# Ecological Impact Assessment
# and
# Biodiversity Net Gain Assessment

**Brook Farm, Daws Heath, Hadleigh, Essex**

**On Behalf of:**

**Countryside Partnerships**

**June 2022**


**www.ses-eco.co.uk**

Ecology, Countryside Management
Professional Service ● Pragmatic Solutions
phone: 01268 711021 email: team@ses-eco.co.uk website: www.ses-eco.co.uk
Address: The Sudbury Stables, Sudbury Road, Downham, Essex, CM11 1LB

# SES Quality Management

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# Disclaimer

**Executive Summary**

1. This report presents the findings and recommendations of ecological surveys undertaken 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 to consist of urban developments with a mosaic of farmland and woodland.

3. Phase 1 and Phase 2 ecology desk study, surveys and assessments were undertaken in 2015 and updated in 2022. The surveys identified a range of ecology receptors: the habitats within the site were not of high ecological value except for the network of hedgerows some of which were classified as important under the hedgerow regulations act (1997) and three ponds. The site supported a range of protected species including a main badger sett, foraging and commuting bats, breeding birds, invertebrates, priority species of mammal and reptiles.

4. The site is located within an important network of protected ancient woodlands and grassland and its value as connecting landscape is potentially high providing a unique opportunity for ecological enhancement.

5. The development proposal includes 173 dwellings within circa 6ha section of the site and the remainder (circa 10ha) provided as green space including important habitats for a range of threatened and protected woodland, hedgerow, heathland and grassland species. Wildlife will also be welcomed within the built environment with sympathetic wildlife landscaping, bat and bird boxes.

6. The site falls within the ZoI of Benfleet and Southend Marshes SPA and Ramsar which form part of the Essex Estuaries SAC. 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.

7. With mitigation direct impacts on designated sites (such as pollution or noise disturbance during construction) will not occur, and indirect effects would have a neutral effect.

8. A main badger sett was identified on site. Badgers are protected under the Protection of Badgers Act (1992) and as such mitigation works are required to prevent death or injury. Mitigation will be required under a Natural England issued licence. Further steps to avoid harm during construction, through standard precautionary techniques will be implemented. Furthermore, to mitigate for the loss of foraging habitat, additional areas within the POS will be allocated and managed as part of a long-term management plan.

9. Due to the relatively low ecological value of the existing habitats on site, there is opportunity to deliver an overall increase biodiversity following the development through a sensitive landscape design. This will be achieved through the implementation of a wildlife friendly soft landscaping scheme as part of a long-term management plan.

10. 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 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 is located centrally at Ordnance Survey Grid Reference TQ 81588 88318 and is approximately 18.9ha in extent.

**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 has been allocated within the 2019 Draft Local Plan for Castle Point District Council.

**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) lies to the south, Pound Wood Local Wildlife Site (LWS) to the north. The wider landscape to consist 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 May 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), and relevant nature conservation policies

**1.6** The following further surveys were considered to be required on the basis of updated Phase 1 habitat and as a result of previous surveys from 2015. A number of surveys are still ongoing at the time of writing:

- Badger monitoring surveys
- Bat - tree ground level tree assessment; buildings assessment; activity survey; static survey
- Bird – Wintering bird survey (complete); breeding bird survey
- GCN eDNA survey
- Hazel dormouse survey
- Invertebrate survey
- Reptile 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. 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 are being implemented to fully inform the predicted impacts of the scheme in accordance with the National Planning Policy Framework (NPPF) (MHCLG, 2021), local planning policy 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 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 *Muscardinus avellanarius* 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 CPERC. 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 habitats based on the UK Habitat classification system (Butcher *et al,* 2020), therefore, the habitats as recorded onsite using the JNCC Phase 1 methodology are translated into the relevant habitat type under the UK Habitat Classification system. Once the habitats have been assigned a classification the habitat areas are split between linear features, such as hedgerows, which are measured in kilometres (km) and non-linear habitat, 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: User Guide (Natural England, April 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. The Phase 1 habitat map was used to calculate existing linear and non-linear habitat areas and mapped using QGIS. 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 20th May 2022 by SES. This assessment also included the recording of signs such paths, hairs, latrines and setts. The survey area comprised the development site (red line area; see 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 over a period of 21 days was conducted and is still ongoing at the time of this assessment. This was conducted 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 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 24th May 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 are in progress once a month which started in April 2022 until October 2022 by experienced ecologists following best practice guidance (Collins, 2016) for a large site of moderate habitat value, 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 are in progress for 2022 which started in April 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 September 2015 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 is currently underway using the standard Common Bird Census (CBC) methodology, devised by the British Trust for Ornithology (BTO Marchant 1983, Bibby et al 1992). Four visits are to be carried out from April to June 2022; a full methodology can be found in Appendix 3. The spread of visits is considered sufficient to record the likely breeding bird community.

*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 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 *Triturus cristatus* (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.

**2.28** A previous presence / likely absence Great Crested Newt (GCN) survey was undertaken during spring 2015 by SES followed published guidance (English Nature, 2001).

*eDNA survey*

**2.29** 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.

**2.30** eDNA surveys were conducted in the onsite ponds and ponds within 250m of the site where access was permitted on the 20th 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*

**2.31** Habitats on site were assessed for their potential to support populations of hazel dormice *Muscardinus avellanarius.* 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*

**2.32** In 2015 SES conducted dormouse surveys, 100 dormouse tubes were installed around the site and monitored form April – October following best practice guidance (Natural England, 2011). The probability score of finding dormouse presence was 46. This survey effort and probability of finding dormice or their field signs was considerably higher than the minimum score of 20.

**2.33** An update of these surveys is currently underway for 2022 with 100 tubes installed around the site from May to September with the probability score of finding dormouse presence of 40.

**2.34** Further detail on the survey method is provided in Appendix 3.

**Hedgerows**

**2.35** A hedgerow survey was undertaken in 2015 by SES. An update of this survey was conducted by suitably qualified ecologists Pete Scott-Norris BSc (Hons) in May 2022, to assess the importance of the hedgerows on site due for removal, 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*

**2.36** 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*

**2.37** In 2015 a survey was conducted by SES which followed Natural England's survey protocol Invertebrate-habitat Information System (ISIS) (Drake et al., 2007). Four sampling visits were undertaken on 23rd April, 26th May, 26th June and 20th July 2015 by Dr Graham Hopkins. Evaluation of the terrestrial fauna followed the criteria proposed by Colin Plant Associates (2006) to define the significance of invertebrate habitats.

**2.38** An update of this survey is currently underway for 2022.

**Reptiles**

*Preliminary Assessment*

**2.39** 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*

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

**2.41** An update of these surveys is currently underway for 2022. These survey methods followed best practice guidance (Froglife, 1999; Gent & Gibson, 2003; and Natural England, 2011). See Appendix 3 for full methodology.

**Other Notable Species**

**2.42** The update extended Phase 1 survey identified habitats on site likely to support NERC Act 2006 species of principle 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*. In 2015 surveys for NERC Act 2006 species of principle importance were undertaken. An update of these surveys is currently underway for 2022 in conjunction with surveys for other protected species.

**Constraints**

**2.43** Desktop data searches are a valuable tool in evaluating a site's potential to hold rare and protected species, it is not however an absolute in confirming presence or absence of notable species due to the nature of how the records are collected. Reptile surveys were conducted at the end of September and the first week of October. October is not considered optimal however given the temperatures and weather conditions were optimal at the time of the surveys this is not considered a constraint.

