

Birds

Preliminary Assessment

2.23 The site was assessed for its potential to support breeding birds and significant wintering and/or migratory bird populations. Suitable habitat generally includes scrub, hedgerows and trees and can also include buildings, open grassland, open water and piles of debris.

Breeding Bird Surveys

2.24 Breeding bird surveys were conducted in 2015 by SES. An update of these surveys was completed in 2022 using a cut-down version of the standard Common Bird Census (CBC) methodology, devised by the British Trust for Ornithology (BTO Marchant 1983, Bibby et al 1992). Four visits were carried out from April to June 2022; a full methodology can be found in Appendix 3.

Wintering Bird Surveys

2.25 A wintering bird survey was undertaken by SES from December 2021 to February 2022 visiting the site four times. The survey followed a modified version of wintering bird monitoring methods given in Gilbert et al. (1998), the methodology can be found in Appendix 3.

Great Crested Newt

Preliminary Assessment

2.26 Aquatic habitats on and within 250m of the site (where accessible) were assessed for their suitability to support breeding great crested newt (as well as other amphibians) using the Habitat Suitability Index (HSI). Further detail on the HSI method is provided in Appendix 3.

2.27 Terrestrial habitats on site were also assessed for their suitability for great crested newt as part of the extended Phase 1 survey. Suitable terrestrial habitat generally includes rough grassland and woodland where they can forage and hibernate, with good links to the ponds where they breed.

eDNA survey

2.28 A previous presence / likely absence Great Crested Newt (GCN) survey was undertaken during spring 2015 by SES following published guidance (English Nature, 2001). Due to the time elapsed since the previous presence/likely absence survey was conducted and given that the site lies within an Amber Risk Zone (Essex) for GCN, an updated survey was considered to be required as any local population of GCN could potentially have colonised this pond in the intervening period.

2.29 eDNA surveys were conducted for onsite ponds and ponds within 250m of the site where access was permitted on the 20 May 2022 in accordance with the Natural England technical advice note (2014). Further detail on the eDNA sampling method is provided in Appendix 3.

Hazel Dormice

Preliminary Assessment

2.30 Habitats on site were assessed for their potential to support populations of hazel dormice. This species generally uses areas of dense woody vegetation and are more likely to be found where there is a wide diversity of woody species contributing to a three-dimensional habitat structure, a variety of food sources, plants suitable for nest-building materials and habitat connectivity.

Presence / likely absence Survey

2.31 In 2015 SES conducted dormouse nest tube surveys, form April – October following best practice guidance from Bright *et al*. (2006) and Natural England's Interim Advice Note: Dormouse surveys for mitigation licensing, best practice and common misconceptions (Natural England, 2011).. An update dormouse nest tube survey was undertaken by SES between May 2022-September 2022. One hundred tubes were placed within suitable habitat (hedgerow, woodland edge and scrub) within and directly adjoining the site red line boundary and checked on a monthly basis through the survey period. Detailed methods are provided in Appendix 3..

Hedgerows

2.32 A hedgerow survey was undertaken in 2015 by SES. An update of this survey was conducted SES in May 2022, to assess the importance of the hedgerows on site, in accordance with the Wildlife and Landscape criteria of the Hedgerow Regulations 1997 (HMSO, 1997), see Appendix 3 for full methodology and Appendix 1 for proposed site layout.

Invertebrates

Preliminary Assessment

2.33 The site was assessed for its potential to support rare or notable invertebrate species. This assessment was made on the basis of the habitats present and their structural complexity and diversity, giving particular consideration to rare and notable species recorded in the local vicinity.

Invertebrate Survey

2.34 In 2015 a series of detailed surveys were conducted by Dr Graham Hopkins FRES on behalf of SES. An update of these surveys were conducted in 2022. Four sampling visits were undertaken on 14 May, 10 June, 07 July and 28 September 2022 by Dr Graham Hopkins FRES with identifications made by him and Dr J.I Thacker.

2.35 The broad sampling protocol followed the protocols relevant to the Invertebrate Species-habitat Information Service (ISIS) of Natural England as described by Drake et al. (2007) and consistent with the proposals of English Nature (2005). Sampling was undertaken at six sampling stations for terrestrial species on each visit, with a 40-minute timed sample, using a combination of hand searching and sweep netting. Incidental recording was also undertaken across the site on each visit. The sampling covers the range of habitats at a station, and these were selected on the basis of the high quality of the habitat as judged visually and also the presence of habitat transitions. These stations were also located where surveys were undertaken in 2015.

2.36 The data was analysed using the Pantheon package (Webb et al., 2018) and the Colin Plant Associates (2006) criteria used as the basis for site evaluation. Species of conservation concern are referred to as either Nationally

Scarce (mostly defined as species in <100 10-grid squares nationally) or NERC Act priority species (S41). The species of conservation concern were identified via a manual screening of records against recent species status reviews, which in practice downgrades the status of a small number of species compared to those identified by Pantheon. Further survey and analysis methods can be found in Appendix 3.

Otter & water vole

2.37 During the update extended Phase 1 survey the site was assessed for its suitability to support otter and water vole. Otters have been recorded exploiting virtually all types of water and waterways in the UK and can be found on still waters (canals, lakes, ponds and reservoirs) as well as rivers and streams of all sizes. Suitable sites must have an abundant supply of food (normally associated with high water quality), together with suitable habitat, such as vegetated river banks, islands, reedbeds and woodland, which are used for foraging, breeding and resting. Water voles will inhabit most open water and wetland habitats including streams, canals, wet ditches and ponds however they do require certain characteristics to thrive. These include slow-flowing waters around 1m deep, steep earth banks to create burrows, and tall herbaceous vegetation to provide food and cover from predators

Reptiles

Preliminary Assessment

2.38 The site was assessed for its suitability for the four widespread reptile species; common lizard *Zootoca vivipara*, slow-worm *Anguis fragilis*, grass snake *Natrix helvetica* and adder *Vipera berus*. Specific habitat requirements vary between species. Common lizards favour rough grassland, however they can be found in a variety of habitats ranging from woodland glades to walls and pastures. Slow-worms use similar habitats to common lizards and are often found in gardens and derelict land. Grass snakes have similar habitat requirements to common lizards but have a greater reliance on ponds and wetlands where they hunt amphibians. Adders occupy areas of rough, open countryside and are often associated with woodland edge habitats.

Presence/likely absence survey

2.39 In 2015 a seven-visit presence and likely absence survey was undertaken for reptile species during spring / summer / autumn.

2.40 An update of these surveys was conducted from May to June 2022. Survey methods followed best practice guidance (Froglife, 1999 and Gent & Gibson, 2003). See Appendix 3 for full methodology.

Other Priority Species

2.41 The update extended Phase 1 survey identified habitats on site with potential to support NERC Act 2006 species of principal importance which are likely to occur in the local area, including hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus*, harvest mouse *Micromys minutus*, polecat *Mustela putorius* and common toad *Bufo bufo*. During the course of the 2015 surveys incidental sightings of NERC Act 2006 species of principal importance were also recorded and were reported. During the course of the update surveys in 2022 incidental sightings of any of these species were also recorded and are reported.

Constraints

2.42 Desktop data searches are a valuable tool in evaluating a site's potential to hold rare and protected species, they are not however an absolute in confirming presence or absence of notable species due to the nature of how the records are collected.

2.43 During the update ground level tree assessment it was not possible to fully inspect 21 of the trees with previously recorded suitable features from the ground due as access on neighbouring land was not permitted at the time of the site visit or because of the size of the tree possibly obscuring features. It was considered that this did not significantly constrain the assessment as these trees will be retained as part of the development and precautionary measures such as sensitive lighting delivered through a LEMP will mitigate for any potential impacts.

2.44 Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by SES for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

2.45 Whilst six of the 12 ponds within 250m of the proposed development site could not be surveyed, the absence of GCN within the remaining six ponds that were surveyed and the lack of records from the past 10 years in the local vicinity (2km radius), together are considered to provide sufficient confidence that GCN are likely absent from site and the surrounding area. Furthermore, research undertaken by Cresswell (2004), indicates it is most common to encounter great crested newts within 50m of a breeding pond, with few moving further than 100m – unless significant linear features are involved, when great crested newts can be encountered at distances of between 150m – and 200m. At distances greater than 200m-250m, great crested newts are hardly ever encountered. As such, it is considered unlikely that a population of GCN has established onsite or within 250m of site within the interim period since 2015 given the habitats onsite and surrounding area have remained largely consistent and there are now fewer aquatic habitats available. As such, this was not considered a significant constraint.

3.0 Baseline Ecological Conditions

Designated Sites

3.1 There were four European designated sites, all coastal, located within 13km from the site. These included Benfleet and Southend Marshes SPA and Ramsar, Essex Estuaries Special Area of Conservation (SAC), Crouch and Roach Estuaries SPA/ Ramsar; and Thames Estuary and Marshes SPA/Ramsar. These sites are designated under the Conservation of Habitats and Species Regulations (Habitats Regulations, 2017) and are of international importance.

3.2

3.3 The site falls within the ZoI for Benfleet and Southend Marshes SPA and Ramsar, a site of **International** importance, which forms part of the Essex Estuaries SAC. The aforementioned sites are listed within the Essex Coast RAMS and also designated as **Nationally** important Sites of Special Scientific Interest (SSSI).

3.4 Details of all nearby designated sites are provided below in Table 1.

3.5 There were five SSSI's within 5km of the site, the closest was Great Wood and Dodd's Grove located adjacent the southern boundary of the site. Belfairs Local Nature Reserve (LNR) is also located adjacent to the southern boundary. Both protected areas are designated for ancient woodland and the SSSI supports a colony of the nationally rare heath fritillary butterfly *Melitaea athalia*. Garrold's Meadows SSSI, which supports unimproved grassland is 340m to the northeast of the site.

3.6 The site falls within a Natural England SSSI Impact Risk Zone (IRZ) for residential development of 100 units or more, or any residential development of 50 or more houses outside existing settlements/urban areas.

3.7 There were five Local Nature Reserves (LNR) that were located within 5km of the site; the closest was Belfairs Wood LNR that was adjacent to the site.

3.8 There were 10 Local Wildlife Sites (LOWS) within 2km of the site, the closest was Coxall Wood LOWS located adjacent to the southern boundary of the site. Pond Wood LOWS was also located close to the north-eastern boundary divided from the site by Bramble Road.

Table 1. Nationally Designated Sites within 5km and Statutory and Non-Statutory Locally Designated sites within 2km of the site

Name and Site Designation	Distance and Direction from Site	Area (ha)	Designated Features
Great Wood and Dodd's Grove SSSI	Adjacent to site, south	36.8	Designated for its ancient broad-leaved woodland habitat and associated flora and for its population of heath fritillary butterfly.
Garrold's Meadow SSSI	0.3km northeast	5	An area of unimproved grassland with marshy influences.
Thundersley Great Common SSSI	1.6km northeast	8.9	Range of acidic grass/heath communities
Benfleet and Southend Marshes SPA and Ramsar *Underpinned by Benfleet and Southend Marshes SSSI*	2.6km southeast	2099.69	Made up of several intertidal, subtidal, and terrestrial habitats that support internationally significant populations of overwintering waterfowl. The site supports internationally important numbers of non-breeding dark-bellied brent goose *Branta bernicla bernicla*, grey plover *Pluvialis squatarola*, and knot *Calidris canutus*; and nationally important populations of dunlin *Calidris alpina alpina* and ringed plover *Charadrius* hiaticula. The site supports internationally important assemblage of non-breeding waterfowl in excess of 27,000 birds.

Name and Site Designation	Distance and Direction from Site	Area (ha)	Designated Features
Hockley Woods LNR/SSSI	3km north	91.3	Ancient Semi Natural Woodland Local Nature Reserve. This is a SSSI due to the ancient coppice woodland which is one of the largest in South Essex. The population of sessile oak is probably the largest in eastern England.
Belfairs LNR	Adjacent, south	469	Grassland and Ancient woodland home to nationally threatened species: dormouse, heath fritillary butterfly and song thrush.
Belton Hills LNR	2.3km south	22	Site with scrub, small trees and wildflowers. This site is considered of 'national significance', with over 667 invertebrate species recorded, including the rare shrill carder bee, found in just seven other areas of the UK.
Leigh LNR	3.1km southeast	257	Coastal habitats (intertidal) which support a wide variety of birds, particularly migratory species. The reserve is also a good habitat for several insects including the three species of carder bee, butterflies including marbled white, small skipper and Essex skipper. Avocets also breed here.
Southend-On-Sea Foreshore LNR	4.1km southeast	1084	This site has a multitude of birds over-wintering in the area. Of particular note, is dark-bellied Brent goose. The foreshore is also home to a growing number of common seals.
Canvey Lake LNR	4.5km southwest	8.27	Lake formed by a former creek cut off by the sea wall with a shingle bank. Water voles and ducks present.
Essex Estuaries SAC	6.6km north	46111.43	Designated for its Annex I habitat interest, including Estuaries, Spartina swards Spartinion maritimae, and Atlantic salt meadows Glauco-Puccinellietalia maritimae.
Crouch and Roach Estuaries SPA/ Ramsar *Underpinned by Crouch and Roach Estuaries SSSI*	6.6km north	1847.87	The salt marshes contain a range of characteristic plant species and Annex II species interest; such as Wintering Dark-bellied Brent Geese Branta bernicla regularly occur in internationally important numbers, whilst wintering Black-tailed Godwit Limosa limosa, Common Shelduck Tadorna tadorna and Northern Shoveler Anas clypeata regularly occur in nationally important numbers
Thames Estuary and Marshes SPA/Ramsar *Underpinned by Mucking Flats and Marshes SSSI & South Thames Estuary and Marshes SSSI*	7.8km south	5589	The site is predominantly characterised by extensive intertidal mudflats that are visible at low tide. Additionally, there is saltmarsh and complex channel systems. A series of disused quarry pits have been transformed to create an extensive series of ponds and lakes at Cliffe Pools. The SPA has a variety of habitat types, which are important feeding and roosting sites for the large populations of bird species, including those during the spring and autumn migration periods.
Non-Statutory Designated			
Coxall Wood LOWS	Adjacent south	0.8	This is the last remaining fragment of the ancient woodland Coxall Wood. The canopy consists of Pedunculate Oak *Quercus robur*, Ash *Fraxinus excelsior* and Hornbeam *Carpinus betulus.*
Pound Wood LOWS	10m northeast	22	Ancient woodland with populations of heath fritillary
Oakwood Reservoir LOWS	0.35km east	0.3	a strip of unimproved acid grassland immediately to the south of the Garrold's Meadow SSSI
West Wood LOWS	0.4 west	33.1	This predominantly ancient wood is bisected by Prittle Brook, with plateaus rising to north and south, and is little changed since the Middle Ages. The ground flora is varied including the Essex Red Data List species Common Cow-wheat *Melampyrum pratense*, Woodruff *Galium odoratum* and Great Wood-rush *Luzula sylvatica* as well as many other species that are indicative of ancient woodland

Name and Site Designation	Distance and Direction from Site	Area (ha)	Designated Features
Belfairs Park Wood LOWS	0.6km east	15.4	Made up of two ancient woods, Great Birches Wood and, in the southern corner, Goldingsley Grove. Just before the Second World War, three golf holes were cleared through when it became part of Belfairs Park
Cottage Plantation and Rag Wood LOWS	0.35km west	6.8	Lowland mixed deciduous woodland may have its origins in the ancient West Wood, but at some stage it has been re-planted with Sweet Chestnut *Castanea sativa*
Little Haven/Tile Wood Complex LOWS	0.3km north	55.4	Comprises a mosaic of ancient woodlands, hedgerows, hay meadows and rough grassland.
Thundersley Plot Lands LOWS	1.2 west		This Site represents the last remaining blocks of old plotland habitat within urban Thundersley, comprising a mosaic of grassland, woodland and scrub that provides a significant Green Space resource to the local population.
Grove Wood LOWS	1.6km north	8.2	Former plot lands now a woodland with a mixture of common hedgerow plants and exotic garden plants.
Oak Wood LOWS	1.3km east		Oak Wood is an ancient wood, now bisected by the A127.

Habitats

3.9 A Phase 1 habitat map of the site and target notes are provided within Appendix 4. Plant species recorded per habitat type are tabled in Appendix 5.

3.10 The Phase 1 Habitat types (JNCC, 2010) within the development site (red-line area) were:

- Cultivated/disturbed land - Amenity Grassland
- Improved Grassland
- Tall Ruderal
- Scattered Trees
- Hedges with Trees
- Hedges without Trees
- Buildings
- Bare Ground
- Broadleaved Woodland
- Standing Water
- Stream / Ditch with water
- Dense Scrub

Amenity grassland

3.11 Within the west corner of the site, formal amenity grassland is present. The sward is very short due to a regular mowing regime. The grassland was dominated by perennial rye-grass *Lolium perenne* with daisy *Bellis perennis*, plantains *Plantago sp.*, yarrow *Achillea millefolium* and white clover *Trifolium repens* also present within the sward.

3.12 Due to the limited diversity of common species observed and maintenance to a short sward height, this habitat was considered to be of only **site** level importance.

Improved Grassland

3.13 Improved grassland makes up most the site in the form of horse-grazed pasture fields, bounded by hedges, scrub or trees. The sward height was 5-10cm due to grazing, however there are small areas within some of the fields with longer sward heights. Grass species included Yorkshire fog *Holcus lanatus*, perennial rye-grass, fescue *Festuca sp.*, cock's-foot *Dactylis glomerata* and timothy *Phleum pratense,* which were all frequent within the sward. Herbaceous species included dock sp. *Rumex sp.*, dandelion *Taraxacum agg*, plantain species, buttercup *Ranunculus sp.* and common centaury *Centaurium erythraea*. The improved grassland was not considered species-rich (below 9 species per m2), and supported a limited range and low cover of forb species.

3.14 Due to the limited diversity of common species observed, this habitat was considered to be of only **site** level importance.

Tall Ruderal

3.15 A few patches of tall ruderal vegetation were present within the study area, most notably in the north of the site adjacent to scattered trees and scrub. Another small patch is present within proximity to pond 5. Several species were present, consistent with plants found on disturbed ground including buttercup, common nettle *Urtica dioica*, broadleaf dock *Rumex obtusifolius*, dandelion, sorrel *Rumex sp*., cow parsley *Anthriscus sylvestris* and common comfrey *Symphytum officinale*, as well as common grasses such as cock's-foot and Yorkshire fog.

3.16 Due to the limited diversity of common species observed, this habitat was considered to be of only **site** level importance.

Scattered Trees

3.17 Scattered trees were located throughout the site at various stages of maturity. Several scattered trees were present within the amenity grassland in the west of the site and included ash *Fraxinus excelsior*, silver birch *Betula alba* and Norway spruce *Picea abies*. Willow sp. *Salix sp.* and horse chestnut *Aesculus hippocastanum* were also located throughout the site. *Leylandii* tree lines bordered some of the field boundaries. Many mature sessile and pedunculate oaks *Quercus petraea* and *Q. robur* and ash trees were located on the north boundary of the site. A tall horse chestnut and a willow tree line bordered the northern boundary of a middle field. A single hawthorn *Crataegus monogyna* was present within the most north westerly field, surrounded by scrub.

3.18 Due to the limited number of common species observed and abundance in the wider landscape (woodlands), scattered trees were considered to be of only **site** level importance.

Hedgerows

3.19 Several species-rich hedges with mature trees were present on site. The hedges along the eastern half of the site meet with Great Wood and Dodd's Grove SSSI / Belfairs LNR and have associated ditches. The hedges are generally species rich with abundant oak and hornbeam *Carpinus betulus*. Hawthorn, ash, field maple *Acer campestre*, elder *Sambucus nigra* and hazel *Corylus avellana* were all frequent as well as bramble *Rubus spp* and dog rose *Rosa canina.* The hedges with trees generally had a better developed understorey than hedges without trees, which consisted of ivy *Hedera helix*, common nettle, hedge woundwort *Stachys sylvatica*, red dead-nettle *Lamium purpureum and* white campion *Silene latifolia*.

3.20 Several hedges without trees were positioned around the site and were species-poor. A mature double hedge lined the track which runs through the middle of the site (east to west) and consisted of abundant blackthorn *Prunus spinosa* and hawthorn with occasional ash, bramble, hazel, field maple and dog rose. A young field maple hedge, with no understorey, and a young blackthorn hedge, also with no understorey, were located along a track leading north. A further hedge without trees was located near to the stables and riding yard, and was also hawthorn dominant, with a limited understorey due to heavy grazing.

3.21 All hedgerows on site are Habitats of Principal Importance as they all contain over 80% native woody species. Eighteen of the 35 hedgerows were considered important under the Hedgerow Regulations 1997 (HMSO, 1997). A hedgerow survey was conducted as part of this assessment and details of the results can be found in Appendix 6. As such, the hedgerow network on site is considered to be of **district** importance.

Buildings

3.22 Buildings present on the proposed development site included a brick-built house with slate tiles and an integrated double garage (B1), two large open barns of corrugated metal construction used for storage (B6 & B7), a single stable (B2), a large u-shaped stable block (B3), one timber stable block (B4) and a storage building (B5) made with concrete breeze blocks and both corrugated metal roofs and clay tile roofs were also present. A plan of the buildings can be found in Appendix 4.

3.23 The buildings on site were well maintained and lacked vegetation, as such they were considered to be of only **site** level importance.

Bare Ground

3.24 Bare ground surrounded all the buildings on site in the form of tarmac, gravel or paving slabs, as well as along the central track through the middle of the site (east-west) and another heading north towards the most northerly field, made from gravel and crushed shell. A large pile of shell is situated nearby pond 10 along the edge of the woodland block off site to the east.

3.25 The bare ground habitat was maintained and lacked vegetation, as such considered to be of only **site** level importance.

Broadleaved woodland

3.26 An area of broadleaved woodland was present surrounding a pond (P10) to the east of the site. Semi-mature trees including willow sp, oak and ash were abundant, with a dense understory of hawthorn, blackthorn and bramble. Given the density of vegetation the ground was predominantly bare, with leaf litter.

Standing Water

3.27 In 2015 SES reported that there were four ponds within the site boundary (Ponds 4, 5, 6, 7, 10). Only ponds 4, 7 and 10 contained water at the time of update. Ponds 5 and 6 were found to be dry at the time of the updated assessment (Appendix 10):

- Pond 5 was a small, lined pond now dry filled with sediment and leaf matter and dominated by common reed *Phragmites australis*;
- Pond 6 was a small natural pond within a deep depression surrounded by *Leylandii sp* now dry with no evidence of it recently containing water;

3.28 Pond 4 was located along the southern boundary of the residential house and garden. It contained heavy sediment and turbid water and was fed by irrigation drains. The pond was surrounded by bramble scrub and trees to the south and amenity grassland to the north. The pond had steep banks and had no marginal or aquatic vegetation present.

3.29 Pond 7 was located within dense bramble scrub to the north of the site and was heavily over shaded by surrounding trees as such had no marginal vegetation.

3.30 Pond 10 was located within a small patch of woodland, as such was heavily shaded with no marginal vegetation.

3.31 Ponds 4, 7 and 10 provided little opportunity to support aquatic/marginal vegetation and survey results indicate they are unlikely to qualify as priority habitats (HoPI) under the JNCC classification (2016). Therefore, these ponds are only given **site** level importance.

Stream/ Ditch with Water

3.32 In 2015 SES reported that there were two ditches within the site boundary, these ditches flowed north to south into the stream which runs adjacent to the southern boundary. The ditches did not have any emergent vegetation, they had bare, sediment bottoms with a slow flow and between 5 – 200cm water depth. Both ditches were dry at the time of this update assessment.

3.33 The ditches on site were therefore considered to only fill seasonally with water and as such they were considered to be only of **site** level importance.

Dense Scrub

3.34 Small areas of dense scrub were present around the site, as well as around Pond 7 and Pond 10. Bramble was the dominant species within most of this habitat type, with hawthorn, elder, ivy and holly also present.

3.35 The updated survey identified that the majority of the boundary scrub along the northern boundary reported in 2015 was no longer present. The updated Phase 1 plan in Appendix 4 represents this.

3.36 As the dense scrub was species poor and dominated by bramble it is considered to be of only **site** level importance.

Summary

3.37 The majority of habitats on site were of site importance only, with the exception of the hedgerow network which was of district importance. The site value habitats were common within the wider landscape and lacked species diversity. The hedgerow network however classifies as a HoPI and some were considered 'important' under the Hedgerow Regulations 1997. Ponds were only considered of site level importance as they are common in the surrounding landscape and were not considered of high ecological value, being unlikely to meet the classification of HoPI.

Protected and Notable Species

3.38 Protected and notable species are animals and plants listed on Conservation of Habitats and Species Regulations 2019 as amended and The Wildlife and Countryside Act as amended (WCA) 1981, The Protection of Badgers Act 1992, or listed in Section 40 or 41 of the NERC 2006. Protected and notable species with existing records within 2km of the site are detailed below.

Flora

Desk Study

3.39 Twenty-eight records of the Schedule 8 protected plant species (bluebell *Hyacinthoides non-scripta*) were included within the data search. One record of a NERC Act Species of Principal Importance was also recorded within 2km of the site for chamomile *Chamaemelum nobile*. There were also notable species of flora within 2km that were red listed and nationally scarce this included lesser calamint *Clinopodium calamintha,* autumn hawkweed *Hieracium sabaudum,* and Bithynian Vetch *Vicia bithynica,* although they are not protected by any laws.

3.40 No records of Schedule 9 invasive plant species were reported in the data search.

On-site Assessment

3.41 No protected, rare or notable species were recorded on site and it was considered the habitats that were present were unsuitable for notable local species that were recorded locally and the management was deemed unfavourable for them to be present.

3.42 No Schedule 9 invasive species were recorded. A native but invasive species field horsetail *Equisetum arvense* was recorded extensively throughout the centre of the site however this is not a species listed under Schedule 9 of the WCA 1981.

Importance

3.43 The botanical assemblage of the development site was considered to be of **site** value only, as no protected flora were recorded.

Badger

Desk Study

3.44 There were 33 records of badger returned within the last 10 years, the closest of which was located 300m south of the site in 2019.

3.45 In 2015 SES recorded a potential main sett one subsidiary and five outlier setts within the site boundary.

On-site Assessment

3.46 Eight badger setts were identified in May 2022 within the site boundary with a total of thirty-nine entrances. Evidence of spoil heaps, fresh bedding, footprints and fresh latrines were observed throughout the site. Foraging signs (snuffle holes) were also observed on site during the Phase 1 survey, and therefore the setts were believed to be in current use. A map of the badger sett entrances is provided in Appendix 7.

Badger Scoping & Monitoring Surveys

3.47 Monitoring of these setts began on 24th May for 21 days. The monitoring confirmed that setts 1, 2, 4, 6, 7 and 8 were in current use by badgers at the time of survey, with footprints recorded in sand traps, and monitoring sticks being triggered. It is considered that Sett 1 is a main sett given its size, number of entrances (18), evidence of fresh bedding and due to the level of activity recorded when first surveyed. The results of the monitoring are summarised in Appendix 7.

3.48 The site boundaries contain extensive further areas of habitat suitable for future sett building in the form of dense scrub and hedgerows, but no further evidence of sett building was identified in these areas.

Importance

3.49 The site is assessed as being of **local** value for badger due to the presence of an active likely main sett within the site. A higher level of importance is not assigned due to the abundance of suitable habitat for this species through the wider local landscape, with large, wooded areas located to both the north (Pound Wood) south (Dodds Grove and Great Wood) east (Belfairs Park) and west (West Wood) of the site.

Bats

Desk Study

3.50 Records of bats identified within 2km of the site are summarised in **Table 2** below.

Table 2. Summary of bat records within 2km of the site.

Species	Nearest approximate distance to site (km)	Total No. of Records	Date of Most Recent Record
Common pipistrelle *Pipistrellus pipistrellus*	0.3	15	2018
Soprano pipistrelle *Pipistrellus pygmaeus*	0.7	7	2018
Noctule *Nyctalus noctula*	1.9	1	2018
Brown Long-eared Plecotus auritus	0.3	4	2013
Daubentons Myotis daubentonii	1.9	2	2018
Serotine *Eptesicus serotinus*	0.7	3	2018
Myotis species	1.9	3	2018

3.51 Results from activity surveys in 2015 concluded that the sites hedgerows and mature trees and boundaries alongside woodland provided moderate/high suitability habitat for foraging and commuting bats. However, the amenity grassland fields on site were considered to provide low suitability habitat as evidenced by the low volume of bat recordings.

3.52 Surveys from 2015 identified 98 trees with low to high bat roost suitability.

Assessment for Roosting Bats

Buildings

3.53 There were seven buildings on site, of which three had low suitability to support roosting bats. Internal inspections of all of the buildings were not possible at the time of survey as access was restricted, therefore assessments were made on the basis of external inspections alone. Results are detailed in Table 3 below and mapped in Appendix 8.

Table 3. Results of the building inspection.

Building number	Description	Bat access points	Potential roosting locations	Evidence of bats	Suitability
B1	Residential house, brick built with flat concrete roof tiles. In good condition and well maintained	None	None	None	Negligible
B2	Stable, brick and concrete block with concrete pantile roof tiles.	Open stable door, above gaps in timber above door, under roof tiles above facia board, under roof	Between bitumen roofing felt and timber beams.	None	Low
B3	U-Shaped stable block, concrete block walls, sheet metal roof and flat concrete roof tiles. Timber doors and internal joists	Open stable door, above gaps in timber above door, under roof tiles above facia board, under roof	Between bitumen roofing felt and timber beams. Where present, gaps in block work	None	Low
B4	Timber clad stable with metal sheet roof in good condition	Open stable doors	None	None	Negligible
B5	Stable, concrete block with flat concrete roof tiles in poor condition.	Gaps under roof tiles, gaps above doors, gaps in block work and between roof and wall	Under roof tiles	None	Low
B6	Agricultural barn, metal roof and structure with no sides	N/A	None	None	Negligible

Building number	Description	Bat access points	Potential roosting locations	Evidence of bats	Suitability
B7	Agricultural barn, metal roof and structure with no sides	N/A	None	None	Negligible

3.54 Confidence in the low suitability assessment for B2, B3 and B5 is high given the potential roost sites only offer opportunities for individual bats and do not provide enough space, shelter or protection for more regular use (Collins, 2016). Furthermore, given the exposed nature of the stable blocks with open fronts these buildings were considered sub-optimal for roof void dwelling species such as brown long-eared bats, and are more likely to be suitable for crevice dwelling species such as common or soprano pipistrelles which are common and widespread.

Trees

3.55 All trees on site were subject to a ground level tree assessment (GLTA). Fifty-three were low suitability, 21 moderate suitability, 7 high suitability. Four trees were no longer present from the 2015 surveys as they had been felled or had blown over in storms (from anecdotal discussions with the landowner). A further 13 trees previously assessed as offering some suitability for bats were downgraded to negligible suitability as features were no longer present. A plan with the location of the trees with bat roost suitability and a summary of the results can be found in Appendix 8.

3.56 In total, the site had 81 trees with suitability for roosting bats however 53 had only low suitability. The nearby landscape is considered to provide a larger resource of potential roost sites within Dodds Grove/Great Wood SSSI and Pound Wood LOWS within the immediate vicinity. As such the site considered to be of **site** importance only for roosting bats.

Assessment for Foraging and Commuting Bats

3.57 The treelines and hedgerows along the boundaries of the site were considered to offer opportunities for foraging and commuting bats, particularly along the southern boundary with Dodds Grove/Great Wood SSSI. This boundary woodland also acts as a windbreak which is attractive to bats invertebrate prey. Connectivity to surrounding habitats is offered throughout the site by the existing network of hedgerows.

3.58 The fields within the site were open improved grassland that was well managed at the time and considered to be of low suitability for foraging and commuting.

3.59 The boundary habitats were valued as being of **moderate** suitability for foraging and commuting bats following current guidance (Collins, 2016; see Appendix 3) which is also consistent with the 2015 assessment.

Activity Transect Surveys

3.60 Six species of bats were confirmed as present during activity transect surveys; common and soprano pipistrelles as well as Myotis sp., noctule and brown long-eared. Myotis species were only identified to genus due to the difficulty of distinguishing between species. A summary of the bat activity transects results is provided in Table 4.

3.61 Common pipistrelles were the most frequently recorded species (Table 5), with approximately 83% of the calls recorded belonging to this species and with a broad distribution across the site. Bats were recorded throughout much of the site, with highest levels of activity along the hedgerows in the centre of the site and on the south-eastern boundary along the stream. Evidence suggested these areas were used both for foraging and as movement corridors. A heatmap summarising the levels of activity within the site can be found in Appendix 8.

Table 4: Summary of activity survey results April to October 2022

Bat species	Number of Passes							
	April	May	June Dusk/ Dawn	July	August	Septem ber	October	Total
Common pipistrelle ***Pipistrellus pipistrellus***	2	14	93	132	195	0	144	**797**
Soprano pipistrelle ***Pipistrellus pygmaeus***	0	5	29	15	16	17	1	**125**
Pipistrelle sp.	0	2	3	1	12	0	0	**19**
Noctule ***Nyctalus noctula***	0	1	4	5	0	0	0	**16**
***Myotis* sp.**	0	0	0	0	0	0	2	**2**
Brown long-eared ***Plecotus auritus***	0	0	0	0	2	0	0	**2**
Monthly Total	**2**	**22**	**129**	**153**	**225**	**17**	**147**	**961**

Automated Detector Surveys

3.62 Automatic static detectors recorded a bat assemblage of nine species on site; analysis of the results is summarised in Table 5 below.

3.63 The assemblage recorded in 2022 was generally comparable to that recorded in 2015. A notable addition was the presence of barbastelle bat, not recorded previously in 2015. Barbastelle is a rarer bat species and woodland specialist receiving a higher level of protection under Annex II of the Conservation of Species and Habitat Regulations (CHSR, 2017 as amended). A single pass for this species was recorded during the September deployments from static detector 2, located in the western portion of the site.

Table 5: Summary of automated detector survey results

Month	Common pipistrelle	Soprano pipistrelle	Pipistrelle spp	Noctule	Nyctalus spp.	Serotine	Myotis spp.	Brown long-eared	Barbastelle	Total
April	2695	160	19	1	10	0	2	0	0	**2887**
May	1884	633	277	0	2	0	1	0	0	**2797**
June	1076	691	35	5	4	0	1	0	0	**1812**
July	744	583	45	27	44	0	1	0	0	**1444**
August	1282	257	48	28	42	0	7	1	0	**1665**
September	530	100	32	1	0	6	27	2	1	**699**
October	499	52	81	2	0	6	5	0	0	**645**
Total	8710	2476	537	64	102	12	44	3	1	**11949**

Importance

3.64 There was a diverse range of trees on site from young to mature trees with decay features that therefore provided a range of suitable features for roosting bats. Three buildings on site provided low suitability for roosting bats. The grassland fields provided low suitability foraging habitat for bats, however, the site provided

good connectivity, with mature hedgerows with trees providing moderate suitability commuting corridors to the surrounding landscape. The results of the update surveys are largely consistent with the 2015 assessment which was anticipated as the habitats and conditions remained the same.

3.65 The surrounding landscape contains a number of woodlands including statutory designated sites such as Dodds Grove/ Great Wood SSSI and Pound Wood that provided better quality foraging and roosting habitat. However as the site is situated in between these sites, it is considered that the boundary and internal hedgerow networks provide important connectivity for local populations of bats. As such, the site is considered to be of **local** importance for foraging, commuting and roosting bats.

Birds

Desk Study

3.66 The data search returned 168 records of species listed under Schedule 1 of the WCA 1981 within 2km. The species recorded that were most relevant to the site and habitats present included fieldfare *Turdus pilaris*, hobby *Falco Subbuteo,* barn owl *Tyto alba* and redwing *Turdus iliacus.* Redwing and fieldfare are migrants that winter in the UK, while hobby breed here in summer. Barn owl are resident throughout the year.

3.67 The 2015 Breeding Bird survey identified ten notable species on the site: four were on the Birds of Conservation Concern (BoCC) (Stanbury *et al.,* 2021) red-list and six on the amber list. None of the species recorded were considered uncommon or rare at any geographical scale and they are considered common and widespread in the region.

3.68 The habitats on site were not considered to be suitable for any important wintering bird populations, such as waterfowl which occur on the nearby SPA/Ramsar site, or granivorous farmland birds.

Wintering Bird Survey

3.69 Wintering bird surveys (WBS) recorded a total of 24 species of which 19 were considered likely to be utilising the site during the wintering season. The remaining species were not considered to be utilising the site and were either recorded adjacent to the site or flying over.

3.70 Two red listed BoCC, starling *Sturnus vulgaris* and house sparrow *Passer domesticus* were recorded on site. These species were recorded in low numbers, with the largest flock recorded being of 11 individuals. Both species were recorded utilising the hedgerows and trees on site.

3.71 There were three amber listed BoCC on site, woodpigeon *Columba palumbus*, wren *Troglodytes troglodytes* and stock dove *Columba oenas*. All species were recorded utilising the hedgerows and trees and trees on site. Large flocks (up to 42 individuals) of woodpigeon were utilizing the grazed fields on site.

3.72 A single Schedule 1 species, redwing Turdus iliacus, was recorded flying over the site. Results are summarised in Table 6 below:

Table 6: Summary WBS data by bird conservation status.

Conservation Status	BoCC
	On site
Sch 1	0
Red	2
Amber	3
Total	**5**

Importance

3.73 The habitats within the site are not considered to be suitable for important wintering bird populations, such as waterfowl which occur on the coast, or granivorous farmland birds. The winter bird assemblage was considered to be common and widespread. As such it is considered that the site has only **site** importance for wintering birds.

Breeding Bird Survey

3.74 Thirty bird species were recorded on the site during the 2022 surveys of which none were Schedule 1 species, four were Red list BoCC and six were Amber list BoCC. The distribution of all likely breeding territories is mapped and provided in Appendix 9 and a summary provided in Table 7 below.

3.75 The results were comparable with the 2015 surveys which was expected as the habitats remain consistent with the 2015 assessment.

Table 7: Summary of breeding bird survey results for notable species.

Species	BOCC Conservation Status	Onsite Breeding Territories	Breeding Status
		Probable/ Confirmed	
Green finch *Chloris chloris*	Red list	Yes	Probable territory along southern boundary
Herring gull *Larus argentatus*	Red list	No	Likely nesting off site
House sparrow *Passer domesticus*	Red list	Yes	Probable nesting within farm buildings on site and adjacent to site
Starling *Sturnus vulgaris*	Red list	Yes	Probable nesting in farm buildings and trees on site/adjacent
Black headed gull *Chroicocephalus ridibundus*	Amber list	No	Likely nesting off site
Dunnock *Prunella modularis*	Amber list	Yes	Probable 8 territories along eastern boundary, west and central hedgerows
Song thrush *Turdus philomelos*	Amber list	Yes	Probable nesting in adjacent woodland to the south of site, suitable habitat on site
Stock dove Columba oenas	Amber list	Yes	Probable nesting in mature trees on site and adjacent to site
Wood pigeon *Columba palumbus*	Amber list	Yes	Probable nesting in farm buildings mature trees and boundary habitat
Wren *Troglodytes troglodytes*	Amber List	Yes	Probable nesting in hedgerow throughout the site and on adjacent land

Importance

3.76 The large majority of records during the survey were from the hedgerow boundaries, scrub and adjacent woodland and gardens.

3.77 There were ten species of Birds of Conservation Concern (BoCC) recorded on the site: four on the red-list and six on the amber list (Stanbury *et al.*, 2021). These are typical species of farmland and residential areas including

song thrush, starling, house sparrow and wood pigeon. None of the species recorded are considered uncommon or rare at any geographical scale, with all red-listed species having that status due to widespread declines across their UK geographic range: they are still relatively common and widespread in the East Anglian region and the reasons for their declines are not considered to be driven by development impacts but predominantly by agricultural change.

3.78 The criteria of Fuller (1980; Table 8) have been adapted to CIEEM geographical importance categories to assess the importance of the breeding bird assemblage on site. Twenty-two bird species recorded were considered have either probable or possible breeding territories on site (Appendix 9).

Table 8: Site value based on breeding bird community size (adapted from Fuller 1980).

Number of breeding bird species	Site Value
<25	Local
25-49	District
50-69	County
70-84	Regional
>85	National

3.79 Given the range of species recorded and the mosaic of valuable habitats for breeding birds present (e.g., scrub grassland, woodland, hedgerow), and the numbers of likely breeding species present it is considered that the site has **local** value for breeding bird species. Confidence in this assessment is high.

Great Crested Newt

Desk Study

3.80 The data search and the NBN Atlas search returned no records for great crested newt within 2km of the site in the last 10 years.

3.81 The site falls within an 'amber zone' under the Natural England (2020) Essex Risk Zones map (developed for the great crested newt district licensing scheme). Amber zones are areas where great crested newt are more likely to be present.

3.82 In 2015, 10 ponds on and within 250m of the site were subject to presence/likely absence surveys which concluded that GCN were likely absent from the site and surrounding area. In 2015 Pond 10 which was located onsite had a population of smooth and palmate newts.

On-site Assessment

3.83 Most of the development site was considered suboptimal terrestrial habitat for great crested newt due to the intensive management of the improved grassland and use as horse paddocks. Very little cover was available for the species however the boundary and interior hedgerows offered some opportunity for commuting and shelter.

3.84 As per the update habitat survey (Paragraph 3.27) two ponds on site were now dry and considered unlikely to refill with water, and the wet ditches were also dry at the time of this updated assessment. A plan of the ponds within 250m of the site is available in Appendix 10.

HSI Survey

3.85 An HSI assessment was conducted where access was possible. A summary of the results can be found in Table 9 below (see Appendix 10 for detailed results).

Table 9: HSI calculation and score for accessible ponds

Waterbody / Pond Score	4	7	10	14	18
H.S.I ($X^{1/10}$)	0.56	0.51	0.64	0.82	0.82
Pond Suitability	Below Average	Below Average	Average	Excellent	Excellent

eDNA Survey

3.86 Five ponds which were surveyed, all of which returned negative results indicating the likely absence of GCN. The eDNA results can be found in Appendix 10.

Importance

3.87 Terrestrial habitats on site were considered to be of negligible importance to any local great crested newt population. Only one pond on site had an average HSI, the other two ponds on site were considered below average. There were two fewer ponds on site holding water than in 2015 providing less opportunity on site for aquatic habitat. Pond 10 had a population of smooth and palmate newts in 2015. Although six ponds were not surveyed it is considered that since the connectivity between these pond and the ponds on site was considered good (connecting hedgerows, scrub and woodland), it there was a population of GCN within these ponds then they would have likely also colonised the ponds on site. As such it is considered that these ponds are unlikely to support a population of GCN.

3.88 Research undertaken by Cresswell (2004), indicates it is most common to encounter great crested newts within 50m of a breeding pond, with few moving further than 100m – unless significant linear features are involved, when great crested newts can be encountered at distances of between 150m – and 200m. At distances greater than 200m-250m, great crested newts are hardly ever encountered as such if there were pond present greater then 250m it is considered unlikely that they would colonise the ponds on site.

3.89 As such, it is considered unlikely that a population of GCN has established onsite or within 250m of site within the interim period since 2015 given the habitats onsite and surrounding area have remained largely consistent and there are now fewer aquatic habitats available. Furthermore, there have been no records of GCN within 2km of the site in the last 10 years. The eDNA survey results support this and as such, the site is considered to have negligible importance to great crested newts and they are not considered further in this impact assessment.

Hazel Dormice

Desk Study

3.90 Records from the data search show populations of dormice present in Great Wood/Dodds Grove SSSI adjacent to the southern boundary within the last year. There are also records from West Wood LNR 350m to the west within the last 10 years and from Little Havens Hospice 0.6km to the northwest of site.

3.91 Long-term monitoring of the dormouse population is undertaken at Hadleigh Great Wood and Dodd's Grove by the Southend Dormouse Group. They have established there is a stable dormouse population present (personal communication) which is considered to be of district importance.

3.92 In 2015 SES found no evidence of dormice or their nests during the surveys onsite. In 2016, there was a report of a single animal in a tube onsite (Essex Wildlife Trust *pers.comm*.).

On-site Assessment

3.93 The site was considered to provide some opportunities for dormice within the hedgerow network and patches of scrub. However, preferred core habitats for this species (broadleaf woodland with developed understorey) were not present.

3.94 Approximately half of hedgerows on site are considered 'important' under the Hedgerow Regulations (HMSO, 1997) with many leading from the woodland edge of Great Wood/Dodds Grove SSSI on the southern fields to the northern field towards Pound Wood. These hedgerows would provide suitable dispersal habitat for dormice due to their species richness and integrity. Species including hazel, hawthorn, bramble, climber species and; mature oak trees. Furthermore, many of these hedgerows have the three-dimensional physical structure required for dormice.

Tube Survey

3.95 A single dormouse nest was found in July 2022 in nest tube 83. The nest comprised shredded material and green leaves, woven into a structured nest that is distinctive to dormice, confirming dormouse presence on site. The nest location can be found in Appendix 11.

Importance

3.96 Given the confirmed presence of hazel dormice, suitable connective habitat onsite (species rich hedgerows) and that the site is located adjacent to a known population it is considered it is considered that the site is of **district** level importance for hazel dormice.

Invertebrates

Desk Study

3.97 374 records of invertebrate species of principle importance covered under section 41 of the NERC Act were recorded within 2km of the site in the last 10 years. These included white admiral butterfly *Limenitis camilla,* wall butterfly *Lasiommata megera,* small heath butterfly *Coenonympha pamphilus* and the heath fritillary butterfly. The closest records were 150m south of the site.

3.98 The site partially lies within an area identified as particularly relevant for creating habitat for pollinating insects, termed a B-Line (Buglife, 2021), which is part of the National Pollinator Strategy (DEFRA, 2018).

3.99 Key species known locally include the heath fritillary butterfly. This is a species associated with a 'transitory' woodland habitat, moving from patches of early successional vegetation as part of the traditional woodland coppice cycle; it feeds on cow wheat *Melampyrum pratense* (a small herb) in recently coppiced clearings, which becomes shaded out as the woodland canopy develops and then returns (from the seedbank) once woodland is re-coppiced. Historically, extinctions of the heath fritillary have occurred with the reduction in area and isolation of habitat patches coupled with the inability of individuals to colonise over more than a few hundred metres (Warren, 1987a,b). An important part of the landscape-scale ecology of the heath fritillary is the need for individuals to disperse and colonise patches of habitat as they become suitable (Hodgson et al., 2009).

3.100 A summary of its local status is provided in Table 10 with recent accounts on various internet sources reporting the continued presence of heath fritillary in woodlands to the north and south of the site. The site occupies a gap approximately 450m wide of undeveloped land between Pound Wood and Belfairs Local Nature Reserve / Great Wood and Dodds Grove SSSI, with the only significant barrier in this gap being a minor residential road

(Butterfly Conservation, 2008). The population to the south is considered stable in Dodds Grove adjacent to the site, but in the woodland parcels to the north the population is declining with extinction from some parcels.

Table 10: Woodlands with heath fritillary butterflies within 5km (from Essex Wildlife Trust, 2015 with additional information from Butterfly Conservation, 2008)

Woodland	Habitat	Population status of heath fritillary (and population trend)	Proximity
Woodland to the south			
The woodland block to the south of the site comprising: Belfairs Local Nature Reserve / Great Wood and Dodds Grove SSSI	Ancient semi-natural woodland (mainly oak, birch and hornbeam)	Heath fritillary (re-established 1997)	To the south and south-east of the site
Dodds Grove (part of Great Wood and Dodds Grove SSSI)	As above 3.8ha	Stable at low levels (stable)	Adjacent
Great Wood (as part of the above SSSI)	As above 23ha	Severely threatened (severe decline)	Connected to Dodds Wood
Belfairs Local Nature Reserve (not within the SSSI boundary but adjacent)	As above 29ha	Absent	Connected to Dodds Wood
Woodlands to the north			
Three woodland parcels to the north of the site, of which Pound Wood is the closest	Ancient woodland blocks	Severely threatened (severe decline)	To the north of the site
Pound Wood	23ha block of ancient woodland	Severely threatened (severe decline)	Separated by a minor residential road
Tile Wood and Whytburns Wood	6.8ha woodland, with an abundance of hostplant (cow wheat) following coppicing	Transient site (with Whytburns being a potential site)	Separated by a minor residential road and some housing
Little Haven (Starvelarks Wood)	0.6ha woodland	Probably extinct	Separated by a minor residential road and some housing
Woodlands to the west			
Hockley Woods (West Wood and Cottage Plantation)	Ancient woodland of mainly hornbeam, willow, sweet chestnut and oak (with coppicing of hornbeam and sweet chestnut in selected areas).	Potential sites	3.3km north-east, separated by residential areas, roads and open farmland

3.101 In 2015 five species of conservation concern were identified during the invertebrate surveys Hornet hoverfly *Volucella zonaria,* Cinnabar moth *Tyria jacobaeae,* Rufous-shouldered longhorn beetle *Anaglyptus mysticusbeetlem* Jewel beetle *Agrilus viridis* and Wood soldierfly *Solva marginata.*

On-site Assessment

3.102 The site was considered largely unfavourable to support a notable assemblage of invertebrates due to the nature of the cultivated/disturbed land - amenity grassland. The hedgerows contained native flora and were considered to have greater potential and provided connectivity to woodland blocks with Belfair Woods LNR /Great Wood

and Dodds Grove SSSI to the south and Pound Wood to the north. No suitable habitat was observed for heath fritillary butterfly (open coppice woodland).

3.103 The plan with sampling locations overlays the Phase 1 habitat survey and is shown in Appendix 12 ; the visual appraisal is arranged by the main habitat types (Table 11).

Table 11: Summary of the Habitat-based Appraisal.

Phase 1 habitats	Description	Positive features for invertebrates	Negative features for invertebrates
Amenity / Improved Grassland	Short sward grass fields with cropping close to the edge of the boundary habitats.	-	Fields and margins lacking in seed-producing herbs.
Hedgerows and scrub	Mature hedgerow trees were present in a number of hedgerows principally oak. These included numerous mature specimens but in general they lacked features of substantial value for invertebrates, with the dead wood mainly comprising smaller aerial branches up to approximately 20cm diameter; a number of trees did, however, have larger dead limb scars potentially leading into rotten internal trunks timbers were also present. Dead wood on the ground comprised twigs and smaller branches to approximately 20cm diameter. The hedgerows themselves were unmanaged and consequently tall, with a number being species-rich.	Large structure, with associated physical diversity in attributes such as extent of shelter. Standard trees with some dead wood resource. Good blossom in resource in spring and some associated summer-flowering herbs.	Scarcer dead wood types apparently absent, e.g. heartwood decay. Adjacent habitat generally with few additional resources such as blossom.
Stream / ditch with water	Adjacent to the south boundary is a small stream, heavily shaded by mature woodland and with semi-natural characteristics. The water was very shallow and lacking aquatic or wetland vegetation.	A relatively humid area in periods of hot weather.	Lacking many key features such as vegetation and physical diversity in conditions

Invertebrate Survey

3.104 A total of 177 species were recorded, the assemblage profile of which are presented in Table 12. The species are mainly associated with grassland and trees and scrub, with a few vagrant hoverflies from wetlands. None of the assemblages are scored within Pantheon as being of high quality (termed favourable condition).

Table 12: Pantheon Profile of the Species Recorded by the Field Surveys (not all species are listed). Not all species within a higher category (e.g. biotope) are assigned to a lower category (e.g. habitat).

Biotope	No. of species	Habitat	No. of species	Specific Assemblage Type	No. of species
Open habitats	116	Tall sward & scrub	97	-	-
		Short sward & bare ground	18	-	-
		-	-	Rich flower resource	15
		-	-	Scrub edge	10
Tree-associated	34	Arboreal	14	-	-
		Shaded woodland floor	12	-	-
		Decaying wood	8	Bark & sapwood decay	7
				Heartwood decay	1
		Wet woodland	1	-	-
Wetland	11	Marshland	1	-	-
		Acid and sedge peats	5	-	-

3.105 The specialist species are listed in Table 13, and these are associated with four specific assemblage types, rich flower resource; scrub edge; and two types of dead wood.

Table 13 Specialists (Species with Specific Assemblage Types) and their Occurrences.

Specific Assemblage Type	Higher taxon	Species	Ecology
Rich flower resource	Hymenoptera	15 species	Various bees and wasps which require an abundance and continuity of blossom, of which a few are also specialists of other assemblage types.
Scrub edge	Lepidoptera: Nymphalidae	*Pyronia tithonus*	The gatekeeper butterfly, which feeds as a caterpillar on grasses in sunny, sheltered situations.
	Lepidoptera: Nymphalidae	*Pararge aegeria*	The speckled wood butterfly, which feeds as a caterpillar on grasses in sunny, sheltered situations.
	Diptera: Asilidae	*Dioctria baumhaueri*	A predatory fly that sits on vegetation with a ground-dwelling larva.
	Diptera: Asilidae	*Neoitamus cyanurus*	A predatory fly that sits on vegetation with a ground-dwelling larva.
	Hymenoptera: Crabronidae	*Crossocerus elongatulus*	A wasp with nests constructed in plant stems and cavities.
	Hymenoptera: Crabronidae	*Ectemnius lapidarius*	A wasp with nests constructed in plant stems and cavities.
	Hymenoptera: Crabronidae	*Trypoxylon medium*	A wasp with nests constructed in plant stems and cavities.
	Hymenoptera: Vespidae	*Dolichovespula media*	A wasp with nests constructed in plant stems and cavities.
	Orthoptera: Meconematidae	*Meconema thalassinum*	A cricket that feeds on shrub foliage.
	Orthoptera: Phaneropteridae	*Leptophyes punctatissima*	A cricket that feeds on shrub foliage.
Bark & sapwood decay	Coleoptera: Cerambycidae	*Anaglyptus mysticus*	Beetle with a dead-wood feeding beetle. Associated with smaller timbers such as moribund or fallen branches
	Coleoptera: Cerambycidae	*Clytus arietis*	Beetle with a dead-wood feeding beetle. Associated with smaller timbers such as moribund or fallen branches
	Coleoptera: Cerambycidae	*Grammoptera ruficornis*	Beetle with a dead-wood feeding beetle. Associated with smaller timbers such as moribund or fallen branches
	Coleoptera: Cerambycidae	*Rutpela maculata*	Beetle with a dead-wood feeding beetle. Associated with smaller timbers such as moribund or fallen branches
	Coleoptera: Pyrochroidae	*Pyrochroa serraticornis*	A beetle with a predatory larva under bark, and a predator on other insects at blossom as adults.
	Hymenoptera: Crabronidae	*Ectemnius lapidarius*	A wasp with nests constructed in plant stems and cavities.
	Diptera: Syrphidae	*Xylota sylvarum*	A fly with larva in dead wood.
Heartwood decay	Diptera: Syrphidae	*Myathropa florea*	A hoverfly with larvae in rot holes with wet, leaf litter and wood decay.

Species of Conservation Concern

3.106 The only species of conservation concern recorded was the cinnabar moth, a widespread but declining moth species:

- Cinnabar moth *Tyria jacobaeae* (Lepidoptera: Erebidae), priority species (S41, widespread but declining). A nationally widespread species, the caterpillars eat ragwort *Jacobaea vulgaris* which is typically found in grassland with occasional or light disturbance.

Importance

3.107 The evaluation of sites for invertebrates typically follows the guidance of Colin Plant Associates (2006 as amended), which is based on the numbers of rare and scarce species recorded from a series of survey visits. The only species of conservation concern was the widespread but declining cinnabar moth. Its presence is not unusual on sites with verges or other areas of grassland and the species is of low significance for the valuation. While

some of the invertebrates recorded may have their core population areas within the adjacent woodlands there was no evidence that the site is important for supporting significant species associated with the SSSI woodlands.

3.108 Of further value at this site is its undeveloped character in a location separating two of the Essex 'heath fritillary woodlands': Pound Wood to the north (separated by a minor road) and Belfairs Wood LNR / Great Wood and Dodds Grove SSSI to the south, adjacent to the site. It is however acknowledged none were seen on the site in 2022 or 2015, there is not suitable habitat on-site, and the adjacent areas of the woodlands do not appear to be suitable habitat for the heath fritillary. The heath fritillary is a species associated with a 'transitory' woodland habitat, moving from patches of early successional vegetation as part of the traditional woodland coppice cycle; historically extinctions have occurred with the reduction in area and isolation of habitat patches coupled with the inability of individuals to colonise over more than a few hundred metres (Warren, 1987a,b). Although the site is within a strategically important location for the heath fritillary, the site is likely to currently represent a partial barrier to dispersal in the landscape due to the extensive open cultivated/disturbed land – amenity grassland, and as such the site does not currently contribute to the dynamics of the Pound Wood and Belfairs Wood LNR / Great Wood and Dodds Grove SSSI populations.