**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** Six waterbodies within 250m of the site could not be accessed for HSI survey.. Whilst six of the 12 ponds within 250m of the proposed development site could not be surveyed, the lack of GCN present within the remaining six ponds that were surveyed and the lack of data search records form the past 10 years, together are considered to confirm GCN are likely absent from site and the surrounding area. Furthermore, studies suggest a routine migratory range of up to 250m for great crested newts (Cresswell & Whitworth, 2004), though Jehle (2000) determined a smaller terrestrial radius of 63m within which 95% of summer refuges were located As such this was not considered a significant constraint.

**2.46** Surveys are currently being updated in 2022 and the results and recommendations of which will be supplied as an addendum to this report. Although these results may change mitigation requirements it is considered that the scheme is wholly deliverable and a precautionary approach to mitigation proposals has been applied.

## 3.0 Baseline Ecological Conditions

### Designated Sites

**3.1** 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 a Nationally important Sites of Special Scientific Interest (SSSI).

**3.2** Three SSSIs are present in close proximity to the site, due to the location less than 1km, have been included in the assessment below.

**3.3** These sites are designated under the Conservation of Habitats and Species Regulations (Habitats Regulations, 2019) and are of international importance. Details of all nearby designated sites are provided below in Table 1.

**3.4** There were three other European designated sites, all coastal, located within 13km from the site including:

- Essex Estuaries Special Area of Conservation (SAC);
- Crouch and Roach Estuaries SPA/ Ramsar; and
- Thames Estuary and Marshes SPA/Ramsar.

**3.5** Due to the proximity of these European designated sites a Habitats Regulations Assessment was conducted as a separate report by SES (SES, 2022) that should be read in conjunction with this assessment.

**3.6** There were five Sites of Special Scientific Interest (SSSI) within 5km of the site, the closest was Great Wood and Dodd's Grove SSSI 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 Meadows SSSI, which supports unimproved grassland, is 340m to the northeast of the site. 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.

**3.7** There were 10 Local Wildlife Sites (LOWS) within 2km of the site, the closest was Coxall Wood LOWA located adjacent to the southern boundary of the site. Pond Wood LOWS was 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 *Mellicta athalia*. |
| 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 | 2.6km northeast | 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 |

| Name and Site Designation | Distance and Direction from Site | Area (ha) | Designated Features |
|---|---|---|---|
| *Underpinned by Benfleet and Southend Marshes SSSI* | | | ringed plover *Charadrius* hiaticula. The site supports internationally important assemblage of non-breeding waterfowl in excess of 27,000 birds. |
| 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 south-east | 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 south-east | 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 south-west | 8.27 | Lake formed by a former creek cut off by the sea wall with a shingle bank. Water voles and ducks present. |
| **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 Resevoir 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 |
| 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 LOWA | 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**

**3.8** 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.

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

- 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*

**3.10** 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.

**3.11** 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*

**3.12** 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* were all frequent within the sward. Herbaceous species included dock sp. *Rumex sp.*, dandelion *Taraxacum agg*, plantain species, buttercup *Ranunculus sp.* and common centuary *Centaurium erythraea*. The improved grassland was not considered species-rich.

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

*Tall Ruderal*

**3.14** 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.

*Scattered Trees*

**3.15** 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.

*Hedgerows*

*Hedges with Trees*

**3.16** Several species-rich hedges were present on site, several which with mature trees. 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 within the hedges 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*.

*Hedges without Trees*

**3.17** 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, 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

**3.18** All hedgerows on site are Habitats of Principal Importance as they all contain over 80% native woody species. 18 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*

**3.19** 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 either corrugated metal roofs or clay tile roofs were also present.

*Bare Ground*

**3.20** 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.

*Standing Water*

**3.21** 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 remined present on this updated assessment:

- 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 recently containing water;

**3.22** 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.

**3.23** 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.

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

**3.25** Ponds 4, 7 and 10 provided little opportunity to support aquatic/marginal vegetation and therefore do not meet the criteria to be a HoPI under the JNCC classification (2016). Therefore, these ponds are only given **Site** level importance.

*Stream/ Ditch with Water*

**3.26** There were two ditches within the site boundary, both of which were dry at the time of this assessment. In 2015 SES reported that 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.

**3.27** 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*

**3.28** 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.

**3.29** 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.

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

*Summary*

**3.31** The majority of habitats on site were of site importance only, with the exception of the hedgerow network which was of district ecological value. The site value habitats were common within the wider landscape and lacked species diversity. The hedgerow network classifies as a HoPI and some considered 'important' under the hedgerow regulations and are assessed as of District value. The ponds are only considered of site level importance as they are common in the surrounding landscape with a further 10 ponds recorded within 250m of the site.

**Protected and Notable Species**

**3.32** Protected 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*

**3.33** 28 records of the Schedule 8 protected plant species (bluebell *Hyacinthoides non-scripta*) were included within the data search. One record of NERC Act Species of Principal Importance were recorded within 2km of the site for chamomile *Chamaemelum nobile*.

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

*On-site Assessment*

**3.35** No protected, rare or notable species were recorded.

**3.36** 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*

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

**Badger**

*Desk Study*

**3.38** There were 33 records of badger returned on the data search withing the last 10 years the closest of which was located 300m south of the site in 2019.

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

*On-site Assessment*

**3.40** 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 9.

*Badger Scoping & Monitoring Surveys*

**3.41** Monitoring of these setts began on 24th May for 21 days and is currently ongoing. The monitoring has so far confirmed that setts 1, 2, 4, 6, 7 and 8 are in active use by badgers, with footprints recorded in sand traps, and monitoring sticks being triggered. It is likely that Set 1 is a main sett given its size, and due to levels of activities when first surveyed. The results of the monitoring are summarised in Appendix 9.

**3.42** 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*

**3.43** 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*

**3.44** 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 | 0.3 | 4 | 2013 |
| Daubentons | 1.9 | 2 | 2018 |
| Serotine *Eptesicus serotinus* | 0.7 | 3 | 2018 |
| Myotis species | 1.9 | 3 | 2018 |

**3.45** The results from the surveys by SES in 2015 concluded that the sites hedgerows and mature trees and boundaries alongside woodland provided moderate/high habitat for foraging and commuting bats. However, the improved grassland fields on site were considered to provide low quality habitat as evidenced by the volume of calls recorded.

**3.46** Surveys from 2015 identified 98 trees with Low to High bat roost suitability. Aerial tree inspections were conducted by SES in 2016 on 15 of these trees that required further assessment and were likely to be impacted by the proposed development.

**3.47** Buildings were not fully inspected by SES in 2015 as access was restricted at the time of the surveys.

*Update Assessment for Roosting Bats*

*Buildings*

**3.48** 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 due to horse being present, therefore assessments were made on the basis of external inspections alone. Results are detailed in **Table 3** below and mapped in Appendix 7.

**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 | 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 |
| B7 | Agricultural barn, metal roof and structure with no sides | N/A | None | None | Negligible |

**3.49** Confidence in the low suitability rating 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)

*Trees*

**3.50** All trees on site were subject to a ground level tree assessment (GLTA). 53 were low suitability, 21 trees moderate suitability, 7 high suitability and four trees were no longer present as they had been felled or had blown over in storms (From discussions with the landowner). A further 13 trees had been downgraded to negligible suitability as features were no longer present in this updated assessment. A plan with the location of the trees with bat roost suitability and a summary of the results can be found in Appendix 7.

**3.51** It was not possible to fully inspect 21 of the trees from the ground due to 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.

**3.52** The site has 81 tree with suitability for roosting bats however 53 had low suitability. The 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.

*Update Assessment for Foraging and Commuting*

**3.53** 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 windbreak which is attractive to bats invertebrate prey. Connectivity to surrounding habitats is offered throughout the site with the existing network of hedgerows.