3.109 It is concluded that the site is likely to be of **local** value to notable invertebrates, based on the species recorded and its role as a partial barrier to dispersal of the heath fritillary between nearby woodlands.

Otter

Desk Study

3.110 The Otter *Lutra lutra* is legally protected under section 9 of the WCA (1981) and regulation 41 of CHSR (2010). Otter *Lutra lutra* has been recorded 1km west of site, however not since 1979.

On-site Assessment

3.111 A stream runs along the southern boundary of the site (off-site) west to east and could potentially be used by otters for foraging and commuting. The adjacent woodland opposite site and adjacent the stream may provide features that may be used as resting places for otters such as exposed root systems and other crevices. It was considered that there were limited opportunities for otter within the site except for where hedgerows joined the stream.

Importance

3.112 As the site is directly adjacent to the stream to the south, otter if present in the local landscape could potentially utilise the bank within the site, along the limited section of hedgerow that joins the stream, for commuting or resting. However, the lack of records in combination with limited suitability drives the conclusion that in the low likelihood they are present locally, the site is highly unlikely to be of any importance for this species and as such, are not considered further in this assessment.

Reptiles

Desk Study

3.113 The data search returned 31 records for reptiles within 10km of the site which include 10 records for grass snake *Natrix Helvetica*, three for adder *Vipera berus* three for common lizard *Zootoca vivipara* and 15 for slow worm *Anguis fragilis*. The closest record was from 2017 0.3km north of the site.

3.114 Presence/likely absence surveys in 2015 observed an 'exceptional' population of slow worm and a 'small' population of grass snake. No adders or common lizards were observed on the proposed development site throughout the survey visits and were considered likely absent from site.

On-site Assessment

3.115 The boundary vegetation on site was considered to provide some limited opportunities for reptiles, with scrub and hedgerows providing cover. However, the value of the majority of the habitats on site (short sward improved grassland) was considered to be suboptimal at the time of survey.

Presence/Likely Absence Surveys

3.116 The results for the presence/likely absence surveys for 2022 can be found in Table 14 below and a heat map of the locations found in Appendix 13.

Table 14: Reptile Species Recorded

Survey visit	Date	Prevailing weather	Temp °C	Species
1	26/05/2022	Cloud 100%, Beaufort 3	14	8 adult slow worms
2	30/05/2022	Cloud 75%, Beaufort 1	14	27 adult slow worms
3	06/06/2022	Cloud 25%, Beaufort 2	15	6 adult slow worms
4	08/06/2022	Cloud 40%, Beaufort	16	4 adult slow worms, 3 juvenile slow worms
5	10/06/2022	Cloud 100%, Beaufort 2	15	3 adult slow worms
6	13/06/2022	Cloud 60%, Beaufort 1	13	Null
7	16/06/2022	Cloud 100%, Beaufort 3	16	Null

Importance

3.117 Considering the number of adult reptiles found on site and using Froglife's assessment criteria (Froglife, 1999), the results indicate an 'exceptional' population of slow worm remains present on site. The results indicate that the majority of slow worms were found to the east of the site along hedgerows and the largest concentration was found on the site boundary to the east Appendix 13. As such, the site is considered as having **local** importance for reptiles.

Water Vole

Desk Study

3.118 Water Vole is protected under the WCA (1981) as amended. There are no records of water voles within 2km of the proposed development site within the last 10 years.

On-site Assessment

3.119 There are several ponds on and within the vicinity of the site, as well as two ditches, which may constitute limited sub-optimal habitat for water voles. The ditches on site link with the stream which runs adjacent to the southern boundary of the site but were dry at the time of visit in May 2022. the stream adjacent to site contained sparse bankside vegetation, limiting suitability for water voles as foraging and shelter habitat.

Importance

3.120 The site had limited aquatic habitats of suboptimal quality due to limited bank side and aquatic vegetation. No records of water vole were returned in the last 10 years within 2km. As such, it is considered unlikely water voles are present and they are not considered further within this report.

Other Notable Species

Desk Study

3.121 Records returned for NERC Act 2006 notable species included one record for hedgehog *Erinaceus europaeus* 1.5km north from site in 2014, and 11 for common toad *Bufo bufo*. No records for brown hare *Lepus europaeus* harvest mouse *Micromys minutus* or polecat *Mustela putorius* were recorded.

3.122 Harvest mouse food cache were recorded onsite in dormouse tubes during 2015 surveys.

On-site Assessment

3.123 The hedgerow network within the site, dense scrub and planted trees were considered to provide suitable sheltering and foraging opportunities for hedgehog.

3.124 Harvest mouse is assessed as likely to be present on site given the evidence of a food cache in 2015 found within a dormouse tube. The habitats on site are considered to be consistent with 2015 as such, suitable harvest mouse habitat (field margins around fields and species diverse hedgerows / tree lines) remain present.

3.125 Pond 10 and surrounding dense scrub and hedgerows provide favourable conditions for common toad.

3.126 The adjacent woodlands (Great Wood/ Dodds Grove SSSI) to the south and (Pound Wood) to the north provide suitable habitat for polecat, and the hedgerow network on site offers potential commuting corridors.

3.127 It is considered that the majority of the habitat on site (improved grassland) is unsuitable for other notable species.

Importance

3.128 The site was therefore considered to have **site** importance for hedgehog, polecat, and common toad and **local** importance for harvest mouse.

Summary

Table 15. Summary evaluation of features.

Feature	Summary Description	Value
SPA/Ramsar/SAC	Benfleet and Southend Marshes SPA and Ramsar/SSSI and Essex Estuaries SAC	International
SSSI	Great Wood and Dodd's Grove SSSI Garrold's Meadow SSSI Thundersley Great Common SSSI Hockley Woods LNR/SSSI	National
LNR	Belfairs LNR Belton Hills LNR Leigh LNR Southend-On-Sea Foreshore LNR Canvey Lake LNR	National
LoWS	There were 10 Local Wildlife Sites (LoWS) within 2km of the site	Local
Habitats	Majority of site made up of improved grassland, three ponds were present, the most important habitat was considered to be the species rich hedgerows.	Up to District
Flora	No red list or protected species within development site	Site
Badger	8 badger setts identified on site including one likely main sett.	Local
Bats	Surveys show moderate levels of activity dominated by 'common' pipistrelle species. Moderate suitability foraging and commuting habitat on-site. Well connected by hedgerows network on-site, commuting value at local level.	Local
Birds	Wintering birds assemblage considered common and widespread.	Site
	Likely 22 breeding bird species recorded on site with a mosaic of valuable habitats for breeding birds	Local
Great crested newt	Limited suitable terrestrial and aquatic habitat, no historic records on or within 250m of site. Considered absent from site.	Negligible
Hazel dormouse	Presence confirmed in nest tube survey, hedgerow network provides suitable nesting and dispersal habitat.	District
Invertebrates	Unlikely to support a notable assemblage of notable species. Heath fritillary populations known in adjacent sites but limited suitable habitat on site.	Local
Otter	Lack of local records and limited suitable habitat onsite.	Negligible
Reptiles	Site supports a population of slow worm and historic population of grass snake	Local
Water Vole	Habitats on and adjacent to site considered sub-optimal	Negligible
Other notable species	Suitable habitats for hedgehog, polecat and common toad.	Site
	Harvest mouse considered present on site in low numbers	Local

4.0 Impacts, Mitigation & Enhancement Measures

Designated Sites

Impacts

4.1 The site falls within the ZoI of Benfleet and Southend Marshes SPA and Ramsar which form part of the Essex Estuaries SAC. The aforementioned sites are listed within the Essex Coast RAMS and also designated as Nationally important Sites of Special Scientific Interest (SSSI). At c2.7km distant, all construction and operational likely significant effects bar recreational pressure in isolation and in combination are screened out. SES have undertaken a Shadow Habitat Regulations Assessment and Designated Sites Assessment which is reported separately but the findings have been summarised below (SES, 2022).

4.2 The site is within 5km of five SSSI's and five LNRs, and is located within a Natural England IRZ for residential developments of 100 units or more. It is considered that in the absence of mitigation Great Wood /Dodds Grove SSSI and Garrold's Meadow SSSI (recreational pressure only) may be subject to the following impact pathways:

- direct loss or damage of habitats within a designated site or of nearby areas used by interest species, including functionally linked land;
- changes in air quality (including dust)
- changes in water quality;
- disturbance (activity, recreation, noise and lighting);
- recreational pressure; and
- introduction or spread of non-native invasive species.

4.3 No impacts to any other statutory or non-statutory sites are expected due to distance from the proposed development.

Mitigation

European Designated Sites

4.4 The Natural England guidance on SANGs provision to mitigate for recreational pressures on European designated sites recommends 8ha per 1,000 persons. With 173 units proposed and an average 2.4 persons per household (based on UK 2011 Census Data), this equates to a 3.32ha requirement for the site.

4.5 The illustrative landscape masterplan (Appendix 1) includes a total of circa 10ha of SANG quality open space which includes a range of different experiences including wetland areas, traditional orchard, wet grasslands, scrub grasslands and meadow grasslands which are all interlinked and accessible.

4.6 The onsite SANG is well above the provision required for the Essex RAMS, this area will also accommodate a series of walking routes.

4.7 The areas of accessible semi-natural open space that will be provided by the proposed development are considered more than sufficient mitigation for any potential recreational impacts on European coastal designated sites. Access throughout the new open spaces will be ensured through the provision of a network of footpaths.

4.8 The public open space will be provisioned with dog waste bins to ensure the amenity of the area is maintained for all residents to enjoy.

4.9 New residents of the development will receive a welcome pack on arrival containing information leaflets detailing the open space facilities available on-site and locally off-site. This information will include suggested walking

routes. Information boards will also be strategically located highlighting walking routes and wildlife / habitat sensitivities including the neighbouring SSSIs and LWS.

4.10 To ensure the long-term maintenance and management of on-site open spaces, a Landscape and Ecological Management Plan (LEMP) will be produced. This will detail appropriate management actions for maintaining the on-site provisions to the required standard for SANGs, works schedules, details of funding and the body or organisation responsible for implementation.

4.11 The site provides ample onsite open space for informal recreation but also has links to the wider offsite PRoW network for residents looking for wider exploration and recreation. These walking routes in addition to the onsite routes provide well over 2.7km of varied SANGS quality circular walks.

4.12 Mitigation in the form of a contribution to the Essex Coast RAMS is further proposed to ensure that there are no increased recreational pressures on the Essex Coast protected areas in combination with other plans and projects within the Zone of Influence of the Essex coast European designated sites. This mitigation measure is a standard measure agreed by Natural England and relevant competent authorities including Castle Point District Council.

4.13 The Essex Coast RAMS indicates a financial contribution of £137.71 per net new dwelling (2022/23). Subject to agreement on a reasonable per unit contribution, the RAMS financial contribution may be secured by an appropriate planning condition or commitment within a S106 agreement.

Great Wood /Dodds Grove SSSI and Garrold's Meadow SSSI

Construction Stage

4.14 Construction effects will be controlled by a CEMP, which will deal with physical protection of habitats such as retained trees and hedgerows. The CEMP will also deal with pollutants, water quality and indirect effects caused by lighting and noise.

Operation Stage

4.15 Mitigation measures to mitigate impacts upon the Benfleet and Southend Marshes SPA will also serve to mitigate impacts upon Great Wood and Dodd's Grove SSSI. In addition, there will be a minimum c.15m green buffer including thorny woody species to deter unfettered access into the woodland. A fence will also be provided along the woodland edge with the existing stream also serving to deter to access.

4.16 Changes to air quality are outside the scope of this report but the closest internal roads/ development parcels are c.200m from the woodland boundary edge Since vehicle exhausts are situated very close to the ground, the emissions only have a local effect within a narrow band along the roadside, well within 200m of the centerline of the road (Highway England, 2019). Beyond 200m, emissions will have dispersed sufficiently that atmospheric concentrations are essentially background levels.

4.17 Important habitats onsite will be protected and enhanced (e.g. hedgerows) with complementary habitats to Great Wood and Dodd's Grove also being created ensuring potential impacts to functionally linked habitats are avoided. Indirect impacts from lighting will also be addressed through a wildlife sensitive lighting strategy. Planting will also not include non-native invasive species, and this will be controlled via detailed landscaping proposals/a LEMP and a landscape clerk of works to ensure compliance.

Residual Effects

Through the above mitigation it is considered that there will be no adverse effects on the integrity of Benfleet and Southend Marshes SPA either alone or in combination or on Great Wood /Dodds Grove SSSI and Garrold's Meadow SSSI. The residual effects on statutory designated sites during the construction /occupational phase will be reduced to **neutral.**

Habitats

4.18 In the absence of mitigation, potential construction phase impacts of the development include loss of habitats of site to district value through site clearance and damage to retained habitats e.g., due to pollution events, or for trees/hedgerows, through direct damage or compaction of roots. In addition, retained habitats could be subject to indirect effects through increased light disturbance. During the occupational phase, retained habitats are also at risk of losing their ecological functionality due to lighting and noise disturbance, therefore affecting their biodiversity value.

4.19 There was one priority habitat (NERC habitat) present on site: hedgerows, and one on site and one adjacent: woodland. The EWT Living Landscapes Scheme for the Hadleigh and Daws Heath area is specifically mentioned in the Castle Point District Draft Local Plan under policy NE2 (now withdrawn). The living landscape scheme aims to "Safeguard and connect existing Biodiversity Action Plan (BAP) habitats within the landscape to make them more robust and sustainable". Policy NE2 of the withdrawn local plan explicitly stated that proposals would be accepted within this area where they seek to enhance the ecological assets of the Daws Heath Historic Natural Landscape.

4.20 The withdrawn Castle Point District Draft Local Plan – policy NE8 also stated that proposals resulting in any adverse impacts to biodiversity within Ramsar sites, SPA, Marine Conservation Zones, SSSI, and Ancient Woodland should be controlled through avoidance, on-site management and on-site mitigation. Where this cannot be achieved development proposals would be refused.

Hedgerows

Impacts

4.21 A large number of hedgerows on site have been classified as important under the Hedgerow Regulations (HMSO, 1997). These are classified as such due to their age, structure and general value to biodiversity. It is considered that these important hedgerows are of particular importance for biodiversity, however other hedgerows on site are also considered to offer ecological value (i.e. regardless of importance under the Regulations).

4.22 During construction ten sections of hedgerow two of which are considered 'important' are due to be cleared to facilitate the development. Potential impacts to retained hedgerows during construction include pollution, damage to the root plates from construction activities, and loss of ecological functionality due to artificial lighting. Impacts during the occupational phase include damage from new residents (such as 'cutting back' or fly-tipping) and increased levels of artificial lighting.

Mitigation

4.23 The proposed layout retains the majority of hedgerows and trees that are important at a district level. Where minor loss is unavoidable, mitigation is achieved in the form of planting new native species hedgerows on new sections of boundary, planting new native species trees in the POS and enhancing existing hedgerows through management plans.

4.24 During the construction phase retained hedgerows will be protected from potential damage during works through the provision of suitable fencing such as Heras fencing, installed in line with Root Protection Areas (RPAs). Impacts from artificial lighting will be mitigated during construction by avoiding night works were possible. Where night works are not avoidable, any required lighting will be pointed away from hedgerows and other ecologically valuable habitats. This and pollution prevention will be incorporated within a CEMP.

4.25 To address potential lighting impacts to hedgerows during occupation, a sensitive lighting scheme will be designed for the residential development in accordance with the latest guidance from the Institution of Lighting Professionals and Bat Conservation Trust's Guidance Note 08/18 Bats and artificial lighting in the UK (2018) and other referenced sources. Lighting along retained hedgerows or other vegetation features will not exceed a maximum of 1 lux (equivalent to a fully moonlit night) at 2m above ground level. Specific lighting strategies adopted to reduce light spill onto sensitive features and into the surrounding environment will include the following, as appropriate:

- LED luminaires will be used. Metal halide and fluorescent sources will not be used.
- LED luminaires will have a warm white spectrum (wherever possible) to reduce blue light component.
- Luminaires will always be mounted on the horizontal, *i.e.,* no upward tilt.
- Only luminaires with flat, cut-off lanterns, an upward light ratio of 0% and good optical control will be used.
- The height of lighting columns will be limited to a maximum of 8m (ideally 6m or below) and the spacing of lighting columns will be maximised to reduce spill of light into unwanted areas such as hedgerows and trees (Fure, 2006).
- Light sources will not emit ultra-violet light to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging.
- Luminaires will feature high peak wavelengths (ideally higher than 550nm) to avoid the component of light most disturbing to bats (Stone, 2012)
- Directional luminaires, shields, baffles and/or louvres will be utilized where necessary to direct light spill away from sensitive habitats
- Low-level directional downlighters will be utilized if lighting along pedestrian routes in proximity to hedgerows and treelines is required.
- A control management system may be used to dim or turn off groups of lights when not in use.
- Lighting that is required for security or access will use a lamp of no greater than 2000 lumens (150 Watts) and be PIR sensor activated on a short timer (1 minute), to ensure that the lights are only on when required and turned off when not in use (Jones, 2000; Hundt, 2012).
- Using reflective surfaces under lights will be avoided. Lights will be positioned so that they do not reflect off windows (e.g., onto bat flight lines).

Enhancement

4.26 Hedgerows will be enhanced through forming a buffer zone of at least 1m of ground flora, using a relaxed mowing regime to create different sward heights of grass and wildflowers. Gaps within existing hedgerows will be planted with native species of benefit to wildlife. Wildlife sensitive management of hedgerows will also be adopted through managing hedgerows on a 2-5 year rotation. Cutting on a three year rotation (i.e. one side, top, other side) will ensure flowers, berries and nuts can be produced by trees / shrubs. Cuts should be made outside of the bird nesting season (i.e. cuts between October – March), although later cuts (January / February) are preferable to provide a winter berry food resource for fauna.

4.27 Where retention of hedgerows is not possible, compensatory planting will be delivered in excess of losses to deliver net gain, in line with the NPPF (2021).

Woodland

Impacts

4.28 Belfairs Wood LNR /Great Wood and Dodd's Grove SSSI is an ancient woodland situated adjacent the site's southern boundary. Pound Wood is an EWT run site which is also designated as ancient woodland and is situated adjacent the sites northern boundary. It is considered likely that without mitigation these habitats could be negatively affected by artificial lighting and pollution during the construction and occupational phases. During the occupational phase direct impacts from human interaction could also cause physical damage to the woodland edges from activities such as 'cutting back' of vegetation.

Mitigation

4.29 The boundaries of the proposed development adjacent to these habitats will be protected from potential damage during works through the provision of suitable fencing such as Heras fencing, installed in line with RPAs (construction phase) and buffered by additional woodland planting (15-20m in width) (occupational phase). Planting of native thorny species will deter access from the site directly to the SSSI during the occupational phase to mitigate for any indirect adverse impacts from potential increases in recreational pressure. To prevent artificial lighting impacts during the occupational phase a sensitive lighting strategy will be implemented as per paragraph 4.24. Mitigation measures during the construction phase including pollution prevention methods and tree protection areas will be included within a CEMP.

Enhancements

4.30 Significant enhancements will be achieved through enhancing the connectivity on site between Belfair's Wood LNR/Great Wood and Dodd's Grove SSSI and Pound Wood ancient woodland. Species rich grassland within the development landscaping will provide further complementary habitat. Connectivity will be achieved through enhancing the hedgerows (see hedgerows section above), ensuring that gaps are closed between woodland and hedgerow. In addition, the creation of 'stepping stone' habitats such as patches of scrub will further increase connectivity for protected and notable species associated with these sites.

Ponds

Impacts

4.31 There are three ponds present on site (ponds 4, 7 and 10, see Appendix 10. Ponds 4 and 10 will be retained. Pond 7 will be lost.

Mitigation

4.32 Mitigation of any indirect impacts during construction will also be appropriated following the Environment Agency pollution prevention guidelines (Environment Agency, 2001-2011) and incorporated within a CEMP. To prevent artificial lighting impacts during occupation a sensitive lighting strategy will be implemented as per paragraph 4.24

Enhancements

4.33 Ponds will be enhanced to provide net gains for biodiversity; removal of fish (if present) will have an immediate beneficial effect. Planting of native species around pond edges and margins will increase the biodiversity value in the long-term. Re-profiling banks will increase the structural diversity of ponds, providing micro-habitats suitable to support a variety of species occupying different ecological niches.

4.34 Additional ponds are included within the proposed development that will increase the aquatic habitat resource on site. New and retained ponds will benefit from the planting of native aquatic and marginal vegetation which will enhance their ecological value. Native tree planting along the southwest banks will also provide some shading but will be managed so they do not prevent marginal vegetation growth. Some of these ponds will retain water permanently while others will only fill seasonally as they will form part of the Sustainable Urban Drainage (SUDs) strategy.

4.35 The SUDs will be designed and managed for biodiversity benefit. These SUDs will have a varied topography with permanently wet areas, broad draw-down zones and shallow gradients to provide niches for aquatic, emergent and marginal vegetation. Management will involve retention of long grassland cut on rotation (1- 3 year); any significant ingress of thistle, nettle or dock or other undesirable weed species will be controlled by more regular cutting management and other control mechanisms. Biodiversity will benefit from the variety of aquatic and marginal features providing habitat for invertebrates, amphibians and quality foraging habitats for birds and bats.

Summary of Biodiversity Enhancements

4.36 The proposed development offers a significant opportunity to deliver benefits to biodiversity through sensitive landscaping. All the POS will benefit from diverse native species planting. Additional enhancement will be delivered through sensitive ongoing management to maintain and enhance these habitats for wildlife and nectar-rich/berry-producing wildlife friendly ornamental planting throughout the development area.

4.37 The following habitat provisions are to be incorporated within the landscape proposals:

- The POS surrounding the SUDs will be landscaped and managed to make them wildlife friendly, and to support species such as common toad and hedgehogs, with occasional native scattered trees along the banks.
- The SUDs will be planted with wetland species rich mix (e.g., Emorsgate EM8) that is tolerant of flooding and will be managed as a wildflower meadow that will be compatible with the overall drainage function.
- Wildflower meadows will be created to the east of the site by enhancing the improved grassland fields. Species rich Tussock Mix (EM10) and Wildflower Mix (EM1) from Emorsgate will be planted for the majority of these areas as it is hard wearing but also species rich.
- The ponds that will retain water year round will include marginal vegetation to be planted with native species (e.g., Emorsgate EP1).
- New scrub planting will include a mix of at least five woody native species, including native berry producing species such as hawthorn and blackthorn and lower plants providing a nectar resource for invertebrates.
- Use of flowering lawn mixture (e.g., Emorsgate EL1) in amenity areas of POS that will be subject to more regular mowing, to deliver increased resource for pollinator species.
- The creation of a traditional orchard within the POS will be of native species and will include a species rich grassland for which is a key feature of this habitat. This area will be made accessible for new residents with a mown path.
- More formal/ornamental planting within the built development incorporating nectar-rich and berry producing species with known wildlife benefit, delivering foraging resource for birds and pollinators
- New tree planting throughout the site will be of native species of a diverse composition.
- Planting of non-native invasive species will be avoided throughout.

Biodiversity Net Gain

4.38 There are currently no adopted or saved policies regarding biodiversity net gain (BNG) in the Castle Point District Councils Local Plans, however the National Planning Policy Framework (MHCLG, 2021) states that developments should:

b) 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.

4.39 An increasing number of LPA's are requesting BNG assessments, citing the NPPF above.

4.40 BNG calculations resulted in a 38.08% net gain for habitat areas and a gain of 2.48% for linear habitats. The headline results are provided in Table 16 and the BNG metric calculation and summary of baseline condition assessments can be found in Appendix 14.

4.41 This BNG is reliant upon a number of assumptions such as: c.7.3ha of existing modified grassland being retained and enhanced to good condition other neutral grassland, the SUDS basins being managed as moderate condition other neutral grassland, and the creation of 0.8ha of traditional orchard managed to a moderate condition.

4.42 A net gain of linear habitats is considered feasible by the creation of 0.458km native species rich hedgerows which will be planted to the east of the site and managed to a 'good' condition. It is to be noted that newly created hedgerows for dormouse mitigation (Appendix 16) are not included within these BNG hedgerow calculations.

4.43 It is considered that these are achievable figures for the proposed development that would also require a clear management plan that would need to be imposed within a LEMP and contain specific detailed management requirements for each habitat.

Table 16: Biodiversity Net Gain Metric 3.1 Headline Results.

Brook Farm, Daws Heath

Headline Results

Return to results menu

On-site baseline	*Habitat units*	70.34
	Hedgerow units	29.28
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	97.13
	Hedgerow units	30.00
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	38.08%
	Hedgerow units	2.48%
	River units	0.00%
Off-site baseline	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00
	Hedgerow units	0.00
	River units	0.00
Total net unit change (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	26.79
	Hedgerow units	0.73
	River units	0.00
Total on-site net % change plus off-site surplus (including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	38.08%
	Hedgerow units	2.48%
	River units	0.00%
Trading rules Satisfied?		Yes ✓

4.44 Given the sites current layout and Landscape Strategy Plan (Appendix 1), a biodiversity net gain is considered fully achievable for habitat and hedgerow units.

Residual Effects

4.45 With the implementation of a CEMP the residual effect on habitats is predicted to be **temporary negative** during the construction phase. Through sensitive design and the implementation of a management plan post

development which will be delivered through a LEMP, long-term, **positive** effects are predicted as enhancements mature.

Protected and Notable Species

Flora

Impacts

4.46 The development site does not currently support any protected or notable plant species and therefore no significant negative impacts to rare or notable flora are expected to result from the development.

Enhancement

4.47 Botanical diversity on site will be enhanced through wildlife friendly landscaping including the creation of wildflower meadows and new native tree and hedgerow planting, as detailed above.

Residual Effects

4.48 As no rare or notable species were found within the proposed construction zone, residual effects during construction are predicted to be **neutral**. Long-term, it is considered likely that a **positive** residual effect on flora will be achieved through implementation of the wildlife friendly landscaping scheme.

Badger

Impacts

4.49 Badgers are legally protected under the Protection of Badgers Act (1992).

4.50 Eight setts including a main badger sett were identified on-site (Appendix 7). The development footprint falls within 30m of six setts (Sett 1, 3, 5, 6, 7 and 8) which includes the likely main sett and there is therefore potential to disturb, damage or destroy underground chambers and risk killing/injuring animals as a result of earthworks and road traffic collisions during the construction period. A network of paths and foraging signs were also identified on site which indicated that the development would have an impact on the badger populations feeding and commuting routes through loss of habitat. This is predicted to have a negative effect at a **site** level during the construction period.

4.51 It is possible that badgers will be affected post-development through increased recreational disturbance (*e.g.,* disturbance from pedestrians and domestic animals). This is predicted to have a **negative** effect at the **site** level.

Mitigation

4.52 A Natural England badger mitigation licence will need to be applied for once planning has been approved. Licenced mitigation works are only permissible from 1st July and up to 30th November.

4.53 These works are proposed to include closures to setts 1 3, 5, 6, 7 and 8. The closures will involve the installation of one-way gates at each entrance and mesh onto the surrounding ground. Gates will then be monitored for 21 days to ensure any badgers present have been excluded and cannot return. Upon 21 days (no signs of badgers re-entering the sett within this period) the setts will be meshed and hard blocked to prevent badgers re-entering.

4.54 As sett 1 is a main sett, additional mitigation in the form of a new artificial sett will be required prior to its closure and will follow guidance by Cresswell et al (1993). The artificial sett will be created on site and within the same badger clans territory. As Natural England licences allowing sett closure are usually only granted for the period between 1st July to 30th November, the artificial sett will be created several months in advance. In this interval, the affected badgers will be encouraged to utilise the artificial sett by means of attractive food baits (peanuts etc.) and materials from the breeding sett added (such as bedding and spoil).

4.55 Setts 2 and 4 are to be retained and will be protected throughout the construction period. Heras fencing will be installed to delineate a 30m exclusion zone around each sett, to prevent disturbance.