**3.54** 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.

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

*Update Activity Surveys*

**3.56** Update bat activity transect surveys are currently underway at the time of writing. Interim results from April and May 2022 showed 2 species were recorded as well as undetermined pipistrelle sp. The results are provided in Table 5 below.

**3.57** Only two passes were recorded in April along the northern boundary. In May 2022 Bats were recorded throughout much of the site, with highest levels of activity along southern boundary with Dodds Grove/Great Wood SSSI and through the east of the site along the hedgerows. Evidence suggested these areas were used both for foraging and as movement corridors.

***Table 4:*** **Interim Summary of activity survey results April to May 2022**

| :Species | | Number of passes | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Apr | May | Jun | Jul | Aug | Sept | Oct | Total |
| Common pipistrelle | *Pipistrellus pipistrellus* | 2 | 14 | | | | | | |
| Soprano pipistrelle | *Pipistrellus pygmaeus* | 0 | 5 | | | | | | |
| Pipistrelle sp. | *Pipistrellus sp.* | 0 | 2 | | | | | | |
| **Total** | | **2** | **21** | | | | | | |

*Update Automated Detector Surveys*

**3.58** Automatic static detectors are to be deployed monthly between April and October 2022, analysis of the results from April and May are still underway at the time of writing.

*Importance*

**3.59** There was a diverse range of trees on site from young and heathy to mature trees with decay features and therefore provided a range of suitable features for roosting bats. Three buildings on site provided low suitability for roosting bats. The site provided good connectivity with mature hedgerows with trees providing moderate suitability commuting corridors to the surrounding landscape. However, the site itself was considered to provided low suitability foraging habitat within the improved grassland fields. The results of the interim update surveys is (where data is available) is largely consistent with the 2015 assessment which was anticipated as the habitats and conditions remained the same.

**3.60** The surrounding landscape contains a number of woodlands including statutory designated site such as Dodds Grove/ Great Wood SSSI and Pound Wood that provided better quality and more suitable foraging and roosting habitat. However as the site is situated inbetween these sites, it is considered that the boundary and internal

hedgerow networks provides important connectivity for local populations of bats. As such, the site is considered to be of up to **Local** importance for foraging, commuting and roosting bats.

**Birds**

*Desk Study*

**3.61** 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.

**3.62** The 2015 Breeding Bird survey identified ten notable species on the site: four on BOCC 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.

**3.63** 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*

**3.64** Wintering bird survey 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

**3.65** 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..

**3.66** 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.

**3.67** A single Schedule 1 species, redwing Turdus iliacus, was recorded flying over the site. Results are summarised in Table 5 below:

**Table 5: Summary data on bird conservation status.**

| Conservation Status | BoCC | |
|---|---|---|
| | On site | Adjacent/ Flyover |
| **Sch 1** | 0 | 1 |
| **Red** | 2 | 1 |
| **Amber** | 3 | 3 |
| **Total** | **5** | **4** |

*Update Breeding Bird Survey*

**3.68** The update breeding bird survey is currently underway at the time of writing. However, as the habitats remain consistent with the 2015 assessment it is expected that the results will comparable.

*Importance*

**3.69** The habitats present on site are common in the surrounding area. The interim breeding bird and winter bird assemblage was considered to be common and widespread. As such it is considered that the site has only **site** importance for birds.

**Great Crested Newt**

*Desk Study*

**3.70** 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.

**3.71** 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 predicted as they more likely to be present.

**3.72** In 2015 10 ponds in 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.

*Update On-site Assessment*

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

**3.74** As per the update habitats survey (Paragraph 3.21) two ponds on site were no longer present, 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 8.

*Update HSI Survey*

**3.75** Aquatic habitat was identified within 250m of the site and a HSI assessment conducted where access was possible. A summary of the results can be found in Table 6 below (see Appendix 9 for detailed results).

**Table 6 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*

**3.76** SES conducted surveys on 10 ponds within 250m of the site with results that concluded an absence of GCN. However, due to the site being located in an 'amber risk zone' for GCN in Essex, and the time elapsed since the last survey it was believed prudent to undertake an eDNA survey of the Ponds within 250m of site as a precautionary measure to ascertain presence or likely absence. This survey was conducted on the 20th May 2022 in accordance with the Natural England technical advice note (2014). As discussed above two ponds were no

longer present, one was dry at the time of survey and two could not be accessed from lack of permission. As such five ponds were surveyed. The results for which are still pending at the time of writing.

*Importance*

**3.77** Terrestrial habitats on site were considered to be of **Low** importance to any local great crested newt population. Only one pond on site had an average Pond Suitability Index, the other two ponds on site were considered Below Average. There were two fewer ponds on site than in 2015 providing less opportunity on site for aquatic habitat. Pond 10 had a population of smooth and palmate newts in 2015.

**3.78** 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.

**3.79** 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, no there have been no records of GCN within 2km of the site in the last 10 years. It is considered that the eDNA survey results will support this and as such, great crested newts are not considered further in this report.

**Hazel Dormice**

*Desk Study*

**3.80** 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 were also records recorded in West Wood LNR 350m to the west within the last 10 years and from Little Havens Hospice 0.6km to the northwest of site.

**3.81** 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 value.

**3.82** In 2015 SES found no evidence of dormice or their nests during the surveys onsite.

*Update On-site Assessment*

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

**3.84** 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 historical integrity. Species including hazel Corylus avellana, hawthorn *Crateagus monogyna*, bramble *Rubus s*p, climber species and; mature oak *Quercus sp*. Trees. Furthermore, many of these hedgerows appear to contain ample three-dimensional physical structure required for dormice.

*Tube Survey*

**3.85** The update dormouse tube survey is currently ongoing for 2022 and due to be complete in September 2022. Tube surveys in 2015 by SES showed no evidence of dormice on site.

*Importance*

**3.86** Given the suitable connective habitat onsite (species rich hedgerows) and that the site is located adjacent to a known population of dormice it is considered that dormice are likely to utilise the site for dispersal. However, as no evidence of dormice were present in 2015 and there is a limited amount of preferred core habitat on site it is considered that the site is only of **site** level importance for dormice.

**Invertebrates**

*Desk Study*

**3.87** 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.

**3.88** 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).

**3.89** There are population of the nationally scarce heath fritillary butterfly to the south at Belfair Woods LNR/ Great Wood and Dodds Grove SSSI and Pound Wood to the north.

**3.90** 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.*

*Update On-site Assessment*

**3.91** The site was considered largely unfavourable to support a notable assemblage of invertebrates due to the nature of the improved 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 (heathland and open coppice woodland).

*Update Invertebrate Survey*

**3.92** An update invertebrate survey is currently ongoing for 2022 season. However habitats on site are largely consistent with that of 2015 when previous survey were conducted and it is considered that the findings will be comparable.

*Importance*

**3.93** The site is located between 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 adjacent to the site on the southern boundary. However, none were observed on site in 2015, suitable habitat on-site remains absent, and the adjacent areas of the woodlands do not appear to be suitable habitat for the heath fritillary as they are not areas of coppice woodland or heathland). 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). Due to these dynamics of patch extinction and colonisation it is considered that the site does not likely contribute to the dynamics of the Pound Wood and Belfairs Wood LNR / Great Wood and Dodds Grove SSSI populations.

**3.94** As such the site is considered to be of **site** value to heath fritillary butterfly and other notable invertebrates.

**Otter**

*Desk Study*

**3.95** 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*

**3.96** 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 on within the site except for where hedgerows adjoins the stream.

*Importance*

**3.97** As the site is directly adjacent to the stream to the south and otter if present in the local landscape is likely to utilise the bank within the site for commuting or resting within limited section of hedgerow that join the stream. However, given that there have been no records of otter within the last 40 years withing 2km of the site otter are considered absent in the wider landscape and are not considered further in this assessment.