4.56 To avoid potential impacts of death/injury to foraging and dispersing badgers during construction, the following precautionary techniques that are sympathetic to badgers will be followed throughout the construction phase and will be delivered through a CEMP:

- All workmen on site will be fully briefed concerning the presence of badgers and the mitigation measures to be followed.
- Any trenches or deep pits will be securely covered overnight to stop any badgers falling in and becoming trapped. Alternatively, a rough plank can be provided, at an angle no steeper than 45 degrees, to allow any badgers a suitable means of escape.
- Any trenches/pits will be inspected each morning and evening to ensure no badgers have become trapped.
- The storage of topsoil or other 'soft' building materials within the site will be given careful consideration. Badgers will readily adopt such mounds as setts, which would then be afforded the same protection as established setts. So as to avoid the adoption of any mounds, they should be subject to daily inspections before work commences.
- During the work, the storage of any chemicals will be contained in such a way that they cannot be accessed or knocked over by any roaming badgers.
- Open pipework with a diameter of more than 120mm will be properly covered at the end of the work day to prevent badgers entering and becoming trapped.
- Litter on site will be cleared at the end of the working day or otherwise kept to a minimum.
- Security lighting will be kept to a minimum so as not to disturb any badgers on site.

4.57 Creation of wildflower meadows to the east of the site with the inclusion of berry rich native species hedgerow planting will mitigate for the loss of foraging habitat. A three-year rotation will be implemented to so that no more than one third of this habitat is cut in a given year, this will provide a varied provision of rough and short grassland which is suitable for badgers.

4.58 Reduced speed limits will be implemented along residential roads, with roads generally set back from dispersal corridors. As part of the development's proposal, garden fencing will restrict direct access to the sett from residents and domestic animals (such as dogs). To further protect the main sett from increased recreational disturbance and in conjunction with the hedgerow mitigation, additional thorny native hedgerow species will be planted to enhance the hedgerows surrounding the sett. This would act to discourage pedestrian access to the sett.

4.59 A pre-construction badger walkover survey will be undertaken within six weeks before works begin on site, to ensure no new setts have established on-site in the intervening period.

Residual Effects

4.60 With the implementation of the above mitigation, the effect on badgers is considered to be **neutral** at the **site** level during both the construction and occupation phases.

Bats

Impacts

4.61 There are three buildings on site (B2, B3 and B5) which were considered to have low suitability for roosting bats. These buildings are due to be demolished to facilitate the development. These works have potential to destroy a roost and disturb, kill or injure bats (if present), which are offences under the Conservation of Habitats and Species Regulations (2017, as amended).

4.62 Eighty-one trees on site were identified to be of low, moderate or high suitability for roosting bats (Appendix 8). All of these trees are to be retained as per the proposed layout. These retained trees are likely to be impacted by site lighting during the construction and occupational phases.

4.63 The ecological functionality of foraging and commuting routes on site could be impacted by habitat loss during construction where existing boundary vegetation is required to be cleared.

4.64 During the occupational and construction phase, foraging and commuting bats, as well as roosting bats (if present) could potentially be impacted by lighting disturbance. This could again result in loss of foraging habitat, disruption of commuting routes, and loss of roosts (if present), through abandonment.

4.65 The impact to the foraging and commuting routes for bats is predicted to be **negative** at a **site** level without mitigation due to the impacts during construction of lighting and commuting/foraging habitat loss.

Mitigation

Tree Roosts

4.66 To enable bats to utilise retained and created roosts post-development, a sensitive lighting strategy will be developed for both the construction and occupation phases that avoids directly lighting the retained vegetation. The general mitigation strategies for lighting can be found in the habitats section paragraph 4.24.

Building Roosts

4.67 Prior to demolition further surveys are required to confirm the presence/likely absence of a roost and determine the requirement for a Natural England mitigation licence to permit demolition of the buildings.

4.68 In accordance with current guidance (Collins, 2016), one emergence/re-entry survey of the buildings is required between May-August. Until these surveys have been completed, the relevant buildings will be retained and protected from disturbance. Should further survey confirm the presence of a roost, further surveys will be necessary (likely three in total), to facilitate the application for a licence, which will be pursued following planning approval.

4.69 As the buildings (B2, B3 & B5) have low suitability, any roost would be expected to have low conservation significance (e.g., day roost for single bat). As such, impacts therefore would be low level, and mitigation will be uncomplex and fully deliverable.

4.70 In the unlikely event that roosting bats are identified licenced mitigation would be required, which would include a soft-strip of roost features on the building supervised by a bat licenced ecologist during appropriate seasonal timings, with alternative roosting opportunities to be provided to compensate for those lost from the site (such as additional bat boxes appropriate for the species impacted).

Foraging and commuting

4.71 Mitigation for impacts to foraging and commuting bats will comprise the retention of the majority of the existing treelines and hedgerows along the boundaries.

4.72 The effect of lighting during the construction phase will be mitigated by working within day light hours only. If nigh time working is required any necessary lighting facilitating the works will be directed away from boundary treelines and hedgerows in order to maintain a dark corridor.

4.73 The effect of lighting from the development post-construction is addressed in paragraph 4.24, and is anticipated to be minimal as only the gardens from the proposed development will back onto the commuting and foraging corridors along the treelines and hedgerows along the east west and south of the site and will therefore allow for a 'dark corridor'. Lighting for the back gardens/patio areas will be installed by the developer to dissuade residents from installing their own, and will follow sensitive lighting recommendations (paragraph 4.24).

Enhancement

4.74 Enhancements for foraging bats will be delivered through the site landscaping. New planting will incorporate a high density and diversity of native species rich scrub, hedgerow and tree species as this is more favourable for invertebrates (bats prey). New planting will create new commuting corridors and create links within the wider landscape. Appropriate management and buffering of retained hedgerows will maintain and enhance the functionality of the existing habitats. New wildflower grassland areas will be subject to low-intensity management to maintain a tall sward height providing refuge and feeding opportunities for a variety of invertebrate species. Ongoing management will additionally seek to maximise the density and diversity of scrub/grassland edge 'micro-habitats' along the margins of the site, particularly through the SUDS and the new ponds as this will provide favourable foraging habitats for bats. Further enhancement will be delivered within the ornamental planting areas within the development itself through planting of nectar-rich night scented flora known to be attractive to moths.

4.75 Further enhancement for roosting bats will include provision of additional roosting opportunities through bat boxes at a ratio of 1 box per 4 dwellings (44 in total) integrated in new buildings and/ or installed on retained boundary trees. A variety of bat boxes that can integrate seamlessly into the design of new buildings are available, such as the Habitat Bat Box, which can be supplied plain for a rendered finish, or faced with brick (see Figure 1). Alternatively, there are a wide range of woodcrete bat boxes with a long lifespan that are suitable for installation on trees, such as the Schwegler 1FD (see Figure 2).

Figure 1: Habibat Bat Box faced with red brick, incorporated within wall at gable end.

Figure 2 :Schwegler 1FD bat box erected on a tree.

4.76 To maximise likelihood of occupation, boxes will be sited within the retained eastern boundary treeline (a core area of bat activity through the site) and within properties along the eastern edge of the development. Boxes will be sited at a minimum height of 3m away from artificial light sources. Orientations will range from south to

north facing to provide a range of micro-climactic conditions suitable for individual torpid bats as well as active maternity groups. Where installed on buildings, boxes will be installed high up within gable ends. Where installed on trees, care will be taken to ensure surrounding branches do not block the flight path to the box or provide opportunity for predators to access the box (e.g., cats).

Residual Effects

4.77 Retention and protection of the site boundary habitats and the majority of the hedgerow network will enable a **neutral** residual effect on bats to be achieved through the construction phase. The addition of bat boxes in trees and buildings will provide an increased opportunity for roosting bats on site. With the enhancement and addition of new hedgerows that will create additional foraging and commuting corridors during the operational phase. It is predicted that this will enable an overall **positive** residual effect on foraging, commuting and roosing bats.

Birds

Impacts

4.78 The proposed development will result in the loss of suitable habitat for wintering and breeding birds. Potential impacts on nesting birds include death, damage to and disturbance of nests during vegetation clearance and reduced foraging resource for wintering and breeding birds from habitat loss. Increased disturbance during the construction phase is also considered likely to have an adverse effect on species nesting along the boundaries of the site and within the adjacent SSSI without suitable mitigation.

4.79 However, the sites breeding and wintering bird assemblages comprised common and widespread species, with relatively low numbers of red and amber list BoCC, and was predominantly associated with the hedgerows, trees and farm buildings onsite which will generally be retained and enhanced.

4.80 Impacts are therefore considered potentially **negative** at up to **site** level in the absence of suitable mitigation.

Mitigation

4.81 The majority of the sites breeding birds are associated within the hedgerows, trees and farm buildings. These habitats will be retained and enhanced where possible. Significant impacts of nesting habitat loss will be avoided through sensitive design, with the site layout retaining the majority of the existing hedgerow features. Where some losses of existing hedgerow will be lost to facilitate the development, this will be fully compensated through new planting.

4.82 New planting, using appropriate species of local provenance is also included within the landscape plan (Appendix 1). Loss of any hedgerow will be mitigated for by new planting of appropriate native species rich hedgerow. New buildings will incorporate integrated nest boxes within the building design suitable for species of Conservation Concern which are associated with the built environment, such as house sparrow and starling (Red listed) and house martin, swallow and swift (Amber listed) all of which have been recorded on site.

4.83 Those habitats of ecological value, which may benefit the bird community, will need long-term management which will be delivered through the LEMP. Where any clearance of nesting bird habitat is required (scrub, trees, hedgerow and buildings), then this will be undertaken outside the nesting bird season (March to August inclusive), or only once a habitat inspection has been carried out by a suitably qualified ecologist within 24 hours prior to clearance to confirm the absence of active nests. Any active nests located during inspections will be protected with a suitable buffer of retained vegetation around the nest (of appropriate size to the species) and monitored until the nest is no longer active/all chicks have fledged, when the ecologist will provide sign off for clearance to be undertaken.

4.84 Potential impacts of disturbance to retained nesting habitats during construction will be mitigated through measures to control light and noise disturbance in accordance with industry best practice.

Enhancement

4.85 New habitats for foraging birds will be delivered through the site landscaping. New planting will incorporate berry producing native hedgerow species as well as wildflower grassland areas within the POS providing refuge and feeding opportunities for a variety of invertebrate species.

4.86 Inclusion of integral bird boxes within the fabric of new buildings and installation of bird boxes on retained trees is recommended to deliver additional enhancement/nesting opportunity for urban associated species. An ecological enhancement plan should be developed for the site to specify the number and locations of boxes to be incorporated. British Standard 42021:2022 for integral nest boxes states that to provide new and enhanced opportunities for nesting, the number of integral boxes on new developments should at least equal the number of dwellings (i.e. 1:1 ratio), though in practical terms, boxes may be 'grouped' within a scheme (more than one box on some properties, and none on others). It is recommended considering the assemblage recorded on site that to diversity the nesting opportunity, integrated provision is further supplemented by an additional 20x boxes on trees.

4.87 Where installed on trees, boxes will be made of a long-lasting material e.g., woodcrete and will be installed at a minimum height of 2m. Care will be taken to ensure surrounding branches do not provide opportunity for predators to access the box (e.g., cats). Examples of artificial nest boxes suitable for erection on trees and integration within new properties are provided below:

Figure 3: Bird Brick Houses swift box for integration into walls.

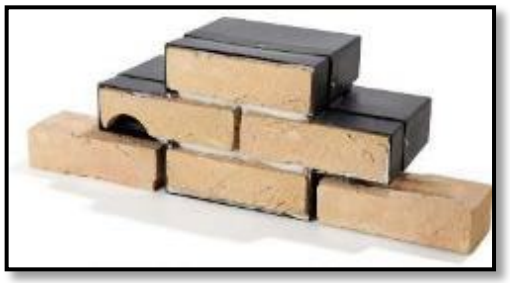


Figure 4: Schwegler 1B bird box for erection on trees.

Residual Effects

4.88 It is predicted that retention of the site boundary and the majority of the hedgerow habitats and protection through construction will enable a **neutral** residual effect to be achieved through the construction phase.

4.89 Through the delivery of on-site landscaping enhancements and provision of bird boxes a **positive** residual effect for birds is predicted to be achieved post-occupation.

Hazel Dormice

Impacts

4.90 The proposals involve the removal of hedgerows on site to facilitate the development. Without suitable mitigation, direct negative effects on hazel dormice are predicted to be **negative** at a **site** level and include loss of foraging habitat, fragmentation, and potential killing / injury of hazel dormice during the construction and operational phases. Given the only locations hazel dormice have been found is on the boundaries it's difficult to conclude that they currently use the site as a connecting corridor, more likely they utilise the edges. As such the internal hedgerows that are to be lost are unlikely to have an impact on the local population.

Mitigation

4.91 As hazel dormice are known to be present on site, a Natural England (NE) European Protected Species Mitigation License (EPSML) will be required to enable vegetation removal.

4.92 The objectives for the dormouse mitigation strategy are:

- To conserve the existing level of use of the proposed development site by dormice;
- Provide dormouse habitat and ensure connectivity is maintained throughout the site and into the wider countryside; and,
- To maintain the abundance and the long-term favourable conservation status of the dormouse population within the zone of influence of the site.

4.93 Mitigation for habitat loss will include retention of boundary habitats, the retention of the majority of the internal hedgerow network and the creation of new hedgerows to achieve a no net loss in hedgerow linear length. Retained hedgerows will also be enhanced, through planting of native, thorny species, where appropriate. This mitigation will maintain connectivity throughout the site and prevent the species from becoming isolated. A plan of the proposed hedgerows can be found in Appendix 16.

4.94 To prevent impacts of death, injury and disturbance during the habitat clearance, mitigation will involve clearing the habitat where required in conditions when dormice are active (between May-October, preferably avoiding the breeding season between June-August) or using a two-phased approach (first cut in winter to knee-height with a following spring cut to ground level once dormice have emerged from hibernation), under a Natural England EPSM licence. Part of the licence application will consist of a method statement which will fully detail mitigation proposals; Natural England agreement will be sought through the licencing process.

4.95 Dormice have the potential to be impacted during construction through disturbance. To mitigate for this effect, retained vegetation will need to be screened (i.e. through Heras fencing), to prevent construction workers from encroaching onto these areas. In addition, the lighting strategy described above in the bat section will also mitigate lighting disturbance for this nocturnal species.

Enhancement

4.96 Enhancing the proposed development site for dormice will significantly promote dormouse dispersal from Belfair's Wood LNR/Great Wood and Dodd's Grove SSSI which are severely isolated due to urban expansion. Enhancement of the proposed development is to include the following:

- Further hedgerow planting in areas identified as having significant gaps, particularly in the southern boundary of the site;
- Increasing the species-richness of hedgerows with under five woody species with species of benefit to dormice and planting climber species including Honeysuckle *Lonicera periclymenum*;
- Management of hedgerows should be based on recommended as per paragraph 4.25 in relation to hedgerows

4.97 Planting of native thorny species within retained hedgerows will provide an increase in structural diversity while bolstering connectivity and will act as a deterrent to predation from cats during the operational phase. The hedgerows will also be planted with additional species of known benefit to dormouse providing an enhancement for the species.

4.98 Additional breeding and nesting areas for dormice will be provided such as dormouse nest boxes within nearby, connecting suitable habitat (including boundary habitat). Nest boxes are a particularly attractive substitute for natural tree holes and, where boxes are provided, a high proportion of the dormouse population may use them.

Nest box density, subsequent monitoring of the species and ongoing management will be confirmed at the licensing stage by NE.

Residual Effects

4.99 Through the proposed mitigation it is considered that a **neutral** residual effect will be achieved during the construction phase. Through the delivery of on-site landscaping enhancements, improving connectivity on site, a **positive** residual effect for dormice is predicted to be achieved post-occupation.

Invertebrates

Impacts

4.100 The areas proposed for development are generally of low value and away from the majority of the species-rich hedgerows with mature trees. The site is located in a potentially strategically important area in relation to two woodlands with heath fritillary butterflies (Pound Wood and Belfair's Wood LNR / Great Wood and Dodds Grove SSSI) and the wider blocks of ancient woodland to the north, west and east (and south-east). Key parts of the site are likely: The eastern end, occupying a direct link between Pound Wood and Belfair's Wood LNR / Great Wood and Dodds Grove SSSI and; the northern and southern boundaries of the site, which may act as corridors of woodland edge habitat relevant to any movements between woodlands to the west and through the site to the woodlands to the north and east (and south-east).

4.101 The location of development along the north-west 'quarter' of the site is probably in the least important part of the site (for invertebrates), representing a partial barrier to east-west movements but not between the heath fritillary woodlands. As such the impact of fragmentation is considered to be minor.

4.102 Site lighting is considered to be the most significant negative impact of the occupational phase, acting to variously attract or even repel some night-flying species. Both these effects may have negative consequences at the population level (Bruce-White and Shardlow, 2011). The masterplan shows development to be restricted to the north-west, at least 170m from Pound Wood and Belfairs Wood LNR / Great Wood and Dodds Grove SSSI and as such the direct impacts on the assemblage of woodland invertebrates are considered to be negligible, but for on-site species likely to be minor.

Enhancement

4.103 Enhancements for invertebrates will be delivered through the site landscaping. New planting will incorporate a high density and diversity of native hedgerow and tree species and new wildflower grassland areas will utilise wildflower mixes. The landscape infrastructure will enhance habitat areas for invertebrates where currently the habitat is a low quality, improved grass sward. The landscaping will create gentler transitions between retained open areas and hedgerow creating a range of conditions and also expanding the availability of key nectar resources in terms of quantity and type of flowers available as well as extending the season over which flowers are abundant.

4.104 These enhancements will be of value to a range of invertebrates, including pollinators which will contribute towards the B-line network that the site falls within.

4.105 The host plants of the heath fritillary are cow wheat *Melampyrum pratense*, ribwort plantain *Plantago lanceolata* and germander speedwell *Veronica chamaedrys*, which are found in open habitats but with shading in summer. Cow wheat has proven to be very difficult to plant or introduce to new habitats as the understanding of its hemiparasite nature is not fully understood (Walter, 2005). As such it is not considered appropriate to consider introducing habitat for heath fritillary as this may be undeliverable within the scheme.

4.106 While it is difficult to create habitat for heath fritillary the key role of the landscaping is considered to be to enhance the potential connectivity between the heath fritillary woodlands. Such connectivity would be facilitated by providing habitat patches (Stepping stones) with abundant nectar resources in June and July, with scrub and shelter providing cover for individual butterflies. A key point is the need to avoid creating continuous bands of vegetation which may act as a barrier to dispersal, such that 'bands' of vegetation should be orientated north-south and if necessary gaps retained or created to allow butterflies to fly through. With the distance of this gap across the site being approximately 450m it is above the typical colonisation distance for heath fritillaries which is in the region of 150m (Holloway et al., 2003) therefore the value of such landscaping is likely to be long-term and occasional.

Residual Effects

4.107 With appropriate design and implementation of the lighting strategy, it is considered that impacts will be neutral. With the soft landscaping proposed, it is considered that there will be moderate benefits: with improvements to habitat areas, resource availability and landscape connectivity. These are relevant to the local landscape and context. Through these measures a **neutral** residual effect on invertebrates is expected to be achieved during construction, with a **positive** residual effect delivered long-term through landscaping measures.

Reptiles

Impacts

4.108 The presence of reptile species on the proposed development site is not considered to significantly constrain the proposed layout of the development scheme due to the large areas of open space which are due to be maintained and enhanced to the east of the site. However without suitable mitigation, direct negative effects on reptiles during the construction phase of the development are predicted, such as loss of foraging habitat (hedgerows and hedgerow margins), fragmentation and potential killing / injury, for example through earthworks or creating temporary hibernacula from earthworks, that the subsequent destruction of would likely cause an offence under the WCA (1981, as amended). Given that the majority of the recordings of slow worm were found to the east of the site it is considered that only a small proportion of the slow worms on site will be negatively impacted by the development parcels to the west of the site.

Mitigation

4.109 Erection of temporary reptile fencing around the development zone is proposed to exclude reptiles from the construction area, alongside a period of trapping and translocation. For the 'exceptional' population of slow-worm and (historic) 'low' population of grass snake, HGBI workers manual good practice guidelines (HGBI, 1998) recommend a 90 day trapping period using 100 refugia per hectare, however, capture effort can be increased (i.e. higher density of reptile refugia placed) to conclude the trapping sooner. Trapping would be concluded after 5 consecutive 'clear' trapping days have been reached, or at the discretion of the onsite ecologist. Captured individuals should be translocated to a previously established refugia within an agreed area of open space which has been enhanced for reptiles prior to translocation commencement. An area in either the southwest or northeast fields (due for retention) of the study area will be sufficient to create an onsite receptor area which will be enhanced in advance of the translocation.

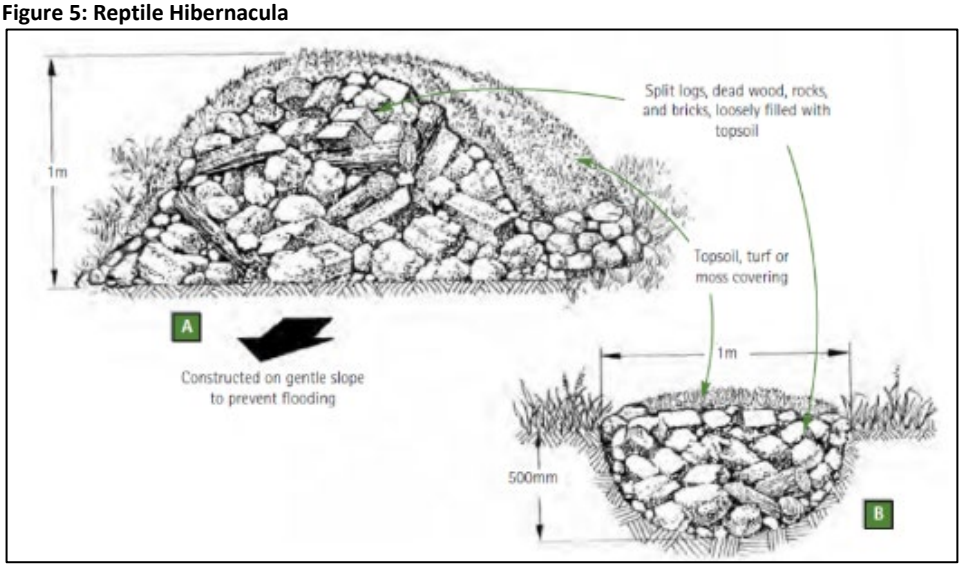
4.110 As the receptor site would have previously been a heavily grazed pasture, enhancements to a wildflower tussocky grassland will provide new high quality suitable habitat and a larger carrying capacity to the areas to be lost to the development (hedgerows and marginal vegetation). As such, the carrying capacity will be significantly increased above the baseline.

Enhancement

4.111 Hedgerows and areas of scrub are largely being retained on site, in addition, large areas of open space in the east of the site are proposed to be retained and enhanced post-development with the creation of wildflower and tussocky grasslands. These grasslands will be created with a sensitive management plan that will deliver new long sward areas with connectivity to hedgerow and scrub habitats suitable for reptiles. The retention and enhancement of hedgerows on site will provide ongoing and improved connectivity for reptiles post-development, south to north (i.e. between Great Wood and Dodd's Grove SSSI and Pound Wood), as well as east to west, i.e. along the river corridor.

4.112 Further enhancement for reptiles can be achieved through the creation of hibernacula (see Figure 5) or log piles within grassed areas and open spaces. This will result in an increase in availability of hibernating / sheltering habitat for any potential reptiles. In addition species of benefit to wildlife will be planted in these areas to encourage invertebrate prey into the area and thus enhance the site for wider biodiversity in general.

Figure 5: Reptile Hibernacula



Residual Effects

4.113 Sensitive working and translocation will deliver a **neutral** residual effect for reptiles during construction. A **positive** residual effect for reptiles will potentially be achieved through landscaping enhancements and the provision of hibernacula.

Other Notable Species

Impacts

4.114 Potential impacts to hedgehogs, polecat, harvest mouse and common toad include risk of death/injury during construction/vegetation clearance.

4.115 In addition, if access is impeded to new residential gardens, habitat loss/fragmentation could significantly impact hedgehog during the occupational phase.

Mitigation

4.116 Where clearance of suitable habitat (arable margins with mixed scrub/grassland) is necessary, precautionary measures will be followed to reduce risk of direct harm, to include:

- Sensitive timings for works e.g., outside of hedgehog hibernation season (November-March)

- A search by an ecologist for hedgehog and harvest mouse nests prior to clearance
- A two-stage cut of tall grasses and ruderals, where the first cut is made to a height of no less than 15cm and 24 hours then left to elapse before remaining vegetation is cleared to ground level, allowing time for any disturbed animals to move away from the area

4.117 Precautionary measures recommended for badger (e.g., covering trenches overnight or provision of a mammal ladder), will further serve to protect hedgehogs during construction.

4.118 To facilitate the movement of hedgehogs through the site post-construction, 'hedgehog highways' will be provided within all new lengths of garden (and where feasible boundary). A 13cm x 13cm hole is recommended which is too small for most pets and can be delivered by raising a fence panel per garden, installing hedgehog friendly fencing, removing a brick at the bottom of a wall or cutting a hole in fencing/walls.

Figure 6: Hedgehog friendly fencing

Enhancement

4.119 The enhancement of retained hedgerows and creation of new hedgerow habitats will benefit hedgehogs, harvest mouse, polecat and common toad by providing enhanced foraging and refuge opportunities on site. The new SUDS created will further enhance potential for the common toad. Wildflower meadows will further benefit harvest mouse.

Residual Effects

4.120 Sensitive working and clearance methods will deliver a **neutral** residual effect for notable species during construction. A **positive** residual effect for harvest mouse, common toad, pole cat and hedgehog should potentially be achieved through landscaping enhancements and the provision of hedgehog friendly fencing.

5.0 Conclusions

5.1 A summary of likely impacts, mitigation and enhancements proposed is provided in Table 17.

Table 17. Summary of likely impacts, mitigation and enhancement measures and residual impacts.

Feature	Impacts – Construction Phase	Impacts – Operational Phase	Mitigation	Enhancement	Residual Effect – Construction Phase	Residual Effect – Operational Phase
SPA/RAMSAR	No significant impacts predicted	Increased recreational pressure	Provision of a householder information pack highlighting recreational spaces and natural greenspaces to visit in the local area Financial contribution to Essex Coast RAMS Creation of on site SANGs managed via a LEMP	N/A	Neutral	Neutral
SSSI	Increased air pollution	Increased recreational pressure	Provision of a householder information pack highlighting recreational spaces and natural greenspaces to visit in the local area CEMP	N/A	Neutral	Neutral
LNR	Increased air pollution	Increased recreational pressure	Provision of a householder information pack highlighting recreational spaces and natural greenspaces to visit in the local area CEMP	N/A	Neutral	Neutral
Habitats	Loss of habitats of up to district value during site clearance Lighting disturbance of retained habitats	Loss of ecological functionality of retained habitats due lighting disturbance	Retention/protection of habitats of district value hedgerows where possible Sensitive lighting strategy CEMP	Positive Biodiversity Net Gain achieved for habitats and linear features and delivered through a LEMP. Wildlife friendly landscaping scheme including: SUDS, wildflower meadows, pond creation and enhancements,	Temporary Negative	Positive

Feature	Impacts – Construction Phase	Impacts – Operational Phase	Mitigation	Enhancement	Residual Effect – Construction Phase	Residual Effect – Operational Phase
	Damage to RPAs of retained hedgerows and trees		RPA fencing	native scrub planting, tree planting and creation of traditional orchard		
Rare and Notable Flora	No significant impacts predicted	No significant impacts predicted	N/A.	Wildlife friendly landscaping scheme incorporating diverse native planting and wildflower mixes.	Neutral	Positive
Badger	Setts including a main sett onsite with risk of damage to underground chambers and risk of injury/death during construction Injury/death during construction via earthworks and construction traffic	Reduced foraging and restricted commuting routes as a result of habitat loss Increased recreational disturbance	Closure of badger setts. Works to be undertaken under Natural England issued licence. Creation of artificial badger sett in advance of main sett closure. Protection of retained setts with Heras fencing Standard **precautionary** measures; covering trenches overnight or installing a plank/mammal ladder, sensible storage of chemicals/equipment, avoidance of littering Pre-construction walkover to check for any new setts established on site Wildflower planting in POS and wild berry planting in enhanced and new hedgerows. Three year cutting regime to ensure provision of rough grassland suitable for badger in the southern POS Planting of additional thorny species to enhance hedgerows and discourage pedestrian access	Wildlife friendly landscaping scheme incorporating diverse native planting of wildflower and wild berry mixes into retained and new hedgerows.	Neutral	Neutral

Feature	Impacts – Construction Phase	Impacts – Operational Phase	Mitigation	Enhancement	Residual Effect – Construction Phase	Residual Effect – Operational Phase
Bats	Killing/injury Loss of three potential roost buildings Loss of foraging/ commuting habitat Lighting disturbance of commuting/ foraging areas and roosts	Lighting disturbance of retained foraging/commuting habitats	Further dusk dawn surveys required to determine current usage of potential roost buildings by bats. If found to be present. A Natural England issued mitigation licence will be required to demolish Buildings 2, 3 and 5. Mitigation to include the provision of bat boxes. Retention and extension of boundary vegetation features. Sensitive lighting scheme during construction and occupational phases avoiding light spill on to boundary habitats and roost trees	Provision of bat boxes on retained trees and within new buildings (44 total) Wildlife friendly landscaping scheme favourable for bats invertebrate prey Enhanced connectivity to the wider landscape with additional hedgerow planting and enhancement.	Neutral	Positive
Birds	Injury/death of birds and eggs Destruction of nests Disturbance of nests Reduced food resources	Disturbance of retained habitats	Sensitive timings for vegetation clearance or nesting bird check by an ecologist within 24 hours prior with suitable buffer to be applied around any nests found Retention, reinforcement and buffering of boundary features New native hedgerow and tree planting	Wildlife friendly landscaping scheme incorporating berry producing native scrub and hedgerow species as well as semi-natural grassland areas providing refuge and feeding opportunities for a variety of invertebrate species. New natural nesting habitats (trees and scrub) to be provided along with artificial nesting opportunities (20 boxes on retained trees, one integrated box per residential unit following BS42021:2022).	Neutral	Positive
Hazel Dormice	Injury/death during vegetation clearance	Reduced foraging and restricted commuting routes	Vegetation clearance under a Natural England EPSML. Hedgerow planting to achieve a no net loss.	Enhancement of hedgerows for connectivity and foraging.	Neutral	Positive

Feature	Impacts – Construction Phase	Impacts – Operational Phase	Mitigation	Enhancement	Residual Effect – Construction Phase	Residual Effect – Operational Phase
	Loss of foraging/ commuting habitat	as a result of habitat loss Disturbance of retained habitats Predation by domestic cats	Retention and enhancement of boundary vegetation features. Protection of retained habitats using Heras fencing.	Creation of new species rich hedgerow and scrub habitat Planting of native thorny species to deter predation by cats Hazel dormice nest box scheme		
Invertebrates	Killing/injury common species	Lighting disturbance of retained habitats	Sensitive lighting scheme Protection of retained habitats	Wildlife friendly landscaping scheme incorporating a diverse mix of native species and nectar-rich species. Creation of 'stepping stone' habitats for heath fritillary butterfly which include larval food plant species	Neutral	Positive
Reptiles	Death/injury during site clearance /destruction	Loss of foraging habitat Fragmentation of populations	Reptile fencing and translocation prior to construction	Enhancement and creation of new hedgerows. Enhancement of field to wildflower species rich and tussocky meadows. Creation of hibernaculum's Creation of log piles	Neutral	Positive
Other notable species (hedgehog, common toad)	Death/injury during site clearance/ construction	Fragmentation of habitat for hedgehog, harvest mouse and common toad	Sensitive timings for clearance (outside hedgehog hibernation season). Search by an ecologist for hedgehog and harvest mouse nests prior to clearance. Sensitive two-stage clearance of suitable habitats Precautionary methods during construction (as for badgers)	Provision of hedgehog highways in fencing. New wildflower meadows and hedgerow habitats in will benefit hedgehogs, harvest mouse and common toad by providing enhanced foraging and refuge opportunities on site.	Neutral	Positive

Feature	Impacts – Construction Phase	Impacts – Operational Phase	Mitigation	Enhancement	Residual Effect – Construction Phase	Residual Effect – Operational Phase
				The new pond as part of the SUDs will benefit common toad populations on site.		

5.2 Through the above mitigation including sensitive layout design, a wildlife friendly landscaping scheme, sensitive practices/management during construction and occupation and precautionary methods as suggested, it is considered that all significant impacts upon biodiversity, including any potential adverse impacts upon specific protected species and habitats will likely be able to be wholly mitigated in line with relevant wildlife legislation, chapter 15 of the NPPF (MHCLG, 2021); and saved local plan policies with regard to biodiversity.

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Appendix 1. Site Location & Development Proposal Plans

Site Location Plan

Landscape Masterplan

Appendix 2. Legislative and Policy Framework

This document has not been prepared by a legal or planning professional and should be read as an interpretation of relevant statutes and planning policy guidance only. The information presented within this document has been reported in good faith and are the genuine opinion of SES on such matters. SES does not accept any liability resulting from outcomes relating to the use of this information or its interpretation within this document.

National Planning Policy

The NPPF (MHCLG, 2021) states that:

Paragraph 8

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

c) an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.

Paragraph 20

Strategic policies should set out an overall strategy for the pattern, scale and quality of development, and make sufficient provision for:

d) conservation and enhancement of the natural, built and historic environment, including landscapes and green infrastructure, and planning measures to address climate change mitigation and adaptation.

Paragraph 28

Non-strategic policies should be used by local planning authorities and communities to set out more detailed policies for specific areas, neighbourhoods or types of development. This can include allocating sites, the provision of infrastructure and community facilities at a local level, establishing design principles, conserving and enhancing the natural and historic environment and setting out other development management policies.

Paragraph 73:

The supply of large numbers of new homes can often be best achieved through planning for larger scale development, such as new settlements or significant extensions to existing villages and towns, provided they are well located and designed, and supported by the necessary infrastructure and facilities (including a genuine choice of transport modes). Working with the support of their communities, and with other authorities if appropriate, strategic policy-making authorities should identify suitable locations for such development where this can help to meet identified needs in a sustainable way. In doing so, they should:

a) consider the opportunities presented by existing or planned investment in infrastructure, the area's economic potential and the scope for net environmental gains;

Paragraph 102

Transport issues should be considered from the earliest stages of plan-making and development proposals, so that:

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; and

Paragraph 119

Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions.

Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land.

Paragraph 120

Planning policies and decisions should:

a) encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside;
b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production;

Paragraph 140

Once Green Belts have been defined, local planning authorities should plan positively to enhance their beneficial use, such as looking for opportunities to provide access; to provide opportunities for outdoor sport and recreation; to retain and enhance landscapes, visual amenity and biodiversity; or to improve damaged and derelict land.

Paragraph 174

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

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

Paragraph 175

Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework58; 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 scale across local authority boundaries.

Paragraph 179

To protect and enhance biodiversity and geodiversity, plans should:

a) 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 biodiversity56; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and
b) 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.

Paragraph 180

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

a) 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;
b) 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;

c) 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

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

Paragraph 181

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

a) potential Special Protection Areas and possible Special Areas of Conservation;

b) listed or proposed Ramsar sites;

c) 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.

Paragraph 182

The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site.

Paragraph 185

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Local Planning Policy

Relevant development control policies relating to ecology from Castlepoint Borough Council's (CBC) Local plan (Adopted 1998) are noted below.

Policy EC1 - Environmental Assessment

When considering development proposals which, by virtue of their nature, size or location are likely to have significant environmental effects, the council will require the submission of an environmental statement in order to identify those effects more precisely.

Policy EC7

Natural and semi-natural features in urban areas natural features, semi-natural features and open spaces within urban areas shall be retained and enhanced wherever possible in order to safeguard their physical, visual, recreational and wildlife value.

Policy EC12 - Sites of Special Scientific Interest

Development which would adversely affect notified sites of special scientific interest or national nature reserves will be refused. Within sites of special scientific interest and national nature reserves, the council will encourage proper maintenance and management in the interests of protecting and enhancing their nature conservation value.

Policy EC13 - Protection of Wildlife and their Habitats

The council will refuse development which is prejudicial to the interests of all wildlife and the retention and management of important habitats

Policy EC14 - Creation of New Wildlife Habitats

The council will encourage proposals for further nature reserves. It will also promote the creation of new wildlife habitats in conjunction with development proposals. In considering planning applications, the council will take into account the potential for the creation of wildlife habitats, particularly where these would enhance and complement existing elements of nature conservation on adjoining land.

Wildlife Legislation

The two principal wildlife statutes are the **Conservation of Habitats and Species Regulations (Habitats Regulations, 2019)** and the **Wildlife and Countryside Act (WCA, 1981)** that both deal with nationally important sites and species.

Selected habitat and species features within discrete sites are protected as Sites of Special Scientific Interest (SSSSI) under the WCA 1981.

Selected SSSI are more strictly protected as proposed or designated Special Protection Areas (SPA), Special Areas of Conservation (SAC) under the Conservation of Habitats and Species Regulations (2019). Ramsar sites are no longer part of the UK site network but remain designated under the Ramsar Convention and protected under the Habitat Regulations (2019).

The Habitats Regulations, 2019 protect features and resources listed as being of national importance from both direct and indirect effects arising from a range of likely significant effects including proposed development. Development proposals remain subject to the Habitats Regulations Assessment (HRA) process and especially the sequential Screening and Appropriate Assessment tests.

Local Nature Reserves (LNR) are designated by Local Planning Authorities and protected under the **National Parks and Access to the Countryside Act, (1949) Section 21**.

Certain species listed on Schedule 5 of the WCA 1981, including all bat species, great crested newt *Triturus cristatus,* hazel dormouse *Muscardinus avellanarius* and otter *Lutra lutra* are also protected under Schedule 2 of the Habitats Regulations 2010Taken together it is illegal to:

- Deliberately kill, injure or capture any wild animal under Schedule 2;
- Deliberately disturb wild animals of any EPS in such a way to be likely to significantly affect:
- The ability of any significant groups of animals of that species to survive, breed, rear or nurture their young; or
- The local distribution of that species.
- Recklessly disturb an Schedule 2 species or obstruct access to their place of rest;
- Damage or destroy breeding sites or resting places of such animals;
- Deliberately take or destroy the eggs of such an animal;
- Possess or transport any part of an Schedule 2 species, unless acquired legally; and/or
- Sell, barter or exchange any part of an Schedule 2 species.

A range of species other than birds, including water vole *Arvicola amphibius*, are protected from disturbance and destruction under the WCA 1981 through inclusion on Schedule 5.

All breeding birds are protected from deliberate destruction under the WCA 1981. Certain species are further protected from disturbance at their nest sites being listed on Schedule 1 of the WCA 1981.

Common reptiles including common lizard *Zootoca vivipara,* slow-worm *Anguis fragilis*, grass snake *Natrix helvetica* and adder *Vipera berus* are protected under the WCA 1981, they are listed as schedule 5 species, therefore part of Section 9(1) and section 9(5) apply; the Countryside and Rights of Way Act 2000 (CRoW) also strengthens their protection.

Badger *Meles meles* is protected from sett disturbance and destruction under the Protection of Badgers Act 1992.

Section 40 of The Natural Environment and Rural Communities Act (NERC) 2006 places a legal duty on Local Authorities to conserve biodiversity. Section 41 (S41) sets out a list of 943 species and habitats of principal importance. These species are known as England Biodiversity Priority (EBP) species and are those identified as requiring action under the former UK Biodiversity Action Plan (BAP) and which continue to be regarded as conservation priorities under the UK Post-2010 Biodiversity Framework.

Native, species-rich hedgerows that fit certain criteria are protected as being 'important' under the Hedgerow Regulations (1997).

Japanese Knotweed *Fallopia japonica*, along with other introduced and invasive species are listed under Schedule 9 of the WCA 1981. Japanese knotweed is highly invasive and its rhizomes cause damage to built structures. Hence it is also classed as controlled waste under the Environment Protection Act 1990 and has therefore either to be removed or disposed of in a licensed landfill or the rhizomes buried to a depth of at least 5m.

Appendix 3. Detailed Methods

Extended Phase 1 Habitat Survey

Phase 1 Habitat Survey is a standard technique for obtaining baseline ecological information for areas of land, including proposed development sites. Phase 1 Habitat Survey methods are set out in the Handbook for Phase 1 Habitat Survey (Joint Nature Conservation Committee, 2010). Habitat mapping was undertaken using the standard classification to indicate habitat types. Features of ecological interest and value were highlighted using target notes.

Detailed Botanical Survey

As the Phase 1 Habitat Survey was conducted during sub-optimal timings for botanical survey, a further site visit was undertaken in May 2019 to assess the floristic value of the site and compile a peak-season detailed botanical species list.

Plant species identified in each of the various habitat parcels were recorded and their abundances assessed on the DAFOR scale:

- D - Dominant
- A - Abundant
- F - Frequent
- O - Occasional
- R - Rare

These scores represent the abundance within the defined area only and do not reflect national or regional abundances. Plant species nomenclature follows Stace (2010).

Badgers

Surveys were carried out using standard guidelines for classifying badger setts (Harris *et al.,* 1989) and categorising entrance holes (Natural England, 2009). All areas of the site and wider area readily accessible except private residential properties and patches of dense scrub.

The survey comprised a detailed systematic walkover survey of the site and known setts. Dense scrub was present on site and was accessed to a satisfactory degree. The badger signs looked for were:

- Additional holes/setts;
- Prints;
- Badger runs;
- Hairs;
- Latrines;
- Scratching posts, and;
- Snuffle marks.

The number of entrances and levels of use were recorded, and the sett was classified according to the criteria used in the National Badger surveys (Harris *et al.,* 1989). The classification criteria are given below:

- Main setts – a large well established, often extensive and in continuous use. There is only one main sett per social group of badgers. This is where the cubs are most likely to be born.
- Annexe setts – occur in close association with the main sett and are linked to the main sett by clear well-used paths. If a second litter of cubs are born, they will be reared here.

- Subsidiary setts – these often have 3-5 holes and are normally over 50m from a main sett and are not linked by clear paths. These setts are not continually active.
- Outlying setts – these usually have 1-3 holes, have small spoil heaps and are sporadically used. Foxes and rabbits may move in.

An assessment of the activity of each sett was undertaken; the following categories were assigned to the entrance holes to make this assessment:

- Well-used: Entrances clear of debris and vegetation and are obviously well used.
- Partially-used: Entrances are not in regular use and have debris such as leaves or twigs across the entrances. These holes could come into regular use with minimal clearance.
- Disused: Entrances have not been used for some time, are partially or completely blocked. There may be a depression in the ground where the hole used to be.

A badger sett is protected by legislation if it "displays signs indicating current use by a badger". A sett is therefore protected if such signs remain present (Natural England, 2009). As such, a sett is likely to fall outside the definition of a sett in the Act if the evidence available indicates that it is not in current use by badgers; e.g. absence of badger field signs, debris in sett entrances etc.

Bats

Preliminary Assessment

Habitats on and adjacent site were assessed for their suitability to support roosting, foraging and commuting bats using guidelines issued by the Bat Conservation Trust (Collins, 2016). All potential roosting habitats (existing trees) were assigned a level of suitability according to the descriptions outlined in Table A3.1. Trees were initially assessed from ground level, using binoculars where necessary to identify potential roost features, bat access points and evidence of bat occupation such as droppings, urine staining and mammalian fur oil staining.

The site was also assigned a level of suitability for foraging and commuting bats according to the descriptions outlined in Table A3.1.

Table A3.1. Assessment of the potential suitability of a proposed development site for roosting, foraging and commuting bats (Collins, 2016)

Suitability	Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats	Negligible habitat features on site likely to be used by commuting and foraging bats
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically but not enough space, shelter, protection and appropriate conditions to be used on a regular basis or by larger numbers of bats A tree of sufficient size and age to contain potential roosting features but with none seen from the ground or features seen with only very limited roosting potential	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by another habitat Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or patch of scrub
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water

Suitability	Roosting habitats	Commuting and foraging habitats
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge High-quality habitat that is well-connected to the wider landscape that is likely used regularly by foraging bats such as broad-leaved woodland, tree-lined watercourses and grazed parkland Site is close to and connected to known roosts

Emergence/Re-entry Surveys

Dusk emergence and dawn re-entry surveys were undertaken on trees and buildings identified to have low (buildings only) moderate or high bat roosting suitability with potential to be impacted (either directly through felling/pruning, or indirectly through disruption of linked commuting routes/lighting disturbance), as a result of the development.

Emergence/re-entry surveys were carried out following standard guidelines recommended in Bat Surveys: Good Practice Guidelines (Collins, 2016) within appropriate seasonal timings (May to September). For moderate suitability trees, two surveys were undertaken with at least one survey between May to August. For high suitability trees three surveys were undertaken with at least two between May to August. At least one dusk emergence and one dawn re-entry survey was undertaken per building/tree, lasting for approximately two hours, with dusk emergence surveys commencing 15 minutes before sunset and dawn surveys finishing approximately 15 minutes after sunrise.

Surveyors maintained static positions around the buildings/trees, focusing their attention on features that could potentially be utilised by roosting bats and watching closely for any emergence or re-entry, while also recording bat activity incidentally observed in the immediate surroundings.

Recordings were made of bat calls to assist in the identification of any bats seen emerging and/or entering the trees. Any bats emerging from or re-entering the trees were identified from calls, counted, with roost access points and flight direction noted where possible. In addition to this, general bat activity at the point of surveys was also recorded. Equipment used included Peersonic, Batbox Duet frequency division detectors with Edirol/Tascam digital recorders, Echo Meter Touch 2, and Batlogger M detectors. Recorded calls were analysed using Batsound and Kaleidoscope according to parameter specified in Russ (2012) to determine species.

Bat Activity Surveys

The BCT guidelines (Collins, 2016) recommends for the medium quality habitat and large sized site that one visit each month April – September should be undertaken alongside 2 automated surveys per transect over 5 consecutive nights each month. The site was divided into two transects due to the size of the site (i.e. 4 static detectors in total). This will provide the necessary data to deliver adequate mitigation to ensure compliance with relevant statutory instruments and planning policy.

The survey followed standard guidelines as set out in Collins (2016).

The transects sampled all suitable habitat types. Five-minute sampling was used at sampling points along the transect route defined with all bat passes recorded. To account for repeated calls from a single bat, only one bat

of each species was recorded per 10 seconds. Between sampling points, bat passes were also recorded, noting attributes such as time, location, direction of flight, species and behaviour.

Bat species from the *Myotis* genus are particularly difficult to identify to species level and these were assigned to *Myotis* genus only or cautiously identified to species where possible. Some pipistrelle recordings are also difficult to differentiate between common or soprano, and have been assigned to *Pipistrellus* genus only.

Bird Surveys

Winter Bird Survey

SES conducted four wintering bird survey visits during the 2021/22 bird wintering season in December 2021, January 2022 and February 2022. The survey area included the whole of the site as well as adjacent areas that could be surveyed from within the site, generally covering a buffer perimeter of 10-20m. Thus, adjacent field boundaries and other potential bird habitats where birds using the site during the wintering season may be, and vice versa, were generally also included. A transect was walked slowly pausing to record birds heard and observed, covering all areas of the study area, and route directions were varied between survey visits. Birds flying over and not using the site or surrounding area were recorded separately. All bird locations and behaviour were mapped onto photocopied OS maps (1:5000 scale) using the standard CBC notation.

All survey visits were undertaken during the morning after the dawn period when bird singing intensity tends to be high but stable (Bibby et al. 2000).

Field maps were analysed to determine probable bird registrations relating to different territories and to judge which birds are using the area.

Breeding Bird Surveys

SES conducted four breeding bird survey visits during the 2022 bird breeding season from April to June. The survey area included the whole of the study area and adjacent areas that could be surveyed from within the site, generally covering a buffer perimeter of 10-20m. Thus, adjacent field boundaries and other potential bird nesting habitats where birds using the site during the breeding season may nest, and vice versa were generally also included. A transect was walked slowly pausing to record birds heard and observed, covering all areas of the study area, and route directions were varied between survey visits. Birds flying over and not using the site or surrounding area were recorded separately. All bird locations and behaviour were mapped onto photocopied OS maps (1:5000 scale) using the standard CBC notation.

All survey visits were undertaken during the morning after the dawn period when bird singing intensity tends to be high but stable (Bibby et al. 2000).

Field maps were analysed to determine probable breeding bird registrations relating to different territories and to judge which birds are using the area for breeding or for other activities such as foraging. A probable or definite territory is defined as a cluster of registrations of singing or displaying individuals from more than one visit, or one or more registrations of the following breeding behaviour: disturbance displaying, interspecific aggressive interaction, repetitively alarming, carrying food, nest material or faecal sacs, or if active nests or young were found.

If a singing bird is recorded on just one visit or sight observations of birds are recorded in the same area on more than one visit and are not likely to be associated with any other recorded territories, these are assigned as possible territories. For birds that do not sing, such as many waterfowl, birds present at a location in suitable breeding territory on at least two visits are assigned to probable territories. Presence of such species in suitable breeding habitat on a single visit is assigned to possible territories unless the possibility of nesting is considered negligible by the observer.

This process is open to subjectivity in interpretation except where active nests are located. Therefore, these territories are classed as putative, and their mapped locations indicate the 'centre' of a territory and not necessarily the nesting location. The maps were analysed to determine the number of probable and possible territories or pairs of each species present.

Great Crested Newt

Habitat Suitability Index

The HSI for the great crested newt was developed by Oldham et al (2000). An HSI is a numerical index, between 0 and 1. 0 indicates unsuitable habitat, 1 represents optimal habitat. The HSI for the great crested newt incorporates 10 suitability indices, all of which are factors thought to influence the likelihood of great crested newt presence (*e.g.* surrounding habitat, geographical location, shading, presence of waterfowl and fish).

The HSI is calculated as a geometric mean of the 10 suitability indices (SI) as indicated below:

- Geographic locality
- Pond area
- Permanence
- Water quality
- Shade
- Waterfowl presence
- Fish presence
- Pond count within 1km2 of survey pond
- Terrestrial habitat quality
- Macrophyte cover

HSI = (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10) 1/10

The data regarding each factor is collected in the field at each pond and also by using maps, this is then converted into SI scores on a scale of 0.1 - 1.0. The results can then be used to calculate the HSI. In general ponds with high HSI scores are more likely to support great crested newts than those with low scores.

Table A3.2 HSI score categories (Oldham et al., 2000)

HSI score	Pond suitability
< 0.5	Poor
0.5 – 0.59	Below average
0.6 – 0.69	Average
0.7 – 0.79	Good
> 0.8	Excellent

The HSI for great crested newt is a measure of habitat suitability. It is not a substitute for newt surveys. In general, ponds with high HSI scores are more likely to support great crested newt than those with low scores. However, the system is not sufficiently precise to allow the conclusion that any particular pond with a high score will support newts, or that any pond with a low score will not do so. There is also a positive correlation between HSI scores and the numbers of great crested newt observed in ponds. So, in general, high HSI scores are likely to be associated with greater numbers of great crested newt. The relationship however is not sufficiently strong to allow predictions to be made about the numbers of newts in any particular pond. HSI scoring of ponds can be useful when:

- Evaluating the general suitability of a pond or group of ponds to support great crested newt;
- Comparing ponds across different areas of a site or within the landscape;

- Evaluating the suitability of ponds to be used as receptor sites for great crested newt;
- Planning restorative or enhancement works to ponds.

Lee Brady developed a system of using HSI scores to define ponds suitability for great crested newts on a categorical scale during a study undertaken in south-east England in which 248 ponds were surveyed for great crested newt using standard methods and also subjected to an HSI. The results of this study show that as the HSI score increases, the proportion of ponds occupied also increases, as summarised below:

Table A3.4 HSI range, associated suitability and predicted probability of presence.

HSI Range	Pond Suitability	Predicted presence of great crested newt (% of ponds occupied n=248)
<0.5	Poor	0.03
0.5 - 0.59	Below average	0.2
0.6-0.69	Average	0.55
0.7-0.79	Good	0.79

eDNA

To detect the presence/likely absence of great crested newt (GCN) in ponds within a predetermined distance of the site, a single eDNA survey visit of the ponds was undertaken between April 15-June 30 2022 following best practice guidance as described by Biggs *et al*. (2014). The equipment required for the eDNA survey, the analysis of water samples, the results and a summary of the appropriate survey, storage and sample return methods were supplied by ADAS.

With the eDNA detection method, it is thought that a negative result will be a strong indication of true absence of GCN, and any individual GCN that is in the pond has a higher likelihood of being detected, even in conditions that are not conducive to traditional sampling (e.g. murky waters). This was tested in the research carried out by Biggs *et al.* (2014). Thomsen *et al*. (2012) demonstrated that GCN DNA in water degrades within 20 days, so a positive result shows that the species has been present recently.

The collection, storage and return of eDNA samples followed the following method (adapted from ADAS, 2015):

Sample Collection

Twenty samples of 30 mL of pond water were collected from around the pond (in the areas already identified as suitable for sampling) using the sampling ladle (fill the ladle). Each of the 20 samples was emptied into the Whirl-Pak bag, filling the Whirl-Pak bag to just under half full. During the pond sampling, a pair of plastic gloves supplied as part of the eDNA sample kit were worn to prevent cross-contamination.

Before each ladle sample was taken, the pond the water column was gently mixed using the ladle to stir the water from the surface to close to the pond bottom, **without** disturbing the mud in the bottom. DNA 'sinks' and so will often be present in larger amounts close to the pond bottom. The collection of sediment within the samples was avoided as this may cause inhibition of the PCR analysis, which could lead to an inconclusive result.

Sample Preservation

Once 20 samples had been collected, the samples were mixed by shaking the Whirl-Pak bag for 10 seconds. This mixed any DNA across the whole water sample. Each conical tube was labelled with the date, the sampler's name, and the pond name along with the sample ID number. Using the clear plastic pipette provided, 15 mL of water was taken from the Whirl-Pak bag, and transferred into one of the six conical tubes containing 35 mL of preserving fluid (i.e. fill tube to the 50 mL mark). The tube was then sealed and shaken vigorously for 10 seconds to mix the sample

and preservative thoroughly. This process was repeated for each of the 6 conical tubes in the eDNA kit. Any liquid that had leaked from a tube was wiped away prior to returning the kit to the sample box. The remaining water from the Whirl-Pak bag was emptied back into the pond.

Samples were returned to ADAS via courier at ambient temperature in the original packaging for analysis one day after sampling. Storage of samples was necessary prior to their return, and so samples were refrigerated (2-4°C). Samples can be stored in this way for up to 1 month prior to analysis.

Hazel dormouse

The survey involved installation of 100 nest tubes in suitable habitat on site on 25th June 2022. The tubes were subject to routine checks to determine presence or likely absence.

All surveys were carried out in suitable weather conditions and were undertaken by competent ecologists.

The thoroughness of a dormouse survey can be measured using an index of probability (Table A3.6). The table below assumes that 50 tubes have been placed in suitable habitat; the points system can be doubled when using 100 tubes. The score from each month that surveys are undertaken are added together, with a score of over 20 required for the survey to be considered valid.

Table A3.5. Index of probability to determine presence or likely absence of hazel dormice

Month	Index of probability (50 tubes)	Index of probability (100 tubes)
June	2	4
July	2	4
August	5	10
September	7	14
October	2	4
November	2	4

Hedgerows

A total of 36 hedgerows were assessed in accordance with the Wildlife and Landscape criteria of the Hedgerow Regulations 1997 (HMSO, 1997).

Hedgerows assessed as important under the Wildlife and Landscape criteria of the Hedgerow Regulations 1997 require permission from the local planning authority before they can be removed in whole or in part.

To be considered important a hedgerow must have been in existence for 30 years or more and satisfy at least one of the criteria listed in part II of schedule 1 of the Hedgerow Regulations 1997.

Species are described in the text by their common and scientific names in the first instance, and thereafter by their common name only. Nomenclature follows Stace (2010).

The survey visit was completed on 09 May 2022 during good weather conditions by suitably qualified ecologists Pete Scott-Norris BSc (Hons).

Invertebrate Surveys

Species of conservation concern are defined as: protected species, those satisfying rare or scarce criteria (Red Data Book or Nationally Scarce), and/or those listed as Species of Principal Importance as described below (Table 9).