**Reptiles**

*Desk Study*

**3.98** 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.

**3.99** Presence/likely absence surveys form SES in 2015 observed an 'exceptional' sized 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 8 survey visits and were considered likely absent from site.

*Update On-site Assessment*

**3.100** 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.

*Update presence/likely Absence Surveys*

**3.101** The presence/likely absence surveys for 2022 are currently ongoing. The interim results can be found in Table 7 below:

**Table 7: 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 |

*Importance*

**3.102** Despite only two visits have been completed as part of this interim assessment an 'exceptional' population of slow worm is shown to remain present on site. Given the historic 'exceptional' slow worm population size recorded in 2015, presence of grass snake and because the habitats on site are consistent of that at the time in 2015 the site is considered as having **local** importance for reptiles.

**Water Vole**

*Desk Study*

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

*On-site Assessment*

**3.104** 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 contains sparse bankside vegetation that is required by water voles for foraging and shelter habitat.

*Importance*

The site had limited habitats likely to support water vole and the stream on the southern boundary had suboptimal 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 are not considered further within this report.

**Other Notable Species**

*Desk Study*

**3.105** 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.

Harvest mouse nest was present onsite in dormouse tubes during 2015 survey.

*Update On-site Assessment*

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

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

**3.108** 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.

**3.109** It is considered that the majority of the habitat on site (improved grass land) is unsuitable for other notable species.

*Importance*

**3.110** The site was therefore considered to have **site** value for hedgehog, polecat, harvest mouse and common toad.

**Summary**

**Table 8. Summary evaluation of features.**

| Feature | Summary Description | Value |
|---|---|---|
| SPA | Benfleet and Southend Marshes SPA and Ramsar/SSSI | National/ International |
| SSSI | Great Wood and Dodd's Grove SSSI<br>Garrold's Meadow SSSI<br>Thundersley Great Common SSSI<br>Hockley Woods LNR/SSSI | National |
| LNR | Belfairs LNR<br>Belton Hills LNR<br>Leigh LNR<br>Southend-On-Sea Foreshore LNR<br>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 grass land, one pond was 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 | 10 badger setts identified on site including one likely main sett. | Local |
| Bats | Historic and interim surveys show Low 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 | Breeding birds and wintering birds assemblage considered common and widespread. | Site |
| Great crested newt | Limited suitable terrestrial habitat and no historic records on or within 250m of site. Considered absent from site. | Negligible |
| Hazel dormouse | Although present locally and within adjacent sites, only limited suitable 'core' habitat on site. | Site |
| Invertebrates | Unlikely to support a notable assemblage of notable assemblage. Heath fritillary populations known in adjacent sites but limited suitable habitat on site. | Site |
| Otter | Stream adjacent to the site suitable for commuting otter limited suitable on-site habitat | Negligible |
| Reptiles | Site supports a population of slow worms and historic populations of grass snake | Local |
| Water Vole | Habitats on and adjacent to site considered sub-optimal | Negligible |
| Other notable species | Suitable habitats for hedgehog, harvest mouse, polecat and common toad. | Site |

## 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 site are listed within the Essex Coast RAMS and also designated as a Nationally important Sites of Special Scientific Interest (SSSI). At c2.7km 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. It is considered that in the absence of mitigation Great Wood /Dodds Grove and Garrold's Meadow Site (recreational pressure only) SSSIs 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*

*Benfleet and Southend Marshes SPA*

**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** While the development proposal is still at outline stage, the illustrative landscape masterplan (Appendix 1) includes a total of circa 10ha of SANG quality openspace which include 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 can 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.

**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 include links north of the site Bramble Road onto Pond Wood, which is an Essex Nature Reserve which includes circular paths around the reserve[1]. Furthermore, to the south off Poors Lane with dedicated path and road through Belfairs Park Wood. The latter wood includes parking as well as multiple pathways through the woodland[2]. 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 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 & Dodd's Grove and Garrold's Meadow Site*

*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 of a c.15m green buffer including thorny wood 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. Changes to air quality is outside the scope of this report but the closet internal roads/ development parcels are c.190m from the woodland boundary edge. 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 functional linked habitats are mitigated. 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/ LEMP and a landscape clerk of works to ensure compliance.

*Residual Effects*

[1] https://www.essexwt.org.uk/nature-reserves/pound-wood
[2] https://www.essexwt.org.uk/nature-reserves/belfairs

**4.16** 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. The residual effects on stautory designated sites during the construction /occupational phase will be reduced to **neutral.**

**Habitats**

**4.17** 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.

**4.18** There were two priority habitats (NERC habitats) which are present on site: Hedgerows, Ponds, 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. 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 local plan explicitly state that proposals will be accepted within this area where they seek to enhance the ecological assets of the Daws heath Historic Natural Landscape.

**4.19** The Castle Point District Draft Local Plan – policy NE8 also states that proposals resulting in any adverse impacts to biodiversity within Ramsar sites, Special Protection Areas, Marine Conservation Zones, Sites of Special Scientific Interest, and Ancient Woodland should be controlled through avoidance, on-site management and on-site mitigation. Where this cannot be achieved development proposals will be refused.

***Hedgerows***

*Impacts*

**4.20** A large number of hedgerows on site can be classified as important under the hedgerow regulations (HMSO, 1997). These can be 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 the hedgerows on site in general are considered to be of good ecological value (i.e. regardless of importance under hedgerow regulations).

**4.21** During construction ten sections of hedgerow two of which are considered 'important' as part of the hedgerow regulations are due to be cleared as part of plans for the development. Impacts to retained hedgerows during construction include pollution, damage to the root plates from construction activities, and loss of ecological value form artificial lighting. Impacts from the occupational phase includes damage from new residents (such as 'cutting back' or fly-tipping) and increased levels of artificial lighting.

*Mitigation*

**4.22** 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.

**4.23** 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, they should be pointed away from hedgerows and other ecologically valuable habitats. This and pollution prevention will be incorporated within a CEMP.

**4.24** 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*

**4.25** Hedgerows will be enhanced through forming a buffer zone of at least 1m, of ground flora, by using a relaxed mowing regime to create different sward heights of grass and wildflowers. Gaps within the hedgerow 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 ensure berries are not lost.

**4.26** Where retention of hedgerows is not possible, compensatory planting to mitigate negative impacts to biodiversity, in line with the NPPF, (2021) and policy NE2 of the Castle Point District's Local Plan.

***Woodland***

*Impacts*

**4.27** 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 of the northernmost field. It is considered likely that without mitigation these habitats could be negatively affected by artificial lighting and pollution during construction and occupational phases. During the occupational phase direct impacts from human interaction may cause physical damage to the woodland edges from activities such as 'cutting back' vegetation.

*Mitigation*

**4.28** 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 Root Protection Areas (RPAs) (construction phase) and buffered by additional woodland plantings (15-20m in width) (occupational phase). Planting of native thorny species is recommended to 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 direct impact during the occupational phase such as increased artificial lighting a sensitive lighting strategy will be implemented as per paragraph 4.24. Mitigation measure during the construction phase including pollution prevention methods and tree protection areas will be included within a CEMP.

*Enhancements*

**4.29** Significant enhancements will be achieved through enhancing the connectivity on site between Belfairs Wood LNR/Great Wood and Dodd's Grove SSSI and Pound Wood ancient woodland and species rich grassland will provide a complementary habitat. Connectivity can 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*

**4.30** There are three ponds present on site (ponds 4, 7 and 10, see Appendix 8), which were classified as NERC Act (2006) habitats of principal importance. Ponds 4 and 10 will be retained. Ponds 7 will be lost. A series of new waterbodies will be created to the south of the development which will increase the area of open water significantly and fully mitigate this loss.

*Mitigation*

**4.31** Mitigation of any indirect impacts during construction should also be appropriated following the Environment Agency pollution prevention guidelines (Environment Agency, 2001-2011) and incorporated within a CEMP. To prevent direct impact during the occupational phase such as increased artificial lighting a sensitive lighting strategy will be implemented as per paragraph 4.24

*Enhancements*

**4.32** 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 a pond, providing different habitats.

**4.33** Additional ponds are included within the proposed development that will enhance the value of ponds on site. New ponds will benefit with the planting of native aquatic and marginal vegetation which will enhance its ecological value. Native tree planting along the southwest banks will also provide some shading which will benefit amphibians. 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.

**4.34** 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 as agreed with the ECOW). Biodiversity will benefit from this variety of riparian features providing habitat for invertebrates, amphibians and quality foraging habitats for birds and bats.

*Summary of Biodiversity Enhancements*

**4.35** 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.

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

- The POS surrounding the SUDs will be landscaped and managed as a wildlife friendly 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.
- Traditional orchard will be created with species rich grassland for which is a key feature of this habitat
- 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 the grassland will be enhanced for biodiversity while making it accessible for new residents.
- 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 be of a diverse species composition.
- Planting of non-native invasive species will be avoided throughout.

**Biodiversity Net Gain**

**4.37** There are currently no policies regarding biodiversity net gain (BNG) in Castle Point District Councils Local Plan, 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.*

**4.38** An increasing number of LPA's are requesting BNG assessments, citing the NPPF above. Although East Castle Point District Councils Local Plan which cite requirements of BNG it does not quantify BNG targets e.g. 10% up lift.

**4.39** BNG calculations were undertaken utilising the latest biodiversity metric (DEFRA 3.1) based on the current layout and Landscape Strategy Plan by David Jarvis Associates (DJA, 2022). These calculations resulted in a 38.08% net gain for habitat areas and a loss of -5.2% for linear habitats. The headline results are provided in Table 9 and the BNG metric calculation can be found in Appendix 10.

**4.40** This BNG is reliant upon a number of assumptions such as, c.7.3ha of modified grassland being enhanced as good condition other neutral grassland, the SUDS basin managed as moderate condition other neutral grassland and the creation of 0.8ha of traditional orchards managed to a moderate condition. It is considered that this is an achievable figure 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.

**4.41** In the current layout there is a net loss of linear habitats due to the loss of hedgerows required to facilitate the development. It is recommended that additional hedgerow are created to the east of the site within areas of public open space which will off-set this loss and create a net gain for linear habitats.

**Table 9: Biodiversity Net Gain Metric 3.1 Headline Results.**

| | | |
|---|---|---|
| On-site baseline | *Habitat units* | 70.34 |
| | *Hedgerow units* | 25.64 |
| | *River units* | 0.00 |
| On-site post-intervention (Including habitat retention, creation & enhancement) | *Habitat units* | 97.13 |
| | *Hedgerow units* | 24.31 |
| | *River units* | 0.00 |
| On-site net % change (Including habitat retention, creation & enhancement) | *Habitat units* | 38.08% |
| | *Hedgerow units* | -5.20% |
| | *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* | -1.33 |
| | *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* | -5.20% |
| | *River units* | 0.00% |
| Trading rules Satisfied? | | Yes ✓ |

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

*Residual Effects*

**4.43** With the implementation of a CEMP the residual effect on habitats is predicted to be **neutral** from 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*

**4.44** 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*

**4.45** 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*

**4.46** 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*

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

**4.48** Eight setts including a likely main badger sett was identified on-site (Appendix 9). The development of houses 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. This is predicted to have a major adverse effect at a **site** level.

**4.49** 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 will have a negative impact at a **site** level.

*Mitigation*

**4.50** Where possible setts are to be retained however setts 1, 3, 5, 6, 7 and 8 may have tunnels potentially crossing into the construction zone that may be impacted via the proposed development at the construction and operational stage of the development. A Natural England licence will be applied for once planning has been approved and mitigations works can commence from 1st July and up to 30th November.

**4.51** These works will involve sett closures to setts 3, 5, 6, 7 and 8. The closures will involve the installation of one-way gates one each entrance and monitoring 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 the sett.

**4.52** In order to retain the main sett (Sett 1) the mitigation works will involve a live dig along the western boundary and up to 20m beyond the furthest entrances to the north and south. The live dig will involve the careful excavation of a trench of up to c.2m deep. Mesh will be installed on the boundary side of the trench to prevent future tunnelling back into the sett during this period as well as the construction and operational phases of the development. Any tunnels encountered will be installed with one-way gates and 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) a destructive search will take place 'chasing' tunnels back that lead into the construction zone to ensure badgers are not within the areas that will be impacted via the proposed development. All methods will be approved by Natural England and carried out under licence.

**4.53** 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:

- Covering trenches at night or leaving a plank of wood leant against the side to ensure badgers can escape if they were to accidentally fall in
- Covering open pipework with a diameter of greater than 120mm at the end of the workday to prevent animals from entering and becoming trapped
- Appropriately storing any chemicals overnight
- Regular removal of litter.

**4.54** 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 ensure the continued provision of rough grassland which is suitable for badgers.

**4.55** 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.

**4.56** With the implementation of the above mitigation, the effect on badgers is considered to be **negligible** during the construction phase**.**

*Occupation impacts*

**4.57** 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 **minor adverse** effect at the **site** level.

*Mitigation*

**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** With the implementation of the above mitigation, the effect on badgers is considered to be **neutral** at the **site** level during the occupation phase.

*Residual Effects*

**4.60** Protection of the main sett during the construction period will result in a **neutral** effect on badgers using the site and provision of additional foraging resources is predicted to result in a **neutral** residual effect at the **site** level.

**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).

**4.62** 81 trees on site were identified to be of low, moderate or high suitability for roosting bats (Appendix 7). 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 foraging and commuting routes on site could additionally be impacted by habitat loss during construction if the existing boundary vegetation on site was required to be cleared. Disruption of linked commuting routes could also occur due to the removal of existing boundary vegetation.

**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 roost through abandonment, if present.

**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 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 should 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** 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. These surveys will be conducted during the 2022 bat survey season. Until further survey work has 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** Licenced mitigation for roosting bats, if required, 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.

*Foraging and commuting*

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

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

**4.72** The effect of lighting from the development post-construction is addressed in paragraph 4.24, as such will be only 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 therefore create a 'dark corridor'.

*Enhancement*

**4.73** 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 hedgerows will also enhance commuting corridors within the wider landscape. 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.

**4.74** Further enhancement for roosting bats will include provision of new 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.**

**4.75** 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*

**4.76** Retention 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 and 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*

**4.77** The majority of the sites breeding birds are associated with the small area of woodland and with the hedgerows and neighbouring gardens. These habitats should be retained and enhanced where possible. Wintering bird surveys found 19 species utilizing the suitable foraging habitat on site, including two red-listed species and three amber-listed species. The proposed development plan 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.

**4.78** Increased disturbance during the construction phase is 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** Impacts are considered potentially **adverse** at up to **site** level in the absence of suitable mitigation.

*Mitigation*

**4.80** The majority of the sites breeding birds are associated with the small area of woodland within the hedgerows and neighbouring gardens. These habitats will be retained and enhanced where possible. 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.

**4.81** Those habitats of ecological value, which may benefit the bird community, will need long-term management and an ecological Management Plan of the site should be prepared. Where any clearance of nesting bird habitat is required (scrub, trees, hedgerow), 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.

**4.82** 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 lossed to facilitate the development, this will be fully compensated through new planting.