Table A3.6. Summary of conservation statuses for invertebrates (see Drake et al., 2007 for full definitions).

Category	Definition
IUCN	
Endangered and Vulnerable	Species in danger of extinction or with small populations in Great Britain, and having undergone substantial declines in range or population size. The declines undergone by Endangered species are greater than experienced by Vulnerable species, as measured by various criteria.
Near Threatened	Species not currently considered to be 'Endangered' or 'Vulnerable' but may qualify for such in the near future.
GB Rarity Status	
Nationally Rare	Species recorded from between 1-15 hectads of the national grid since 1990. This is broadly equivalent to what were formerly termed Red Data Book species.
Nationally Scarce	Species recorded from between 16-100 hectads since 1990. This category is broadly equivalent to what were formerly Nationally Notable and Nationally Scarce, which in some instances were divided into -A and -B.
Priority Species	
Species of Principal Importance (priority species)	Species included on Schedule 41 of the NERC Act, abbreviated as S41 Priority Species. Although legislation does not make a distinction between species, in practice a large suite of S41 Priority Species are widespread butterflies and moths which are likely to be present on many sites, and in the case of moths many are habitat generalists. These are termed 'research only' species and are considered to be of lower conservation value unless present as significant populations or a rich assemblage.

For invertebrates, the frame of reference is as described above with the evaluation following the criteria proposed by Colin Plant Associates (2006) (Table 10). Also available is the output from Pantheon, which provides scores with thresholds for determining 'favourable' status of assemblages, which is broadly equivalent to assemblages of Site of Special Scientific Interest (SSSI) quality or national value.

Table A3.7. The criteria used to define significance of invertebrate habitats, based on Colin Plant 2006 but as amended to reflect the status of sites with widespread but declining (research only) Section 41 Priority moths.

Significance	Description	Minimum qualifying criteria
National	UK important site	Achieving SSSI invertebrate criteria or supporting sustainable populations of species that are listed as Critically Endangered or supporting sustainable populations of species listed in the European Union Habitats and Species Directive or supporting sustainable populations of species listed in and generally held to fairly belong within Red Data Book category 1 (Endangered) or supporting sustainable populations of any species protected under the UK Wildlife and Countryside Act, as amended or containing important invertebrate habitats that are actively threatened nationally (Great Britain).
Regional	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region, or which is well-represented in the region but is rare or absent outside the region, and which has, or is reasonably expected to have, an assemblage of invertebrates that includes a combination of Nationally Rare (Red Data book category 3) and Nationally Scarce (former Nationally Notable categories) species amounting to at least ten such species in total or supporting sustainable populations of at least six S41 Priority Species.
County	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county and either contains or is reasonably expected to contain an assemblage of invertebrates including a combination of Nationally Rare (Red Data book category 3) and Nationally Scarce (former Nationally Notable categories) species amounting at least five such species in total provided that these species warrant now that status which was allocated several years earlier, or which has viable populations of at least five S41 Priority Species.

Significance	Description	Minimum qualifying criteria
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Scarce species in the range from 1 to 4 examples are reasonably expected, but not yet necessarily recorded, sites that have 1 to 4 S41 Priority Species and sites that have an outstanding assemblage of widespread but declining (research only) Section 41 Priority moths.
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes	Habitats or species unique or of some other significance within the local area.
Low Significance	_	Although almost no area is completely without significance these are the areas with nothing more than expected 'background' populations of common species and the occasional Nationally Local species

Reptiles

To detect presence or likely absence, a seven-visit survey is recommended (Froglife, 1999). Seven survey visits were undertaken during 'suitable' days for reptile activity; a 'suitable' survey day is determined by the weather, with temperature being the pre-eminent factor. A single additional visit was made due to mats being moved/damaged during one of the survey visits.

Refugia were laid in suitable habitat using the surveyor's professional judgement. This assessment allowed an assessment of the carrying capacity of these habitats. As density dependence often plays a role in population size (Massot *et al*, 1992), this information will guide the mitigation and compensation measures.

Refugia were laid at a density of 10 per hectare in suitable habitat, as per best practice guidance (Froglife, 1999). Reptile refugia (0.5m x 0.5m felt squares) were used to observe reptiles basking or taking refuge, these were laid in transects and left for seven days to settle before the survey commenced. Appendix 13 shows the indicative refugia positions. If presence was detected a categorical population assessment would be carried out with the largest count within the first seven visits indicating the category (Low, Good, Exceptional) of the recorded reptile species. This survey methodology is recognised as best practice by Froglife (1999) and the Herpetofauna Worker's Manual (Gent and Gibson, 2003).

As described above, following guidelines set out by Froglife (1999) it is possible to make an assessment of the population size using the maximum number of adult animals seen per survey visit. This method is based on refuges being placed at a density of up to 10/ha. Table A2.7 below details the assessment categories:

Table A3.8. Population Class Assessment for Reptiles (Froglife, 1999)

Species	Low Population	Good Population	Exceptional Population
Common Lizard	<5	5-20	>20
Slow-Worms	<5	5-20	>20
Grass Snake	<5	5-10	>10
Adder	<5	5-10	>10

Ambient air temperature is an essential factor for reptile surveys after suitable habitat has been located. Reptile surveys conducted between 10 and 17 degrees centigrade have the most chance of success. The key months for reptile surveys are April, May and September with April and May being advantageous because it is reptile mating season, which means they will be more obvious and less wary of observers. Also, the temperatures are generally lower during these months and as such it will take longer for the reptiles to warm up so they must spend more time basking. During the warmer summer months, animals will have to spend less time basking due to the increase in ambient temperature, thus reptile survey visits will be conducted earlier in the day during the hotter summer months. However, the temperature on the day of the visit will ultimately determine what time the survey takes place.

CIEEM EcIA Methods

Ecological features are evaluated and assessed with due consideration for the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (EcIA) (CIEEM, 2016; updated 2018). For clarity, the evaluation and assessment process adopted within this report is set out below.

Establishing potentially important ecological features

Potentially important ecological features of relevance to the development are determined in accordance with current CIEEM guidelines. Table A3.9 below sets out a non-exhaustive list of ecological features that are typically considered, along with key examples:

Table A3.9. Examples of potentially important ecological features.

Potentially important ecological feature	Typical examples
Statutory designated sites	SSSIs, SACs, SPAs, Ramsar sites, LNRs, NNRs
Non-statutory designated sites	LWSs, CWSs
Protected species	European protected species (*e.g.* GCN, bats)
International, National or local priority habitats	S41 priority habitats and species; Annex I Habitats
Notable species or sub-species	Individual red-listed species
Notable or large population or assemblage of species	Diverse bird assemblage; exceptional numbers of common amphibians
Novel or locally distinct assemblage of species	Diverse non-native floral community on a brownfield site; populations of individual species showing distinct physical variation
Habitats which form diverse mosaics, create important connection and/or have synergistic attributes;	Brownfield habitat mosaics; riparian habitat corridors; hedgerow network utilised by an important bat population
Habitats of potential importance (with regard to restoring or creating habitats to S41 priority or SSSI quality)	Previous Ancient Woodland (PAWs) sites
Habitats of secondary or supportive importance (which safeguard important habitats, or which support important populations of species)	Scrub habitats buffering calcareous grassland from agricultural improvement; pasture regularly utilised by bird populations for which an SPA is designated

Establishing likely Zone of Influence (ZoI)

For the purposes of this assessment, the site is considered to be inside the 'zone of influence' of:

- Internationally important designations within 22km of the site boundary.
- Nationally important designations within 5km of the site boundary.
- Locally important designations within 2km of the site boundary.
- Non-statutory designations within 2km of the site boundary.

The arbitrary distances identified set out above considered sufficient for identifying the majority of designations which may be affected by the proposals. However, it is acknowledged that in certain circumstances effects beyond these distances are possible and should be considered as far as is reasonably practicable to do so.

It should also be noted that certain ecological features have smaller 'zones of influence' than those mentioned above. For such features the appropriate zone of influence is described and justified as appropriate within the report, depending on their respective sensitivity to an environmental change.

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

Determining importance of ecological features

In determining the importance of ecological features, a range of guidelines and reference materials have been utilised, including:

- Criteria against which statutory and non-statutory nature conservation designations are selected (*e.g.* SSSI designation criteria; LWS selection criteria).
- Definitions for national and priority habitats.
- Publications and guidelines against which to establish the importance of particular populations or assemblages of species groups (*e.g.* Wray *et al* for evaluating bat populations and roosts; ISIS for assessing conservation interest of invertebrate assemblages).
- Publications describing the conservation status of individual species (*e.g.* Red-data books).
- The Hedgerows Regulations to assess the importance of hedgerows.
- National, regional and local species Atlases.
- Species/group population trends.

It should be noted that the legal protection which some species and their habitats receive are considered separately from 'importance' within this assessment as not all legally protected species are necessarily rare (*e.g.* common pipistrelle bat). Legal issues and the appropriate mechanism for dealing with any such constraint are addressed in the report.

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

Geographic frame of reference

The size, conservation status and the quality of features or species are all relevant in determining value. Furthermore, the value of a species and / or habitat may vary depending on its geographical location.

Characterising effects and any significant effects of the proposed project or occupation are characterised using the following terminology:

- Direct or indirect
- Beneficial or adverse
- Magnitude and/or extent
- Duration
- Reversibility
- Timing and frequency

Impacts have been assessed using the Mitigation Hierarchy, which forms the key principles of Ecological Impact Assessment (EcIA):

- Avoidance – seeking options to avoid harm to ecological features;
- Mitigation – seeking options to avoid or minimise adverse effects;
- Compensation – offsetting adverse effects through appropriate compensatory measures;
- Enhancements – seeking to provide net benefits for biodiversity.

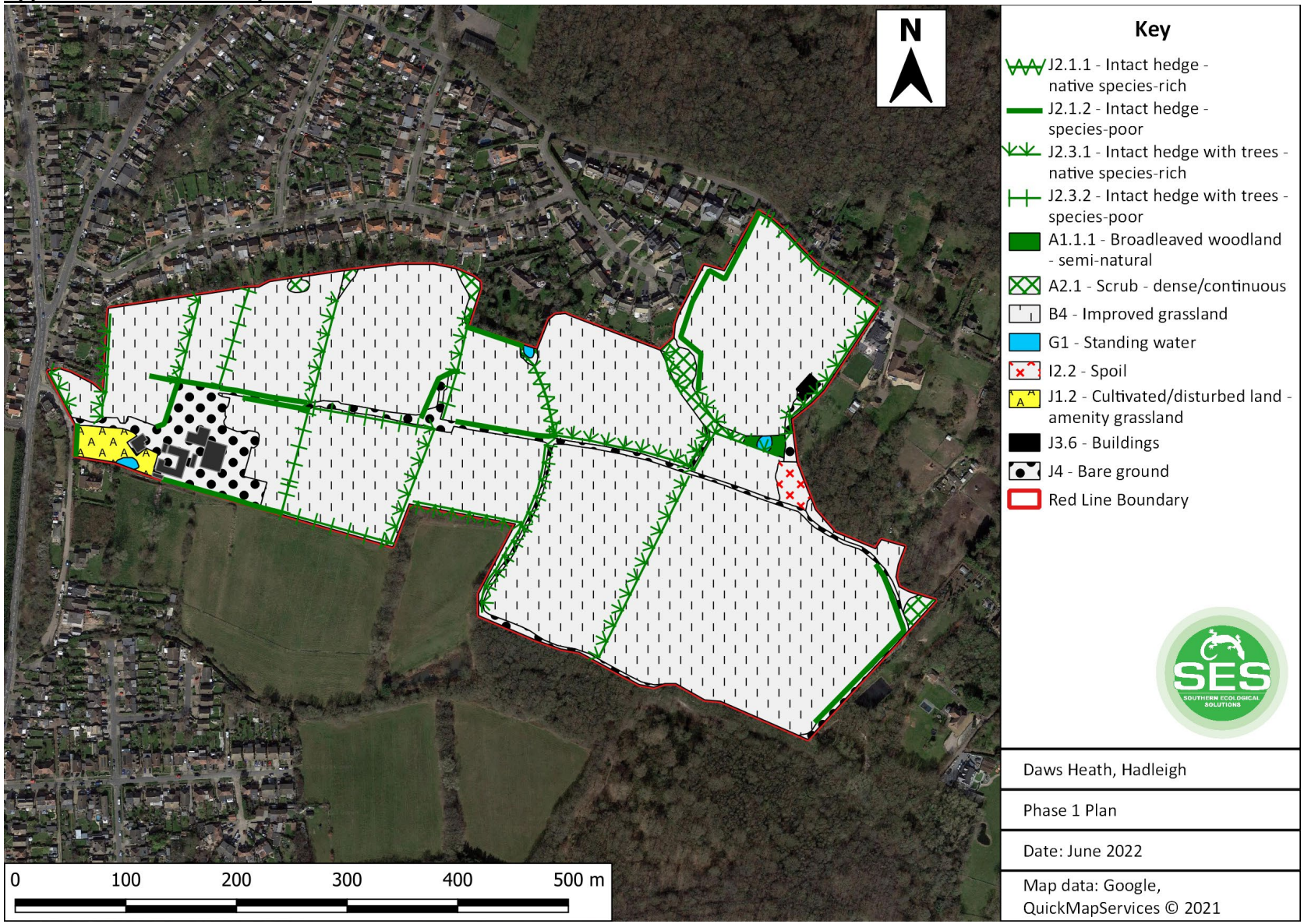
Determining ecologically significant effects

An ecologically significant effect is defined as an effect (adverse or beneficial) on the integrity of a defined designated site or ecosystem and/or the conservation status of habitats or species within a given geographical area.

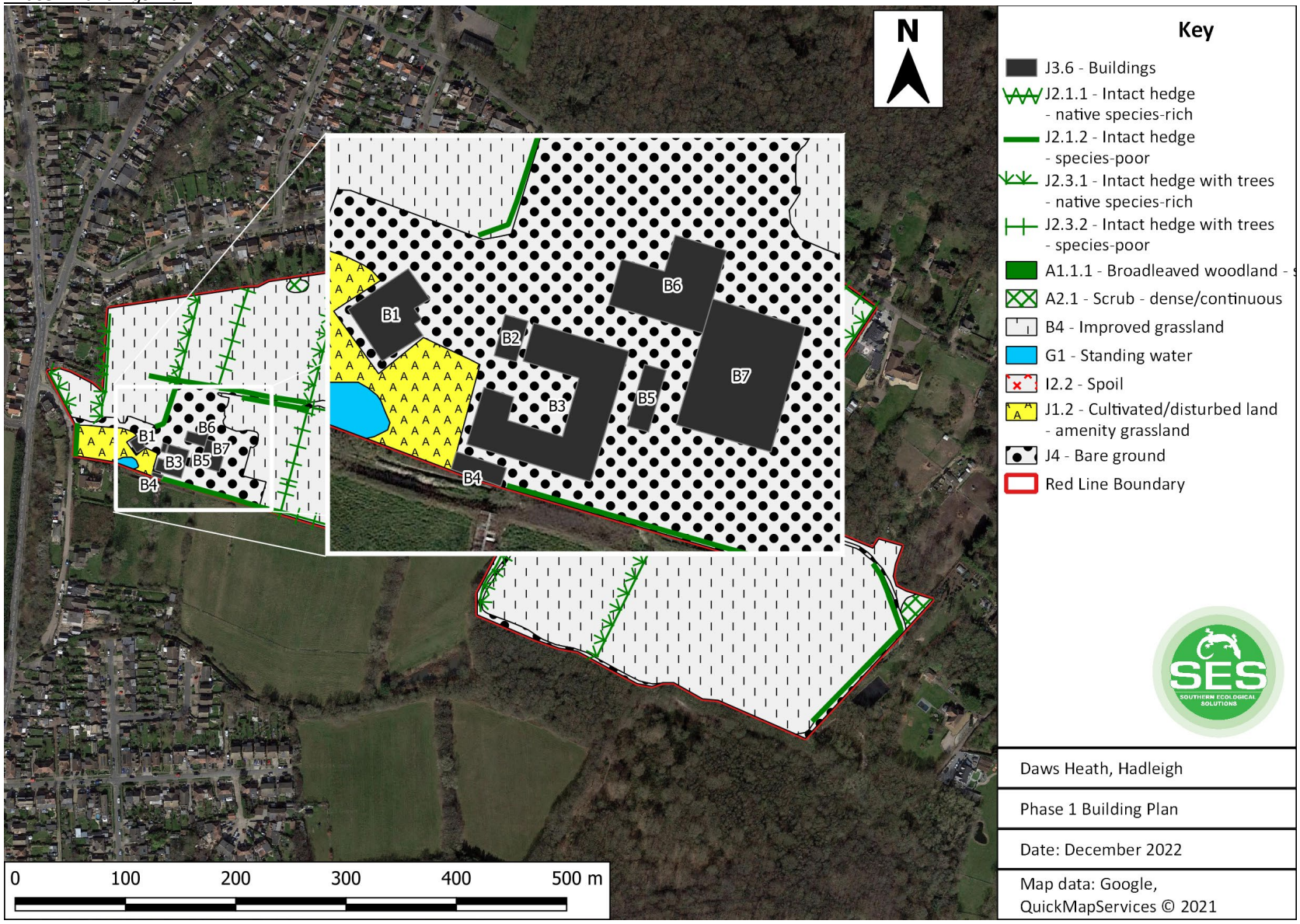
The importance of any feature that will be significantly affected is then used to identify the geographical scale at which the impact is significant. This value relates directly to the consequences, in terms of legislation, policy and/or development control at the appropriate level. So, a significant adverse effect on a feature's importance at one level would be likely to trigger related planning policies and, if permissible at all, generate the need for development control mechanisms, such as planning conditions or legal obligations, as described in those policies.

If an effect is found not to be significant at the level at which the resource or feature has been valued, it may be significant at a more local level. Significant effects on features of ecological importance will be mitigated (or compensated for) in accordance with guidance derived from policies applied at the scale relevant to the value of the feature or resource. The scale is derived from the interaction of the feature sensitivity and magnitude of impact.

Appendix 4. Phase 1 Survey Plan



Phase 1 Buildings Plan



Appendix 5. Botanical Species Lists

Table A5: Plant assemblages recorded during Phase 1 survey

Common name	Scientific name	Hedges	Scattered Trees	Amenity Grassland – horse pasture	Tall Ruderal	Dense Scrub	Woodland	Running Water	Amenity Grassland Formal	Ponds
Bramble	*Rubus sp.*	O			O	O	O			
Common Nettle	*Urtica dioica*	O			O			O		
Sycamore	*Acer psuedoplatanus*	O				O				
Blackthorn	*Prunus spinosa*	O								
Hedge bindweed	*Calystegia sepium*	O					O			
Elder	*Sambucus nigra*	O	O			O	O			
Hawthorn	*Crataegus monogyna*	O	O			O	O			
Red Dead-nettle	*Lamium purpureum*									
Cock's foot	*Dactylis glomerata*			O	O					
Dandelion	*Taraxacum agg.*			O	O		O			
Buttercup sp.	*Ranunculus sp.*			O				O		
Rose	*Rosa sp.*	O					O			
Ash	*Fraxinus excelsior*	O	O				O			
Field maple	*Acer campestre*	O					O			
Ivy	*Hedera helix*	O	O		O					
English Oak	*Quercus robur*	O	O				A			
Sessile Oak	*Quercus petraea*	O					O			
Cow parsley	*Anthriscus sylvestris*				O		O			
Horse chestnut	*Aesculus hippocastanum*		O							
Ragwort	*Senecio sp.*			O						
Dock	*Rumex sp.*			O	O		O			
Willowherb sp.	*Epilobium sp.*				O			O		
Prickly sow thistle	*Sonchus asper*			O						
Common mallow	*Malva sylvestris*				O					
Cherry	*Prunus avium*	O								
Ribwort plantain	*Plantago lanceolata*			O			O		O	
Silver Birch	*Betula pendula*		O							
Norway Spruce	*Picea abies*		O							
Hornbeam	*Carpinus betulus*	O	O				A			
Willow	*Salix sp.*	O	O				O			
Weeping willow	*Salix babylonica*		O							
Hogweed	*Heracleum sphondylium*			O	O			O		
White Clover	*Trifolium repens*			O					O	
Purple Toadflax	*Linaria purpurea*			O					O	
Yarrow	*Achillea millefolium*			O					O	
Thistle sp.	*Cirsium sp.*			O	O					
Fescue sp.	*Festuca sp.*			O				O	O	
Yorkshire Fog	*Holcus lanatus*	O		O	O		O	O		
Petty Spurge	*Euphorbia peplus*			O			O			
Perennial Ryegrass	*Lolium perenne*			O	O				O	

Common name	Scientific name	Hedges	Scattered Trees	Improved Grassland	Tall Ruderal	Dense Scrub	Woodland	Running Water	Amenity Grassland	Ponds
Timothy	*Phleum pratense*			O			O			
Knapweed	*Centaurea nigra*			O						
Creeping Cinquefoil	*Potentilla reptans*			O						
Redshank	*Persicaria maculosa*			O			O			
Common Centaury	*Centaurium erythraea*			O						
Holly	*Ilex aquifolium*	O	O			O	O			
Dogwood	*Cornus sanguinea*	O				O				
Hazel	*Corylus avellana*	O								
Plum	*Prunus sp.*	O								
Pear	*Pyrus communis*	O								
Leylandii	*Leylandii sp.*	O	O							
Goat willow	*Salix caprea*	O	O							
Nettle	*Urtica dioica*	O		O	O		O			
Sorrel	*Rumex acetosa*				O					
Fern	*Dryopteris spp*	O			O		O			
Alder	*Alnus glutinosa*	O								
Elm	*Ulmus sp.*	O								
Buddleja	Buddleja davidii	O								
Wild Service Tree	*Sorbus torminalis*	O								
Sweet Chestnut	*Castanea sativa*	O								
White Bryony	*Bryonia dioica*	O								
Buttercup	*Ranunculus sp.*						O	O		
Common Chickweed	*Stellaria media*							O		
Ground Ivy	*Glechoma hederacea*							O		
Gorse	*Ulex europaeus sp.*						O			
Broom	*Cytisus scoparius ssp*						O			
Yew	*Taxus baccata*						O			
Nipplewort	*Lapsana communis*						O			
White Campion	*Silene latifolia*	O								
Hedge Woundwort	*Stachys sylvatica*	O								
White Water-lily	*Nymphaea alba*									O
Bulrush	*Typha latifolia*									O
Daisy	*Bellis perennis*			O					O	
Cleavers	*Galium aparine*	O		O						
Common Comfrey	*Symphytum officinale*				O					
Lombardy Poplar	*Populus nigra 'Italica'*		O							
Wood Avens	*Geum urbanum*						O			
Broadleaf Dock	*Rumex obtusifolius*				O					

Appendix 6. Hedgerow Survey Results

Table A6. Hedgerow Survey Results

Hedgerow ID	Avg. no. of woody species	No. of associated features	Other features	Important?
1	5	1	-	No
2	7	2	-	Yes
3	7	2	-	Yes
5	7	1	-	Yes
6	4	1	-	No
7	5	1	-	No
8	4	2	-	No
9	5.5	3	-	No
10	2	2	-	No
11	7	4	-	Yes
12	3	1	-	No
13	2	2	-	No
14	7	3	-	Yes
15	3	2	-	Yes
16	7	1	-	Yes
17	7	3	-	Yes
18	7.5	3	-	Yes
19	5	3	-	No
20	3	0	-	No
21	4.5	2	-	No
22	6.5	3	-	Yes
23	6	4	-	Yes
24	6	4	-	Yes
25	1	0	Newly planted	No
26	7	3	-	Yes
27	8	3	-	Yes
28	8	4	-	Yes
29	7	2	-	Yes
30	4	3	-	Yes
31	4	1	-	No
32	3	1	-	No
33	4	2	-	No
34	4	2	-	No
35	2	2	-	No
36	3	1	-	No
37	9	3	-	Yes
38	6	0	Newly planted	No

Appendix 7: Badger Survey Results

Badger Sett Entrances Plan

Table A7. Badger Monitoring Results

Date	Visit number	Sett 1	Entrance hole ID																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
26/05/2022	1		*Triggered*	*N/A-*	*N/A*	*Triggered*	*Triggered*	*N/A*	*N/A*	*N/A*	*Triggered*	*Triggered*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
30/05/2022	2		*N/A*	*N/A*	*N/A*	Triggered	1 stick down - b fur	*N/A*	*N/A*	*N/A*	1 stick down - b fur	1 stick down	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	1 stick down	*N/A*
06/06/2022	3		*N/A*	*N/A*	*N/A*	*N/A*	1 stick down	*N/A*	*N/A*	*N/A*	1 stick down	Triggered	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	Triggered	*N/A*
08/06/2022	4		*N/A*	*N/A*	Triggered	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	1 stick down	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
10/06/2022	5		*N/A*	*N/A*	*N/A*	*N/A*	Triggered	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
13/06/2022	6		Triggered	*N/A*	*N/A*	Triggered	Triggered	*N/A*	*N/A*	*N/A*	Triggered	Triggered	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
15/06/2022	7		Triggered	*N/A*	*N/A*	*N/A*	Triggered	*N/A*	*N/A*	Triggered	Triggered	Triggered	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

**N/A = No Activity*

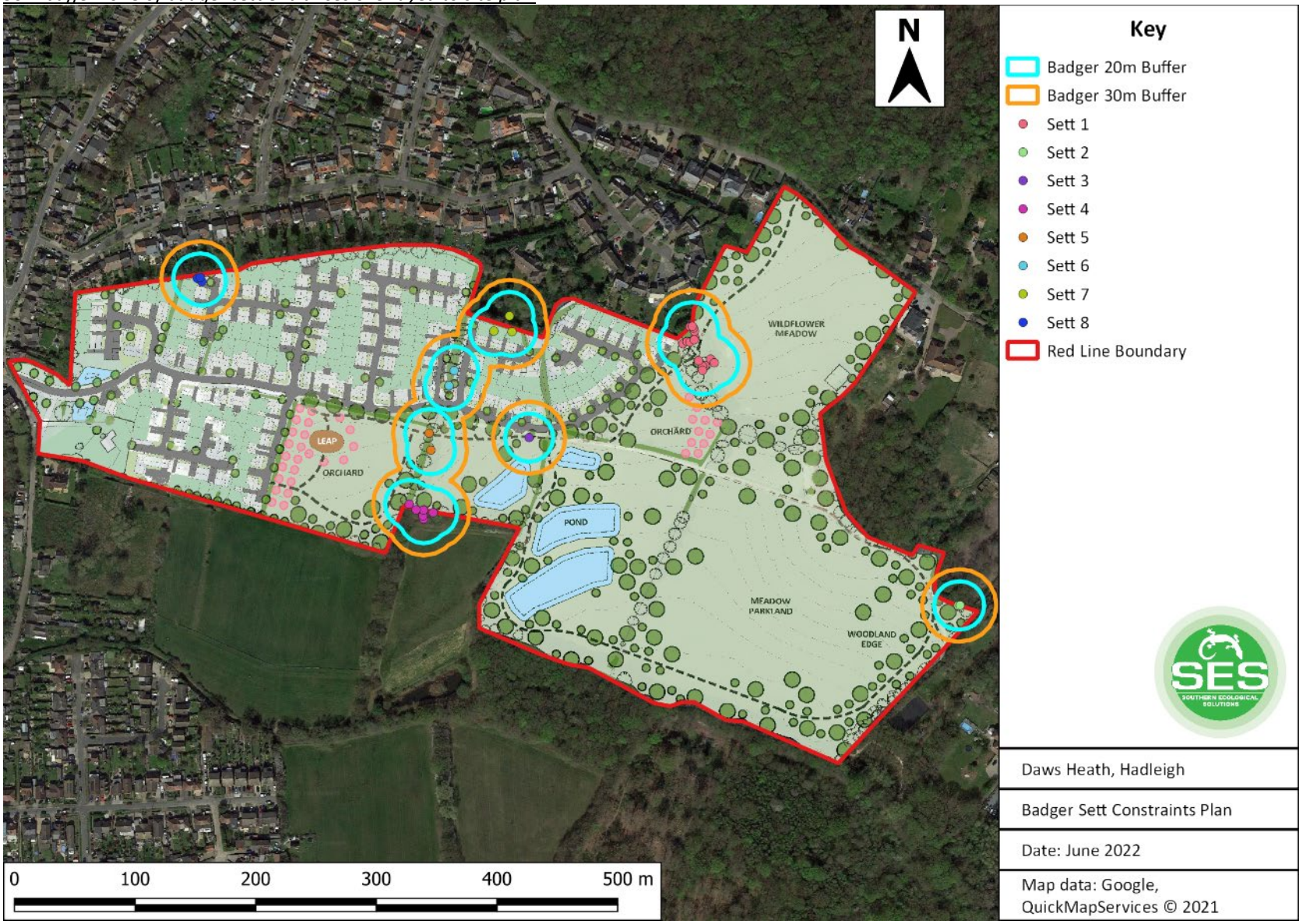
Date	Visit number 1	Sett 2	Entrance hole ID		Sett 3	Entrance hole ID	Sett 4	Entrance hole ID							Sett 5	Entrance hole ID	
			1	2		1		1	2	3	4	5	6	7		1	2
26/05/2022	1		*N/A*	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*Triggered*	*N/A*		*N/A*	*Triggered*
30/05/2022	2		*N/A*	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	1 stick down		*N/A*	Triggered
06/06/2022	3		1 stick down r fur found	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*		*N/A*	Triggered
08/06/2022	4		*N/A*	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*		*N/A*	*N/A*
10/06/2022	5		sticks down	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*		*N/A*	Triggered
13/06/2022	6		Triggered	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*		Triggered	*N/A*
15/06/2022	7		1 stick down	*N/A*		*N/A*		*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*		1 stick down	*N/A*