**4.83** 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*

**4.84** 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.

**4.85** Furthermore, the scheme will provide integral bird boxes within the fabric of new buildings and/or installed on retained trees. This will comprise 20 boxes installed on retained trees around the boundaries of the site and 10 integrated swift bricks to be installed on the gable ends of new properties. Studies have shown swift bricks are frequently used by a range of other small bird species such as house sparrow (Barlow et al., 2020), which are known to utilise the site. Swift bricks will be installed with a northerly to easterly orientation to prevent overheating and will be clustered within the scheme due to the colonial nesting habitats of both swifts and house sparrows to foster likelihood of successful uptake. 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). Numerous suitable designs are available, two examples 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*

**4.86** 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.

**4.87** Through the delivery of on-site landscaping enhancements, provision of bird boxes a **positive** residual effect for birds could be achieved post-occupation.

**Hazel Dormice**

*Impacts*

**4.88** Dormice, their nests and their young are protected under UK (WCA, 1981) and European (Conservation of Habitats and Species, 2010) law, making it illegal to damage, destroy or disturb dormice without having taken the necessary precautions.

**4.89** Due to the lack of dormouse field signs throughout the 2015 tube surveys neither impacts nor mitigation are considered to be required for this species. However, due to the placement of the proposed development site being located between ancient woodlands with dormouse populations of district importance and other designated sites, it is important to protect and enhance connectivity in the wider landscape. This is in line with: the NPPF (2021), Castle Point District Council's Draft New Local Plan and EWT's 'Living Landscapes' campaign.

*Enhancement*

**4.90** Enhancing the proposed development site for dormice would 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

**4.91** Planting of native thorny species within the hedgerow may deter excessive predation from cats during the operational phase, which may increase with the rise in number of new residential dwellings on site. However, due to the neighbouring residential development already present, it is considered the increase of residential dwellings is unlikely to increase the predation risk significantly. The hedgerows will also be planted with additional species of known benefit to dormouse (Appendix 16), providing an enhancement for the species.

**4.92** 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 and ongoing management will be confirmed at the licencing stage.

*Residual Effects*

**4.93** Through the delivery of on-site landscaping enhancements, improving connectivity on site, a **positive** residual effect for dormice could be achieved post-occupation.

**Invertebrates**

*Impacts*

**4.94** 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).

**4.95** 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.

**4.96** Site lighting is considered to be the most significant negative impact of the operational 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 is considered to be negligible, but for on-site species it is likely to be minor.

*Enhancement*

**4.97** 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.

**4.98** 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.

*Enhancements for Heath Fritillary*

**4.99** 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.

**4.100** 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*

**4.101** With appropriate design and implementation of the lighting strategy, it is considered that the negative impacts on the adjacent woodlands can be reduced to a negligible level. 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*

**4.102** 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 on the development site. However without suitable mitigation, direct negative effects on reptiles is predicted such as loss of foraging habitat, fragmentation and potential killing / injury of reptiles during the construction phase of the development.

*Mitigation*

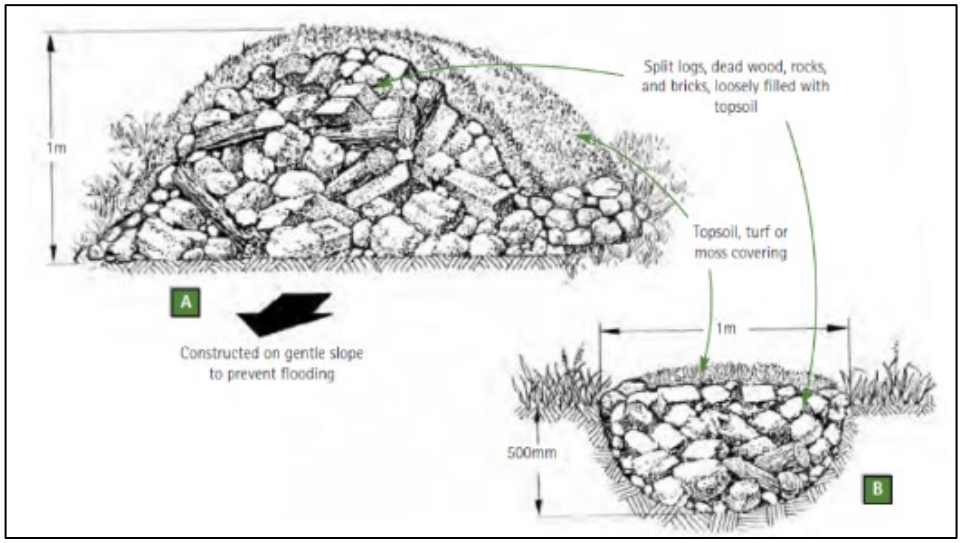
**4.103** There remains a risk of potential killing / injury of reptiles during the construction phase of the development, for example through earthworks or creating temporary hibernacula from earthworks, that the subsequent destruction of would likely cause an offence under the WCA (1981, as amended). As such it is recommended erection of temporary reptile fencing around the development zone to exclude reptiles from the construction area, alongside a period of trapping and translocation. For the 'exceptional' population of slow-worms and 'low' population of grass snakes, a 90 day trapping period using 100 refugia per hectare is recommended following the HGBI workers manual good practice guidelines (HGBI, 1998). Capture effort can be increased (i.e. higher density of reptile refugia placed) to conclude the trapping sooner. Trapping should 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 improved for reptiles. An area in either the southwest or northeast fields (due for retention) of the study area should be sufficient to create an onsite receptor area.

*Enhancement*

**4.104** 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, maintaining large areas of habitat post-development. The retention and enhancement of hedgerows on site will provide ongoing and improved connectivity for reptiles post-development, providing ground flora is retained (and preferably enhanced) 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.

**4.105** 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*

**4.106** 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 hibernaculum's.

**Other Notable Species**

*Impacts*

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

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

*Mitigation*

**4.109** 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 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

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

**4.111** 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*

**4.112** New hedgerow habitats to be will benefit hedgehogs, harvest mouse and common toad by providing enhanced foraging and refuge opportunities on site, and new ponds created will further enhance potential for the common toad. Wildflower meadows will further benefit harvest mouse.

*Residual Effects*

**4.113** 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 10.

**Table 10. 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<br><br>Financial contribution to Essex Coast RAMS<br><br>Creation of on site SANGs | 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<br><br>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<br><br>CEMP | N/A | Neutral | Neutral |
| **Habitats** | Loss of habitats of up to district value during site clearance<br><br>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<br><br>Sensitive lighting strategy<br><br>CEMP<br><br>RPA fencing | Positive Biodiversity Net Gain achieved for habitats and linear features<br><br>Wildlife friendly landscaping scheme including:<br>- SUDs will be landscaped and managed as a wildlife friendly | Neutral | 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 | | | native scattered trees along the banks.<br>- The SUDs will be planted with wetland species rich mix and will be managed as a wildflower meadow<br>- Wildflower meadows will be created to the east of the site by enhancing the improved grassland fields<br>- The ponds that will retain water year round will include marginal vegetation to be planted with native species<br>- 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.<br>- Use of flowering lawn mixture in amenity areas of POS that will be subject to more regular mowing<br>- The creation of a traditional orchard.<br>- More formal/ornamental planting within the built development incorporating nectar-rich and berry producing species<br>- New tree planting throughout the site will be of native species be of a diverse species composition.<br>- Planting of non-native invasive species will be avoided throughout. | | |

| Feature | Impacts – Construction Phase | Impacts – Operational Phase | Mitigation | Enhancement | Residual Effect – Construction Phase | Residual Effect – Operational Phase |
|---|---|---|---|---|---|---|
| **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** | 10 setts including a main sett onsite with risk of damage to underground chambers and risk of injury/death during construction<br><br>Injury/death during construction via earthworks and construction traffic | Reduced foraging and restricted commuting routes as a result of habitat loss<br><br>Increased recreational disturbance | Closure of outlier setts and a live dig along the construction boundary of the main sett to exclude badgers from any tunnels and chambers that lead on to the construction site. Underground exclusion fencing to prevent re-tunnelling onto construction site. Works to be undertaken under Natural England issued licence.<br><br>Standard **precautionary** measures; covering trenches overnight or installing a plank/mammal ladder, sensible storage of chemicals/equipment, avoidance of littering<br><br>Pre-construction walkover to check for any new setts established on site<br><br>Wildflower planting in POS and wild berry planting in enhanced and new hedgerows.<br><br>Three year cutting regime to ensure provision of rough grassland suitable for badger in the southern POS<br><br>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 |
| **Bats** | Killing/injury | Lighting disturbance of retained | Further dusk dawn surveys required to determine current usage by bats. If | Provision of bat boxes on retained trees and within new buildings (44 total) | Neutral | Positive |

| Feature | Impacts – Construction Phase | Impacts – Operational Phase | Mitigation | Enhancement | Residual Effect – Construction Phase | Residual Effect – Operational Phase |
|---|---|---|---|---|---|---|
| | Loss of three roost buildings<br><br>Loss of foraging/ commuting habitat<br><br>Lighting disturbance of commuting/ foraging areas and roosts | foraging/commuting habitats | found to be present. A Natural England issued mitigation licence will be required to demolish Buildings 2, 3 and 5.<br><br>Mitigation to include the provision of bat boxes.<br><br>Retention and extension of boundary vegetation features.<br><br>Sensitive lighting scheme during construction and occupational phases avoiding light spill on to boundary habitats and roost trees | Wildlife friendly landscaping scheme favourable for bats invertebrate prey<br><br>Enhanced connectivity to the wider landscape with additional hedgerow planting and enhancement. | | |
| **Birds** | Injury/death of birds and eggs<br><br>Destruction of nests<br><br>Disturbance of nests<br><br>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<br><br>Retention, reinforcement and buffering of boundary features<br><br>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.<br><br>New natural nesting habitats (trees and scrub) to be provided along with artificial nesting opportunities (20 boxes on retained trees, 10 installed in new properties). | Neutral | Positive |
| **Hazel Dormice** | N/A | N/A | N/A | Enhancement of hedgerows for connectivity and foraging. | N/A | Positive |
| **Invertebrates** | Killing/injury common species | Lighting disturbance of retained habitats | Sensitive lighting scheme | Wildlife friendly landscaping scheme incorporating a diverse mix of native species and nectar-rich species. | Neutral | Positive |

| Feature | Impacts – Construction Phase | Impacts – Operational Phase | Mitigation | Enhancement | Residual Effect – Construction Phase | Residual Effect – Operational Phase |
|---|---|---|---|---|---|---|
| | | | | Creation of 'stepping stone' habitats for heath fritillary butterfly which include larval food plant species | | |
| **Reptiles** | Death/injury during site clearance /destruction | Loss of foraging habitat<br><br>Fragmentation of populations | Reptile fencing and translocation prior to construction | Enhancement and creation of new hedgerows.<br><br>Enhancement of field to wildflower species rich meadows.<br><br>Creation of hibernaculums<br><br>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).<br><br>Search by an ecologist for hedgehog nests prior to clearance.<br><br>Sensitive two-stage clearance of suitable habitats<br><br>Precautionary methods during construction (as for badgers) | Provision of hedgehog highways in fencing.<br><br>New wildflower meadows and hedgerow habitats in will benefit hedgehogs, harvest mouse and common toad by providing enhanced foraging and refuge opportunities on site.<br><br>The new pond as part of the SUDs will benefit common toad populations on site. | Neutral | Positive |

**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 adopted 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).

**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<br><br>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<br><br>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<br><br>Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water |
| 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<br><br>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<br><br>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 (Hundt, 2012) 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 Hundt (2012).

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.

**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 A3.4 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 A3.5 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 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 (2015).

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 A3.6. Index of probability to determine presence or likely absence of hazel dormouse**

| 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 19 August 2015 during good weather conditions by suitably qualified ecologists Lucy Addison MSc BSc (Hons) Grad CIEEM and Katie Mann.

**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. Detailed results are provided in Appendix 11, as well as a map showing the location of badger setts in Appendix 4.

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.

**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.

**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 6 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 A2.7: 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 A3.7 below sets out a non-exhaustive list of ecological features that are typically considered, along with key examples:

**Table A3.7. 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.

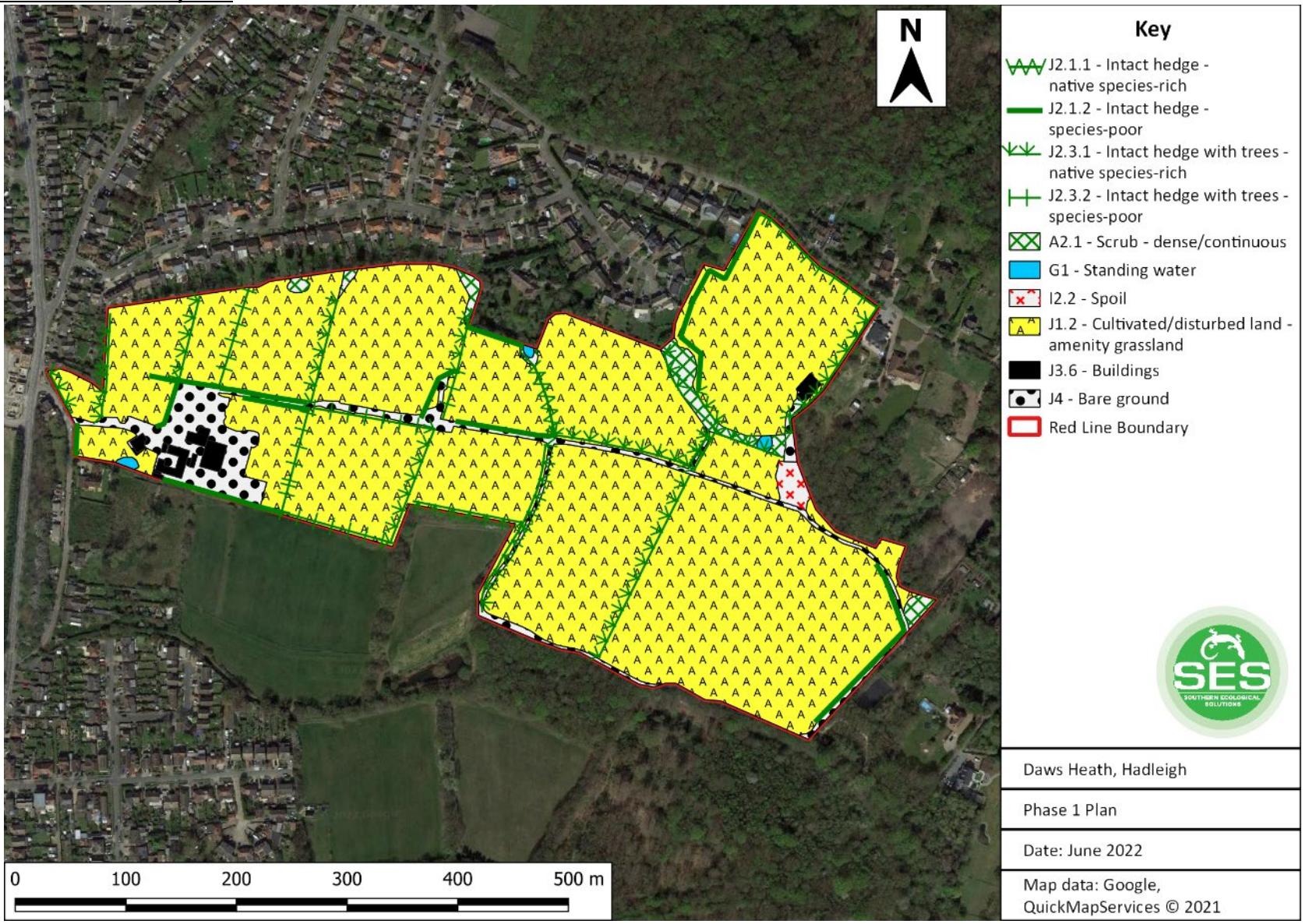
**Determining ecologically significant effects**