**N/A = No Activity*

Date	Visit number 1	Sett 6	Entrance hole ID		Sett 7	Entrance hole ID			Sett 8	Entrance hole ID			
			1	2		1	2	3		1	2	3	4
26/05/2022	1		*Triggered*	*N/A*		*N/A*	*N/A*	*N/A*		*N/A*	*N/A*	*N/A*	*N/A*
30/05/2022	2		*N/A*	*N/A*		1 stick down	*N/A*	Triggered		Triggered	*N/A*	*N/A*	*N/A*
06/06/2022	3		*N/A*	Triggered		Triggered	*N/A* -	Triggered		triggered, fresh spoil	1 stick down, no fur	triggered, fresh spoil	*N/A*
08/06/2022	4		Debris blocking entrance	*N/A*		*N/A*	*N/A*	Triggered		Triggered	Triggered	Triggered	*N/A*
10/06/2022	5		*N/A*	*N/A*		Triggered	Triggered	Triggered		Triggered	*N/A*	1 stick down	*N/A*
13/06/2022	6		*N/A*	Triggered		Triggered	Triggered	Triggered		*N/A*	*N/A*	*N/A*	*N/A*
15/06/2022	7		*N/A*	Triggered		1 stick down	Triggered	Triggered		Triggered	*N/A*	*N/A*	*N/A*

**N/A – No Activity*

30m buffer zone of badger sett entrances overlayed to site plan



Appendix 8. Bat Survey Results

Trees with bat roost suitability

Results of GLTA

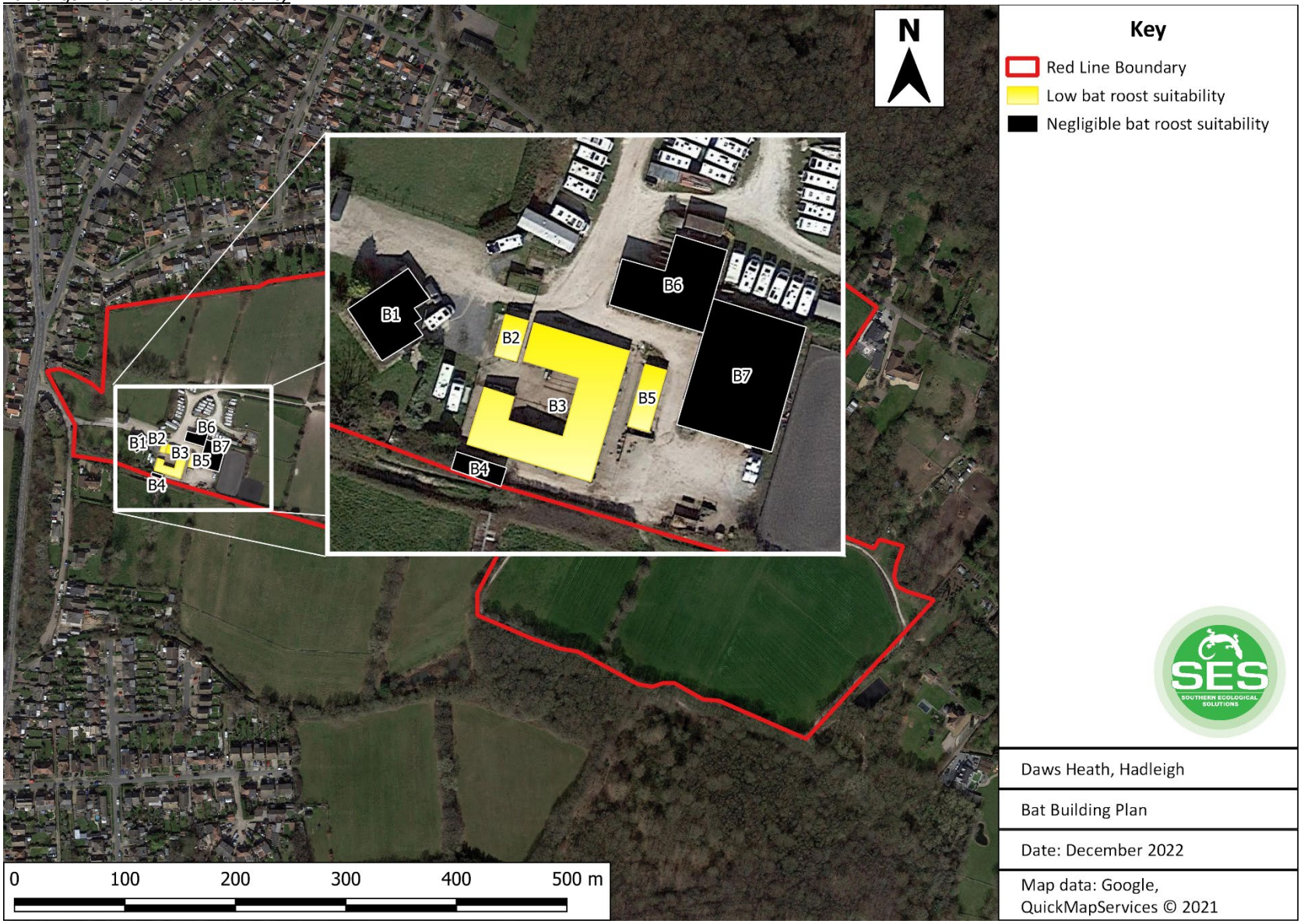
Tree Number	Species	Potential bat roost features	Bat roosting suitability
T1	Semi-mature Oak	1 dead limb but very small and upward facing	Low
T2	Semi-mature Oak	Shearing crack 7m high, on limb stretching out West but feature facing north.	Low
T3	Mature Ash	Ivy clad Ash, next to power lines.	Low
T4	Mature Oak	Ivy clad Oak, next to power lines.	Low
T5	Mature Oak	Ivy clad Oak, next to powerlines.	Low
T6	Mature Oak	Very mature English Oak, no features observed but tree is of an age and size where aerial inspection may show roosting features plus tree can only be observed from site side. Unable to assess north aspect due to land ownership.	Low*
T7	Mature Oak	Mature English oak, very thick dead ivy around trunk. Tree is of an age and size where aerial inspection may show roosting features plus tree can only be observed from site side.	Low
T8	Oak	English Oak with two dead limbs and dense ivy around trunk. Ivy has begun to die off but dead stems remain. Pruning cut at 5m south facing.	Moderate
T9	Oak	Small knot hole on north facing dead limb at 4m facing NE.	Low
T10	Hornbeam	Semi-mature Hornbeam with a tear-out from trunk. Unable to view from North.	Low
T11	Hornbeam	Hornbeam with 2 dead stems but no features observed.	Low
T12	Field maple	1 cavity 4-5m up the tree where there is a tear-out. Also has knot hole on stem facing north but both features listed have ivy partially covering entrance.	Low
T13	Oak	Ivy clad. Unable to view from North aspect.	Low
T14	Oak	Mature Oak with the limb which overhangs site containing a large split 2-3m from the ground.	Low
T15	Oak	Mature Oak with a large tear out 2-3m from the ground and 1 x cavity 5m from ground. Between T15 and T16 there are 3 oaks all large that may need a climb. All off site though.	Moderate
T18	Mature Oak	Mature oak clad in ivy. Dead limbs also observed. Unable to view from North aspect.	Moderate
T19	Mature Oak	Ivy clad mature oak – possible features present underneath dense ivy. Unable to view from North aspect. Very cluttered with ivy foliage around stem.	Low
T20	Mature Oak	Ivy clad mature oak – possible features present underneath dense ivy + dead limb. Dense ivy foliage. Unable to view from North.	Low
T21	Mature Oak	Mature Oak with multiple woodpecker holes on main trunk + dead limb. Holes are cavities formed from loss of limbs around 10 in total. Knot hole on dead limb 6m high south facing. Unable to view from North.	High
T22	Mature Oak	Hole 10m up trunk although upward facing. Limb facing site with large split and cavity. Transverse snap overhanging field 7m high south facing. Unable to view from North aspect. Likely additional features present.	Moderate*

Tree Number	Species	Potential bat roost features	Bat roosting suitability
T23	Mature Oak	Ivy clad. No other features. Ariel inspection recommended. Unable to view from North aspect but tree is in good health. Ivy has been cut at base and has died.	Low
T24	Mature Ash	Thick Ivy stems. Hole on East facing side.	Low
T25	Semi-Mature Oak	Split on main trunk 10m up.	Low
T26	Mature Oak	Woodpecker hole approx. 4m up trunk on eastern side. Fork in base of trunk may extend upwards, endoscope recommended. West facing side displays 1 hole 0.5m from ground, 1 hole on main trunk 1.5m up and 1 hole 2-3m up. Ariel inspection recommended.	Moderate
T27	Large Mature Oak	Numerous limbs. Partial ivy coverage on main trunk, some smaller broken limbs however no obvious cracks or splits etc for potentially roosting bats. Would climb due to size. Moderate potential.	Moderate
T28	Mature Oak	Peeling bark, few holes under dead limb near top of tree some 15m up. Tear out on small limb 6m high on West Side of tree line, feature facing south.	Moderate
T29	Mature Oak	Dead limb where main trunk splits. Dead limb on east facing side, peeling bark.	Moderate
T30	Oak	No features seen however. Ivy covered Could also be hiding features. Dead branches have flaking bark. Also has some fluting.	Moderate
T31	Oak	Oak stem splits in half 1m up. 1 hole on branch elbow (east facing) 10m up. 1 split limb with west facing cavity. Ivy over North stem. Large tree may be hiding more features.	Moderate*
T32	Mature Oak	Two dead branches west facing.	Low
T33	Hornbeam	Ivy clad. Might be referring to Ash next door as Hornbeam Ivy is very light. ASH ivy is thicker but not great. Might be hiding features.,	Low
T34	Semi-Mature Oak	Large knarly features associated with maturity, 3m up with cavities. Tearout with large squirrel hole leading to a bulbous cavity.	Low
T35	Ash	Partially dead. Large cavity 1m up main trunk.	Low
T36	Mature Ash	Hole on elbow 15-20m up and two holes on elbow 7m up.	Low
T37	Mature Oak	No features observed. Split on small limb west facing 8m up. Large tree may have features not visible from ground.	Low*
T39	Oak	Ivy clad covering trunk. Lateral limbs with holes. Ivy is dense, would recommend aerial inspection.	Moderate*
T40	Mature Oak	South facing fallen branch, most likely recent, with possible cavity. Further inspection recommended. Would recommend aerial inspection due to condition.	Moderate*
T41	Mature Oak	Ivy covered cavity on main trunk 5m up. Cavity entrance had ivy covering. Unable to view from west aspect.	Low
T42	Semi-Mature Oak	1 lump 2m up, difficult to see other possible features. Cavity in tear-out 1.5m facing east. Small weld (where two branches meet) at 3.5m facing east.	Low
T43	Hornbeam	Dead young Hornbeam. West facing cavity, 1 ft. Up. Now in dense foliage.	Low
T44	Large Mature Oak	Ivy covered trunk with four dead limbs. Mature tree with dense ivy on stem. Callous on top of dead limb to east.	Moderate

Tree Number	Species	Potential bat roost features	Bat roosting suitability
T47	Mature Oak	Hole on East facing side 20-30m up. Few cracks and splits 1-2m up, cavities facing up. Would recommend climb due to size.	Low*
T48	Mature Oak	West facing hole in torn out limb, now cut - Pruning cut with cavity, goes in at least 10cm.	Moderate
T49	Mature Oak	3 cavities visible, features were difficult to see due to limited access. 3 holes on main stem facing east, bit of clutter impeding access however. Moderate. Unable to see Western aspect.	Moderate*
T50	Mature Oak	Ivy clad. No features seen at ground level. Further inspection recommended. Aerial inspection required.	Low*
T54	Mature Oak	Very large mature oak with 2 woodpecker holes on main trunk and holes in 3 limbs. Contains nesting birds in one woodpecker as saw emerging. Top hole is a squirrel hole. Really good features.	High
T55	Mature Oak	Mature Oak ivy clad, difficult to see possible features due to ivy coverage. Ivy is plated on Eastern aspect with cavities behind. Ivy foliage is dense around trunk and likely impedes bat access.	Low
T56	Mature Oak	Mature Oak ivy clad, difficult to see possible features due to ivy coverage. Features could be hidden but ivy thin and sparse.	Low
T57	Mature Oak	Mature Oak ivy clad, difficult to see possible features due to ivy coverage. Transverse snap on top of limb facing west. Vertical subsidence crack on southern stem facing south.	Moderate
T58	Mature Oak	Mature Oak ivy clad, difficult to see possible features due to ivy coverage. Ivy has been removed. Small hole in dead limb on main stem facing south. Low potential.	Low
T60	Large Mature Oak	Broken limb. Ivy clad. Ariel inspection recommended. Not visible from North aspect. Small calls on old tear out on South side 8m High.	High
T61	Mature Oak	No obvious features. Knot hole on dead limb 8m high south facing. Knot hole 4.5m high on South facing limb close to trunk. Cavity facing north 5m high on stem. Moderate.	Moderate
T62	Mature Oak	Thick Ivy coverage. No obvious features.	Low
T63	Oak	Thick Ivy coverage. No obvious features.	Low
T64	Oak	Thick Ivy coverage. No obvious features.	Low
T65	Oak	Thick Ivy coverage. No obvious features.	Low
T66	Oak	Ivy clad with broken limb.	Low
T67	Large Mature Oak	Ivy clad on multiple limbs. Would recommend aerial inspection due to size.	Low*
T71	Oak	No apparent features, knots in trunk forming small dips, these extend roughly 1-2 inches into tree downwards. Would climb due to large size.	Low*
T72	Large Mature Oak	Broken limbs, some ivy coverage however no obvious features. Unable to view from west.	Low
T75	Medium Mature Oak	Multiple dead limbs however no obvious features.	Low
T78	Large mature tree	Tall tree with few limbs, no obvious features. Mature Ash, good health. Cannot see from the east. Aerial inspection recommended due to size.	Low*

Tree Number	Species	Potential bat roost features	Bat roosting suitability
T79	Mature Oak	Expansive ivy coverage on main trunk, no obvious features Ivy sparse and comprises mainly foliage but tree not observed from Eastern aspect due to land ownership.	Low
T80	Mature Oak	Tree not onsite but overhanging, woodpecker hole x 2, 1st (lower) hole reachable via ladder and endoscope.	High
T81	Mature Oak	Dead/broken limb with split with further possibility of 2 holes. Ivy has died. Hazard beam 10m.	Moderate
T82	Mature Oak	No obvious features, Western side is the only accessible. Pruning cut south facing, 5m high. Moderate due to lots of pruning and age.	Moderate
T83	Mature Oak	No obvious features, Western side is the only accessible side, Eastern side not inspected.	Low*
T84	Mature Oak	No obvious features, Western side is the only accessible side, Eastern side not inspected. Tree has been pollarded heavily with all branches now removed. Some small gaps may be present around the Pruning cuts.	Low*
T85	Twin stem Mature Oak	No obvious features, Western side is the only accessible side, Eastern side not inspected. Tear out cavity south facing 6.5m high. Moderate. As with other trees in this tree line could be features on Eastern aspects.	Moderate*
T86	Small tree	Eastern side not inspected. Bit cluttered however lots of knot holes worth inspecting.	Low *
T87	Mature Oak	No obvious features, Western side is the only accessible side, Eastern side not inspected.	Low
T88	Mature Oak twin stem	No obvious features, Western side is the only accessible side, Eastern side not inspected.	Low*
T89	Mature oak	No obvious features, but aerial inspection recommended due to age and size.	Low*
T91	Large Mature Oak	Woodpecker hole 8m high south, blackbird chicks heard and adults seen entering. Two broken limbs. Ariel inspection recommended not possible as Tree is dead.	High
T92	Mature Oak	Multiple limbs broken and split. No Obvious features. Ariel inspection recommended. Butt rot at base but entrance blocked for bats by bramble. Squirrel hole on dead limb 6m up facing east.	High
T93	Large Mature Oak	Ivy Clad, Woodpecker holes 5m up. Main trunk broken and hollow. Ariel inspection recommended. Ivy is more expansive, but woodpecker holes are still highly suitable.	High
T94	Mature Oak	Large broken and dead limbs. No obvious features but no access to other aspect. Ariel inspection recommended. Butt rot with small cavity but very cobwebbed. No features on North aspect. Small knot hole with gap at top on left stem facing south., height 6m.	Low
T95	Ash – multi-stemmed.	Knot hole in fork facing west 7m. Small knot hole facing south at 4m likely low. Knot hole east facing on centre stem at 8m.	Moderate
G1	Mature Oak	Group of mature oaks. No features observed. Ariel inspection recommended due to size.	Low*
G2	Mature Oak	Group of mature oaks. No features observed. Ariel inspection recommended due to size.	Low*
G3	Mature Oak	Group of mature oaks. No features observed. Ariel inspection recommended due to size.	Low*

Buildings with bat roost suitability



Bat Transect Heatmap

Appendix 9. Bird Survey Results

Table A9. Summary of breeding bird survey results

Species	Sch 1	BoCC Conservation Status	Visit 1 22/04/22	Visit 2 09/05/22	Visit 3 31/05/22	Visit 4 29/06/22	Total numbers	Max count	Probable/Possible onsite breeding territories	Breeding Status/ Observation
Green finch *Chloris chloris*		Red	0	0	0	1	1	1	Yes	Probable territory along southern boundary
Herring gull *Larus argentatus*		Red	4	0	0	1	5	4		Likely nesting off site
House sparrow *Passer domesticus*		Red	6	9	3	14	32	14	Yes	Probable nesting within farm buildings on site and adjacent to site
Starling *Sturnus vulgaris*		Red	1	9	3	24	37	24	Yes	Probable nesting in farm buildings and trees on site/adjacent
Black headed gull *Chroicocephalus ridibundus*		Amber	0	0	1	2	3	2		Likely nesting off site
Dunnock *Prunella modularis*		Amber	3	1	1	4	9	4	Yes	Probable territories along eastern boundary, west and central hedgerows
Song thrush *Turdus philomelos*		Amber	0	0	0	1	1	1	Yes	Probable nesting in adjacent woodland to the south of site, suitable habitat on site
Stock dove Columba oenas		Amber	0	1	2	2	5	2	Yes	Probable nesting in mature trees on site and adjacent to site
Wood pigeon *Columba palumbus*		Amber	56	56	75	81	268	81	Yes	Probable nesting in farm buildings mature trees and boundary habitat
Wren *Troglodytes troglodytes*		Amber	8	8	6	6	28	8	Yes	Probable nesting in hedgerow throughout the site and on adjacent land
Blackbird *Turdus merula*		Green	10	10	5	15	40	15	Yes	Probable nesting onsite suitable habitat present
Blackcap *Sylvia atricapilla*		Green	0	2	0	2	4	2		Unlikely nesting onsite, but prefered breeding habitat in adjacent woodland
Blue Tit *Parus caeruleus*		Green	32	17	26	26	101	32	Yes	Probable nesting onsite suitable habitat present
Buzzard *Buteo buteo*		Green	1	0	0	0	1	1		Unlikely nesting onsite, but prefered breeding habitat in adjacent woodland
Chiffchaff *Phylloscopus collibita*		Green	0	1	0	0	1	1	Yes	Probable nesting onsite suitable habitat present
Collard dove *Streptopelia decaocto*		Green	4	2	3	0	9	4	Yes	Probable nesting onsite suitable habitat present
Crow *Corvus corone*		Green	8	3		10	21	10	Yes	Probable nesting onsite suitable habitat present
Greater spotted woodpecker *Dendrocopos major*		Green	1	2	4	1	8	4		Unlikely nesting onsite, but prefered breeding habitat in adjacent woodland
Goldcrest *Regulus regulus*		Green	0	2			2	2		Unlikely nesting onsite, but prefered breeding habitat in adjacent woodland
Goldfinch *Carduelis carduelis*		Green	7	2	5	12	26	12	Yes	Probable nesting onsite suitable habitat present
Great Tit *Parus major*		Green	5	5	1		11	5	Yes	Probable nesting onsite suitable habitat present

Species	Sch 1	BoCC Conservation Status	Visit 1 22/04/22	Visit 2 09/05/22	Visit 3 31/05/22	Visit 4 29/06/22	Total numbers	Max count	Probable/Possible onsite breeding territories	Breeding Status/ Observation
Green Woodpecker *Picus viridis*		Green	1	0	0	1	2	1	Yes	Possible breeding onsite suitable habitat present
Grey Heron *Ardea cinerea*		Green	0	1	0		1	1		Unlikely nesting onsite observed flying over
Jackdaw *Corvus monedula*		Green			3	0	3	3		Unlikely nesting onsite, but prefered breeding habitat in adjacent woodland
Jay *Garrulus glandarius*		Green	5	2	0	0	7	5	Yes	Probable nesting onsite suitable habitat present
Long-tailed tit *Aegithalos caudatus*		Green		0	1	3	4	3	Yes	Probable nesting onsite suitable habitat present
Magpie *Pica pica*		Green	17	6	11	21	55	23	Yes	Probable nesting onsite suitable habitat present
Pied wagtail *Motacilla alba*		Green	3	0	1	0	4	3	Yes	Probable nesting onsite suitable habitat present
Robin *Erithacus rubecula*		Green	4	11	5	8	28	11	Yes	Probable nesting onsite suitable habitat present
Swallow *Hirundo rustica*		Green	0	0	0	1	1	1	Yes	Possible nesting onsite suitable habitat present
Total			176	150	156	236	718			

BoCC Breeding Territory Plan

Appendix 10. Pond Locations

Waterbody Location Plan

HSI Results

Table A10.1:HSI Range, Associated Pond Suitability and Predicted Presence of Great Crested Newts.

HSI Ranges	Pond Suitability	Predicted Presence of Great Crested Newts (proportion of ponds occupied n=248)
<0.5	Poor	0.03
0.5-0.59	Below Average	0.2
0.6-0.69	Average	0.55
0.7-0.79	Good	0.79
>0.8	Excellent	0.93

Table A10.2: HSI values for ponds on or within the direct vicinity of the site.

SI Number / Pond Score	2	4	7	9	10	11	12	13	14	15	17	18	D1
1 – Location		1	1		1				1			1	
2 – Pond Area		0.16	0.1		0.1				0.97			0.97	
3 – Drying Out		0.9	0.		0.9				0.9			0.9	
4 – Water Quality		0.67	0.67		0.67				0.67			0.67	
5 - Shade		0.6	0.2		0.6				1			1	
6 – Water Fowl		0.67	1		1				0.67			0.67	
7 – Fish		0.67	1		1				0.67			0.67	
8 Nearby Ponds		1	1		1				1			1	
9 – Terrestrial Habitat		0.33	0.67		0.67				0.67			0.67	
10 - Macrophytes		0.36	0.33		0.51				0.8			0.8	
H.S.I ($X^{1/10}$)		**0.56**	**0.51**		**0.64**				**0.82**			**0.82**	
Pond Suitability		**Below Average**	**Below Average**		**Average**				**Excellent**			**Excellent**	

Pond eDNA Result

Client: Laura Bennett,
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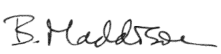
Sample ID: ADAS-4854	Condition on Receipt: Medium Sediment	Volume: Passed
Client Identifier: P14	Description: pond water samples in preservative	
Date of Receipt: 25/05/2022	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	26/05/2022
Degradation Control[§]	Within Limits	Real Time PCR	26/05/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/05/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/05/2022	Date of issue:	27/05/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Laura Bennett,
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Sample ID: ADAS-4858	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: P10	Description: pond water samples in preservative	
Date of Receipt: 25/05/2022	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control[†]	2 of 2	Real Time PCR	26/05/2022
Degradation Control[§]	Within Limits	Real Time PCR	26/05/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/05/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/05/2022	Date of issue:	27/05/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

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Sample ID: ADAS-4862	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: P4	Description: pond water samples in preservative	
Date of Receipt: 25/05/2022	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	26/05/2022
Degradation Control[§]	Within Limits	Real Time PCR	26/05/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/05/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/05/2022	Date of issue:	27/05/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Laura Bennett,
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Sample ID: ADAS-4863	Condition on Receipt: Medium Sediment	Volume: Passed
Client Identifier: P9a	Description: pond water samples in preservative	
Date of Receipt: 25/05/2022	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	26/05/2022
Degradation Control[§]	Within Limits	Real Time PCR	26/05/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	26/05/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	27/05/2022	Date of issue:	27/05/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Client: Michelle Haines,
Orb Ecology

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Sample ID: ADAS-4861	Condition on Receipt: Good	Volume: Passed
Client Identifier: Pond 7, Daws Heath	Description: pond water samples in preservative	
Date of Receipt: 08/06/2022	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	2 of 2	Real Time PCR	16/06/2022
Degradation Control[§]	Within Limits	Real Time PCR	16/06/2022
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	16/06/2022
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	17/06/2022	Date of issue:	17/06/2022

eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

[†] Recorded as the number of positive replicate reactions at expected C_t value. If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

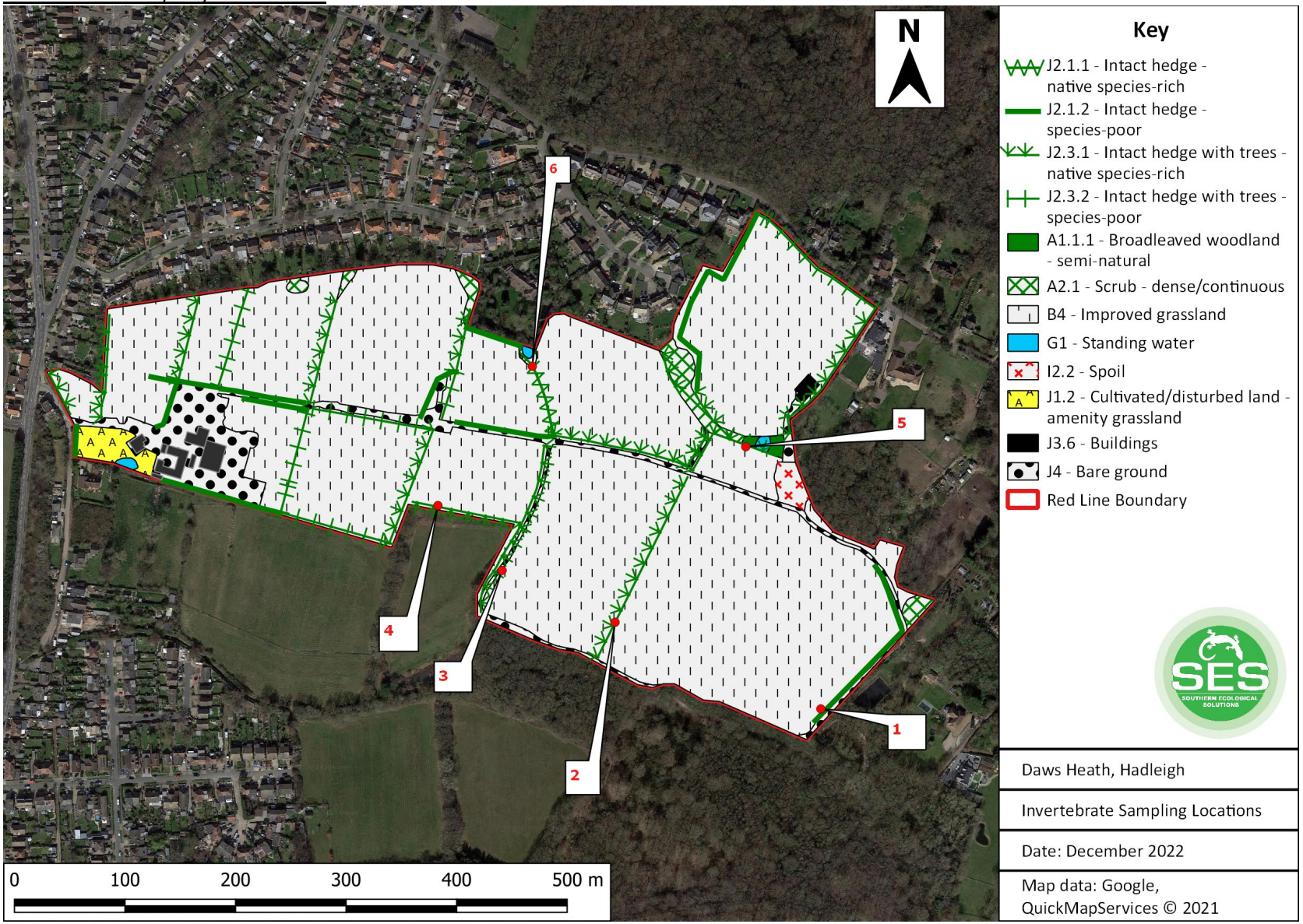
[§] No degradation is expected within time frame of kit preparation, sample collection and analysis.

[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Appendix 11: Hazel Dormouse Survey Results

Appendix 12: Invertebrates Survey Results

Invertebrate Sampling Station Plan



Invertebrate Survey Results

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Arachnids	Phalangiidae	*Mitopus morio*	x					
Arachnids	Phalangiidae	*Opilio saxatilis*	x					
Araneae	Araneidae	*Araniella cucurbitina*	x				x	
Araneae	Araneidae	*Argiope bruennichi*						x
Araneae	Dictynidae	*Dictyna uncinata*					x	
Araneae	Linyphiidae	*Erigone atra*	x		x			
Araneae	Linyphiidae	*Erigone dentipalpis*	x					
Araneae	Linyphiidae	*Lepthyphantes zimmermanni*	x					x
Araneae	Linyphiidae	*Linyphia hortensis*	x					
Araneae	Philodromidae	*Philodromus dispar*	x	x				
Araneae	Philodromidae	*Tibellus oblongus*		x				
Araneae	Pisauridae	*Pisaura mirabilis*	x					
Araneae	Tetragnathidae	*Meta mengei*	x	x	x		x	
Araneae	Tetragnathidae	*Meta segmentata*		x	x			x
Araneae	Tetragnathidae	*Metellina mengei*			x			
Araneae	Theridiidae	*Enoplognatha ovata*	x		x	x		
Araneae	Zoridae	*Zora spinimana*	x			x		
Coleoptera	Apionidae	*Protapion fulvipes*					x	
Coleoptera	Apionidae	*Protapion trifolii*					x	
Coleoptera	Cantharidae	*Cantharis lateralis*		x				
Coleoptera	Cantharidae	*Cantharis livida*	x	x				
Coleoptera	Cantharidae	*Cantharis nigra*		x		x		x
Coleoptera	Cantharidae	*Cantharis rustica*		x				x
Coleoptera	Cantharidae	*Rhagonycha fulva*	x	x				x
Coleoptera	Carabidae	*Amara aenea*	x					
Coleoptera	Carabidae	*Nebria brevicollis*		x				
Coleoptera	Carabidae	*Notiophilus biguttatus*	x	x	x	x	x	x
Coleoptera	Carabidae	*Pterostichus niger*		x				
Coleoptera	Cerambycidae	*Agapanthia villosoviridescens*	x					
Coleoptera	Cerambycidae	*Anaglyptus mysticus*	x					
Coleoptera	Cerambycidae	*Clytus arietis*	x					
Coleoptera	Cerambycidae	*Grammoptera ruficornis*	x					
Coleoptera	Cerambycidae	*Strangalia maculata*		x				
Coleoptera	Chrysomelidae	*Cassida rubiginosa*		x	x			
Coleoptera	Chrysomelidae	*Otiorhynchus sulcatus*		x				
Coleoptera	Chrysomelidae	*Podagrica fuscicornis*		x				
Coleoptera	Coccinelidae	*Harmonia axyridis*	x					
Coleoptera	Coccinellidae	*Adalia bipunctata*	x	x			x	x
Coleoptera	Coccinellidae	*Adalia decempunctata*	x					
Coleoptera	Coccinellidae	*Calvia quattuordecimguttata*	x					
Coleoptera	Coccinellidae	*Coccinella septempunctata*	x					
Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*	x					
Coleoptera	Curculionidae	*Apion carduorum*	x					
Coleoptera	Curculionidae	*Apion frumentarium*	x					
Coleoptera	Curculionidae	*Barypeithes pellucidus*	x					
Coleoptera	Curculionidae	*Curculio nucum*					x	x
Coleoptera	Curculionidae	*Nedyus quadrimaculatus*					x	
Coleoptera	Curculionidae	*Phyllobius roboretanus*	x					
Coleoptera	Curculionidae	*Sitona humeralis*		x		x		
Coleoptera	Curculionidae	*Sitona lineatus*			x			
Coleoptera	Curculionidae	*Trichosirocalus troglodytes*					x	
Coleoptera	Elateridae	*Athous haemorrhoidalis*	x			x	x	x
Coleoptera	Pyrochroidae	*Pyrochroa serraticornis*		x				
Coleoptera	Staphylinidae	*Ocypus olens*						x
Coleoptera	Staphylinidae	*Philonthus cognatus*	x					
Coleoptera	Staphylinidae	*Philonthus decorus*					x	
Coleoptera	Staphylinidae	*Tachyporus hypnorum*	x					
Coleoptera	Tenebrionidae	*Lagria hirta*	x					
Dermaptera	Forficulidae	*Forficula auricularia*	x					
Diptera	Asilidae	*Dioctria baumhaueri*	x					

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Diptera	Asilidae	*Dioctria rufipes*	x	x				
Diptera	Asilidae	*Leptogaster cylindrica*				x		x
Diptera	Asilidae	*Neoitamus cyanurus*	x					
Diptera	Bibionidae	*Bibio marci*	x	x		x	x	x
Diptera	Calliphoridae	*Calliphora vicina*				x		
Diptera	Calliphoridae			x				
Diptera	Conopidae	*Conops quadrifasciatus*						x
Diptera	Dolichopodidae	*Dolichopus festivus*	x					
Diptera	Dolichopodidae	*Sciapus platypterus*	x					
Diptera	Empididae	*Empis aestiva*	x					
Diptera	Empididae	*Empis livida*	x					
Diptera	Rhagionidae	*Chrysopilus asiliformis*	x					
Diptera	Rhagionidae	*Chrysopilus cristatus*	x					
Diptera	Rhagionidae	*Rhagio scolopaceus*	x					
Diptera	Sepsidae	*Sepsis fulgens*	x	x			x	
Diptera	Stratiomyidae	*Beris geniculata*		x				
Diptera	Stratiomyidae	*Chorisops tibialis*	x					
Diptera	Syrphdiae	*Helophilus pendulus*	x	x				
Diptera	Syrphidae	*Baccha elongata*	x					
Diptera	Syrphidae	*Cheilosia albitarsis*	x					
Diptera	Syrphidae	*Cheilosia bergenstammi*					x	
Diptera	Syrphidae	*Cheilosia illustrata*	x	x		x		
Diptera	Syrphidae	*Cheilosia pagana*					x	
Diptera	Syrphidae	*Cheilosia vernalis*	x					
Diptera	Syrphidae	*Chrysotoxum verralli*	x					
Diptera	Syrphidae	*Epistrophe eligans*	x	x				
Diptera	Syrphidae	*Episyrphus balteatus*	x	x	x	x	x	x
Diptera	Syrphidae	*Eristalis nemorum*	x					
Diptera	Syrphidae	*Eristalis pertinax*	x				x	
Diptera	Syrphidae	*Eristalis tenax*	x	x	x		x	
Diptera	Syrphidae	*Eupeodes corollae*	x					
Diptera	Syrphidae	*Melanostoma mellinum*	x	x	x			
Diptera	Syrphidae	*Merodon equestris*	x					
Diptera	Syrphidae	*Metasyrphus corollae*					x	
Diptera	Syrphidae	*Myathropa florea*	x	x				
Diptera	Syrphidae	*Neoascia podagrica*	x					
Diptera	Syrphidae	*Platycheirus albimanus*						x
Diptera	Syrphidae	*Platycheirus angustatus*					x	x
Diptera	Syrphidae	*Platycheirus clypeatus*	x					
Diptera	Syrphidae	*Sphaerophoria scripta*					x	
Diptera	Syrphidae	*Syritta pipiens*	x	x	x	x	x	x
Diptera	Syrphidae	*Syrphus ribesii*						x
Diptera	Syrphidae	*Volucella zonaria*						x
Diptera	Syrphidae	*Xylota sylvarum*	x					
Diptera	Syrphidae							x
Diptera	Tephritidae	*Tephritis formosa*	x					
Heteroptera	Acanthosomatidae	*Elasmucha grisea*		x	x	x		
Heteroptera	Anthocoridae				x			
Heteroptera	Lygaediae	*Heterogaster urticae*	x	x	x	x	x	x
Heteroptera	Miridae	*Apolygus lucorum*		x				
Heteroptera	Miridae	*Calocoris norvegicus*	x			x	x	x
Heteroptera	Miridae	*Capsus ater*	x	x	x			
Heteroptera	Miridae	*Closterotomus norwegicus*		x				
Heteroptera	Miridae	*Cyllecoris histrionius*	x					
Heteroptera	Miridae	*Deraeocoris ruber*	x					
Heteroptera	Miridae	*Heterotoma planicornis*	x					
Heteroptera	Miridae	*Leptopterna dolabrata*	x				x	x
Heteroptera	Miridae	*Lygocoris pabulinus*		x				
Heteroptera	Miridae	*Lygus rugulipennis*	x				x	
Heteroptera	Miridae	*Notostira elongata*					x	
Heteroptera	Miridae	*Orthops kalmii*		x				

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Heteroptera	Miridae	*Phylus melanocephalus*					x	
Heteroptera	Miridae	*Phytocoris varipes*	x					
Heteroptera	Miridae	*Pithanus maerkeli*		x	x		x	x
Heteroptera	Miridae	*Pithanus maerkelii*	x	x				
Heteroptera	Miridae	*Stenodema calcarata*			x			
Heteroptera	Miridae	*Stenodema laevigatum*	x	x			x	x
Heteroptera	Miridae	*Stenotus binotatus*	x					
Heteroptera	Miridae			x		x	x	x
Heteroptera	Nabidae	*Himacerus apterus*	x					
Heteroptera	Nabidae	*Himacerus mirmicoides*					x	x
Heteroptera	Pentatomidae	*Palomena prasina*	x	x	x			
Heteroptera	Pentatomidae	*Pentatoma rufipes*	x	x	x			
Heteroptera	Pentatomidae	*Zicrona caerulea*		x				
Heteroptera	Tingidae	*Tingis ampliata*	x					
Hymenoptera	Andrendiae	*Andrena fulva*	x				x	
Hymenoptera	Andrendiae	*Andrena haemorrhoa*					x	
Hymenoptera	Apidae	*Andrena minutula*						x
Hymenoptera	Apidae	*Anthophora plumipes*	x	x			x	x
Hymenoptera	Apidae	*Apis mellifera*	x	x			x	
Hymenoptera	Apidae	*Bombus hypnorum*	x	x		x	x	x
Hymenoptera	Apidae	*Bombus pascuorum*	x	x	x	x	x	x
Hymenoptera	Apidae	*Bombus terrestris*		x	x			
Hymenoptera	Apidae	*Halictus tumulorum*					x	
Hymenoptera	Apidae	*Hylaeus communis*				x	x	
Hymenoptera	Apidae	*Lasioglossum calceatum*						x
Hymenoptera	Apidae	*Nomada flava*						x
Hymenoptera	Apidae	*Nomada goodeniana*	x	x		x	x	x
Hymenoptera	Apidae	*Nomada ruficornis*	x		x			
Hymenoptera	Crabronidae	*Crossocerus elongatulus*	x					
Hymenoptera	Crabronidae	*Ectemnius lapidarius*	x					
Hymenoptera	Crabronidae	*Trypoxylon medium*	x					
Hymenoptera	Formicidae	*Formica fusca*	x	x			x	x
Hymenoptera	Formicidae	*Lasius niger*	x	x	x	x	x	x
Hymenoptera	Megachildiae	*Anthidium manicatum*	x					
Hymenoptera	Vespidae	*Dolichovespula media*	x			x		
Hymenoptera	Vespidae	*Vespula germanica*	x					
Hymenoptera	Vespidae	*Vespula vulgaris*	x	x		x		
Isopoda	Philosciidae	*Philoscia muscorum*	x					
Lepidoptera	Arctiidae	*Tyria jacobaeae*	x	x		x	x	x
Lepidoptera	Hesperiidae	*Ochlodes faunus*					x	
Lepidoptera	Lepidoptera	*Aphantopus hyperantus*	x			x	x	x
Lepidoptera	Lycaednidae	*Polyommatus icarus*	x					
Lepidoptera	Lycaenidae	*Celastrina argiolus*	x	x				
Lepidoptera	Lycaenidae	*Lycaena phlaeas*	x	x				
Lepidoptera	Nymphalidae	*Aglais urticae*					x	x
Lepidoptera	Nymphalidae	*Inachis io*					x	
Lepidoptera	Pieridae	*Pieris brassicae*						x
Lepidoptera	Satyridae	*Maniola jurtina*				x	x	x
Lepidoptera	Satyridae	*Pararge aegeria*	x					
Lepidoptera	Satyridae	*Pyronia tithonus*					x	x
Mollusca	Cochlicopidae	*Cochlicopa lubrica*	x					
Mollusca	Endodontidae	*Discus rotundatus*	x					
Mollusca	Enidae	*Ena obscura*	x					
Mollusca	Helicidae	*Cepaea nemoralis*						x
Mollusca	Helicidae	*Trichia hispida*	x					
Mollusca	Oxychilidae	*Aegopinella nitidula*	x					
Orthoptera	Acrididae	*Chorthippus parallelus*					x	x
Orthoptera	Meconematodae	*Meconema thalassinum*	x	x				
Orthoptera	Phaneropteridae	*Leptophyes punctatissima*	x	x		x	x	x
Orthoptera	Tettigoniidae	*Metrioptera roeselii*	x					

Appendix 13: Reptiles Survey Results

Appendix 14: Biodiversity Net Gain Metric 3.1

Biodiversity Metric 3.1 Calculations appended separately

Condition Assessment Summary Tables

Habitat (area) criteria

Habitat Parcel	Corresponding Condition Sheet	Condition Criteria													Score
		1	2	3	4	5	6	7	8	9	10	11	12	13	
MS1	Heathland and scrub	P	F	P	F	F									Moderate
MS2	Heathland and scrub	P	P	P	P	F									Moderate
MS3	Heathland and scrub	P	F	P	F	F									Moderate
MS4	Heathland and scrub	P	P	P	F	F									Moderate
MS5	Heathland and scrub	P	P	P	P	F									Moderate
MG1 (Formal)	Low distinctiveness grassland	P	F	P	P	P	P	P							Moderate
MG2	Low distinctiveness grassland	P	F	P	F	F	P	P							Moderate
P4	Pond	F	P	P	P	F	P	P	F	P					Moderate
P7	Pond	P	P	P	P	P	P	F	F	P					Moderate
P10	Pond	P	P	P	P	F	P	P	N/A	N/A					Moderate
P5	Pond - Dry														
W1	Woodland	3	2	3	3	3	3	2	3	2	2	1	2	1	Moderate

Hedgerow (km) criteria

Hedgerow	Criteria										Score
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	
H1	P	P	P	P	F	F	P	F	F	P	Moderate
H2	P	P	P	P	P	F	P	F	P	P	Good
H3	P	P	P	P	F	F	P	P	P	P	Moderate
H5	P	P	P	P	F	F	P	F			Moderate
H6	P	F	P	P	F	F	P	F			Moderate
H7	P	P	P	P	F	F	P	F	F	P	Moderate
H8	P	P	P	P	F	F	P	F			Moderate
H9	P	P	P	P	F	F	P	F			Moderate

Hedgerow	Criteria										Score
	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	
H10	P	P	P	P	F	F	P	F			Moderate
H11	P	P	P	P	F	F	P	F	F	P	Moderate
H12	P	P	P	P	F	F	P	F	P	P	Moderate
H13	P	P	P	P	F	F	P	F			Moderate
H14	P	P	P	P	F	F	P	F			Moderate
H15	P	P	P	P	F	F	P	F			Moderate
H16	P	P	P	P	F	F	P	P	P	P	Moderate
H17	P	P	P	P	F	F	P	F	P	P	Moderate
H18	P	P	P	P	F	F	P	F	F	P	Moderate
H19	P	P	P	P	F	F	P	P	P	P	Moderate
H20	P	P	P	P	F	F	P	F			Moderate
H21	P	P	P	P	F	F	P	F	P	P	Moderate
H22	P	P	P	P	F	F	P	F	P	P	Moderate
H23	P	P	P	P	P	F	P	F	P	P	Good
H24	P	P	P	P	P	F	P	F	P	P	Good
H25	P	P	P	P	P	F	P	P			Good
H26	P	P	P	P	P	F	P	P	P	P	Good
H27	P	P	P	P	F	F	P	P	P	P	Moderate
H28	P	P	P	P	F	F	P	P	P	P	Moderate
H29	P	P	P	P	F	F	P	P	P	P	Moderate
H30	P	F	P	P	F	F	P	F	F	P	Moderate
H31	P	F	F	P	F	P	P	F	F	P	Moderate
H32	P	P	P	P	F	F	P	P			Moderate
H33	P	F	F	P	F	F	P	F			Moderate
H34	P	P	P	P	F	F	P	F			Moderate
H35	P	P	P	P	F	F	P	F			Moderate
H36	P	P	P	P	P	F	P	P	P	P	Good
H37	P	P	P	P	P	F	P	F			Good
H38	F	F	P	P	P	F	P	F			Moderate

Appendix 15: Plant Species of Known Benefit to Bats

The following table is reproduced from *Gunnell, K., Grant, G. and Williams, C. (2012). Landscape and Urban Design for Bats and Biodiversity, Bat Conservation Trust*. This suggests plant species that can provide benefit for bats by either providing a food source for insects and / or roost potential. The plants listed are predominately native to Britain. The small group of non-native plants included for their documented value for wildlife. This list has been checked against Natural England's list of invasive non-native plants.

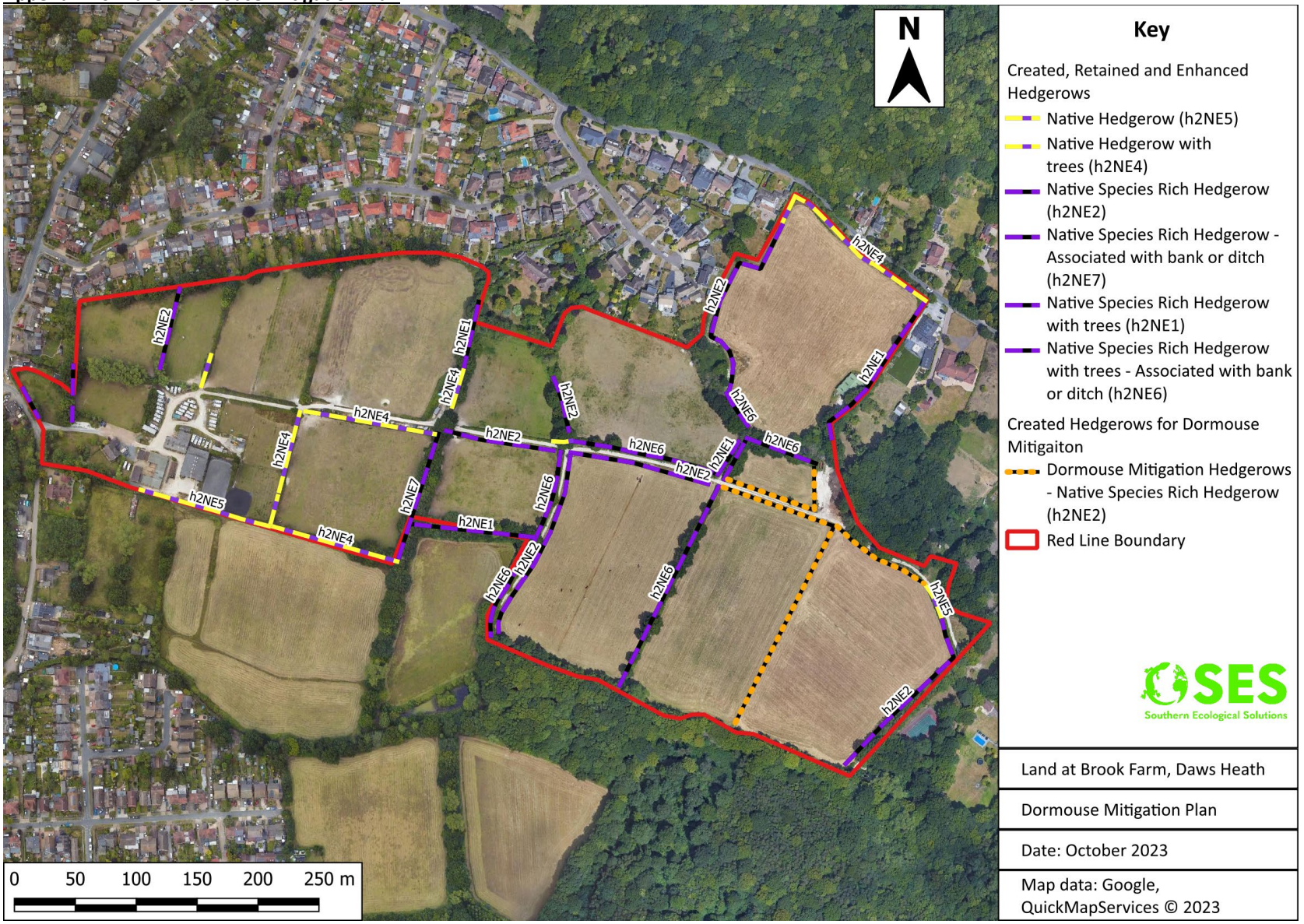
Plant species	Common name	Native (N)	Type	Benefit	Soil	Light	Green roofs	Living walls	Rain gardens	Hedge/ trees	Beds/ borders
Acer campestre	Field maple	N	T/S	C	Any	Sun / shade				Y	
Acer platanoides	Norway maple		T	S	Well drained / alkaline	Sun / shade				Y	
Acer saooharum	Sugar maple		T	S	Any	Sun / shade				Y	
Achillea millefolium	Yarrow	N	HP	C,F	Well drained	Sun				Y	
Ajuga reptans	Bugle	N	HP	C,F	Any	Sun / shade	Y		Y		
Anthyllis vulneraria	Kidney vetch	N	HP	F	Well drained	Sun	Y				
Aubrieta deltoidea	Aubrieta		H	F	Well drained	Sun/shade		Y			
Betula pendula	Sliver birch	N	T	C	Sandy / acid	Sun				Y	
Cardamine pratensis	Cuckoo- flower	N	HP	F	Moist	Sun / shade			Y		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	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 cinera	Bell heather	N	S	F	Sandy	Full sun					Y
Ersimum cherira	Wallflower		Bi-P	F	Well drained	Sun		Y			Y
Eupatorium	Hemp agrimony	N	H	F	Moist	Sun / shade			Y		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	Y
Hesperis matrionalis	Sweet Rocket		H	F	Well drained/ dry	Sun / shade					Y
Hyacinthoides non -scripta	Bluebell	N	B	F	Loam	Shade / partial shade		Y		Y	Y
Ilex aquailfolium	Holly	N	T	C	Any	Sun / shade				Y	
Jasmine officinale	Common jasmine		C	F	Well drained	Sun		Y			Y
Lavandula spp.	Lavender 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	

Plant species	Common name	Native (N)	Type	Benefit	Soil	Light	Green roofs	Living walls	Rain gardens	Hedge/ trees	Beds/ borders
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				Y
Malus spp.	Apple		T	C	Any	Sun				Y	Y
Matthiola longipetala	Night - scented stock		A	F	Well drained / moist				Y		Y
Myosotis spp.	Forget me not species	N	A	F	Any	Sun	Y	Y			Y
Nicotiania alata	Ornamental tobacco		A	F	Well drained moist	Sun / partial shade			Y		Y
Oneothera spp.	Evening primrose		Bi	F	Well drained	Sun	Y				Y
Origanum vulgare	Marjoram	N	HP	F	Well drained / dry	Sun				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				Y
Primula vulgaris	Primrose	N	HP	F	Moist	Partial shade	Y	Y		Y	Y
Prunus avium	Wild cherry	N	T	C	Any	Sun				Y	Y
Prunus domestica	Plum		T	C	Well drained / moist	Sun				Y	Y
Prunus spinosa	Blackthorn	N	S	C	Any	Sun / partial shade				Y	
Querois petraea	Sessile oak	N	T	C,R	Sandy loam	Sun / shade				Y	
Quercus robur	Common oak	N	T	R	Clay Loam	Sun / shade				Y	
Rosa canina	Dog rose	N	S	C	Any	Sun			Y	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					Y
Saxifraga oppositifolia	saxifage	N	HP	C	Well drained	Sun	Y	Y			Y
Scabiosa columbaria	small scabious	N	HP	F	Well drained / alkaline	Sun	Y				Y
Sedum spectabile	Ice plant		HP	F	Well drained / dry	Sun	Y				Y
Silene dioecia	Red campion	N	HP	F	Any	Shade / partial shade		Y	Y	Y	Y
Sorbus aucuparia	Rowan	N	T	C	Well drained	Sun				Y	
Stachys lanata	Lamb's ear		HP	F	Well drained / dry	Sun					Y
Symphotrichum spp.	Michalemas daisies		HP	F	Any	Sun					Y
Tages patula	French marigold		A	F	Well drained	Sun					Y
Thymus serpyllum	Creeping thyme	N	HP / S	F	Well drained / dry	Sun	Y	Y			Y
Tilia x europaea	Common lime		T	C	Any	Sun / shade				Y	
Trifolium spp.	Clover species	N	H	F	Any	Sun	Y				Y
Valerina spp.	Valerian species	N	HP	F	Moist	Sun / partial shade			Y		Y
Verbascum spp.	Mulliens	N	Bi, HP	C	Well drained	Sun					Y
Verbena bonariensis	Verbena		HP	F	Well drained /moist	Sun					Y
Viburnum lantana	Wayfaring tree	N	S	C	Any	Sun / shade				Y	Y
Viburnum opulus	Guelder rose	N	S	C	Moist	Sun / shade			Y	Y	
Viola tricolor	Pansy	N	A	F	Well drained / moist		Y	Y			Y

Legend:

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

Appendix 16: Hazel Dormouse Mitigation Plan



Key

Created, Retained and Enhanced Hedgerows

- Native Hedgerow (h2NE5)
- Native Hedgerow with trees (h2NE4)
- Native Species Rich Hedgerow (h2NE2)
- Native Species Rich Hedgerow - Associated with bank or ditch (h2NE7)
- Native Species Rich Hedgerow with trees (h2NE1)
- Native Species Rich Hedgerow with trees - Associated with bank or ditch (h2NE6)

Created Hedgerows for Dormouse Mitigaiton

- Dormouse Mitigation Hedgerows - Native Species Rich Hedgerow (h2NE2)
- Red Line Boundary

SES Southern Ecological Solutions

Land at Brook Farm, Daws Heath

Dormouse Mitigation Plan

Date: October 2023

Map data: Google, QuickMapServices © 2023