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**



## Appendix 5. Botanical Species Lists

**Table A6: Plant assemblages recorded during Phase 1 survey**

| Common name | Scientific name | Hedges | Scattered Trees | Improved Grassland | Tall Ruderal | Dense Scrub | Woodland | Running Water | Amenity Grassland | 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 A7.1 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 | 1 | - | 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 | - | Newly planted | No |
| 26 | 7 | 3 | - | Yes |
| 27 | 8 | 3 | - | Yes |
| 28 | 8 | 4 | - | Yes |
| 29 | 7 | 2 | - | Yes |
| 30 | 4 | - | - | 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 | - | Newly planted | No |

**Appendix 7. 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* |

| | | | |
|---|---|---|---|
| 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 |

| | | | |
|---|---|---|---|
| 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* |

| | | | |
|---|---|---|---|
| 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* |

**Appendix 8. Pond Locations**

*Waterbody Location Plan*

*HSI Results*

**Table A8.1: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 A8.2: 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*

**Pending results**

**Appendix 9: Badger Survey Results**

*Badger Sett Entrances Plan*

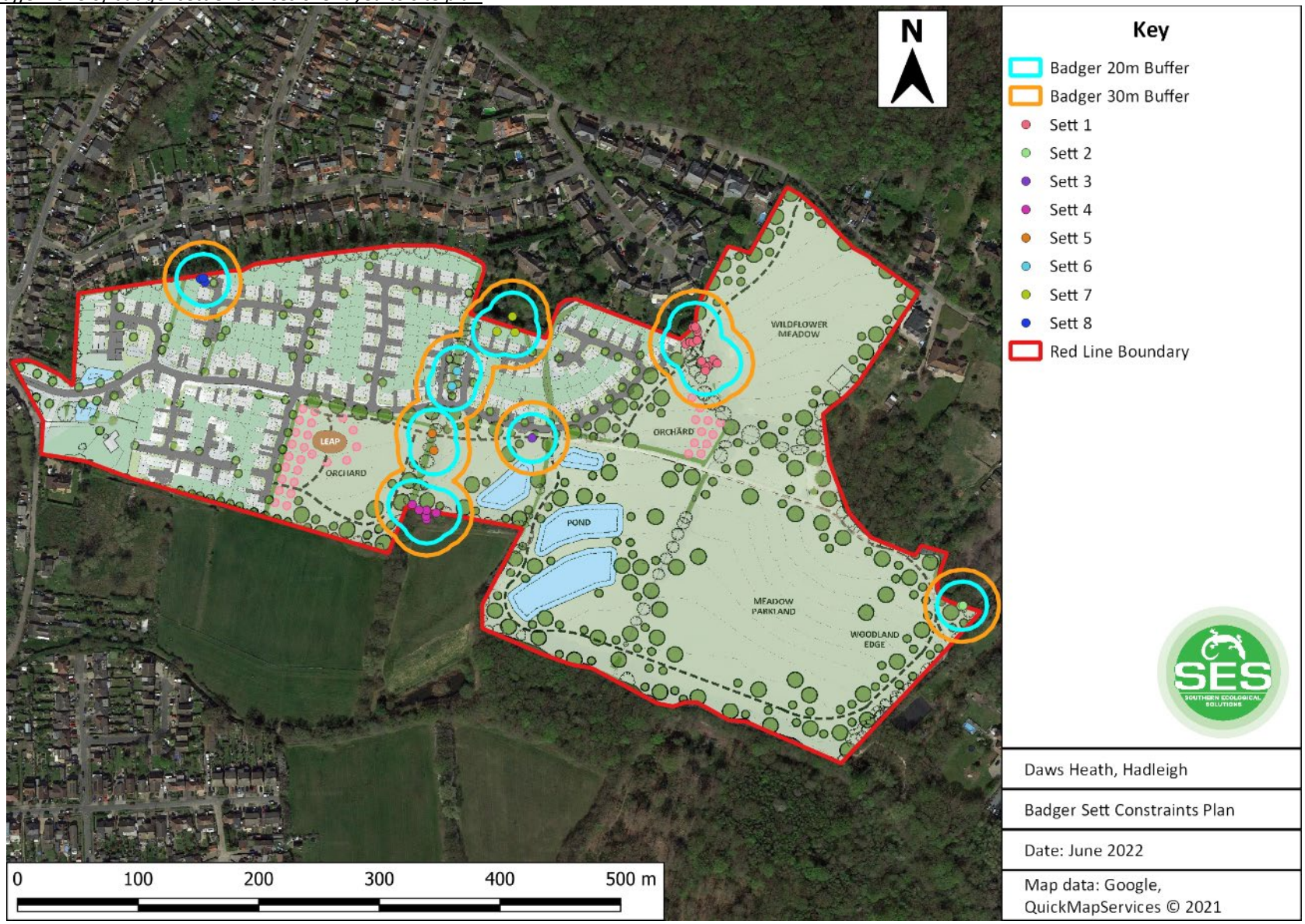
**Table A9.1: Badger Monitoring Results**

| Date | Visit number | Surveyors | 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 | VW | | *Triggered* | - | - | *Triggered* | *Triggered* | - | - | - | *Triggered* | *Triggered* | - | - | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | |
| 30/05/2022 | 2 | JS | | - | - | - | triggered | 1 stick down - b fur | | - | - | 1 stick down - b fur | 1 stick down | - | - | - | - | - | - | 1 stick down | - |
| | | | | | | | | | | | | | | | | | | | | | |
| 06/06/2022 | 3 | JS | | - | - | - | - | 1 stick down | - | - | - | 1 stick down | sticks down | - | - | - | - | - | - | sticks down | - |
| | | | | | | | | | | | | | | | | | | | | | |
| 08/06/2022 | 4 | VW | | - | - | Sticky stick down | - | - | - | - | - | - | - | - | 1 stick down | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | |
| 10/06/2022 | 5 | JS | | - | - | - | - | sticks down | - | - | - | - | - | - | -. | - | - | - | - | - | - |
| | | | | | | | | | | | | | | | | | | | | | |

| Date | Visit number 1 | Surveyors | 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 | VW | | - | - | | - | | - | - | - | - | - | *Triggered* | - | | - | *Triggered* |
| | | | | | | | | | | | | | | | | | | |
| 30/05/2022 | 2 | JS | | - | - | | - | | - | - | - | - | - | - | 1 stick down | | - | Triggered |
| | | | | | | | | | | | | | | | | | | |
| 06/06/2022 | 3 | JS | | 1 stick down r fur found | - | | - | | - | - | - | - | - | - | - | | - | triggered |
| | | | | | | | | | | | | | | | | | | |
| 08/06/2022 | 4 | VW | | - | - | | - | | - | - | - | - | - | - | - | | - | - |
| | | | | | | | | | | | | | | | | | | |
| 10/06/2022 | 5 | JS | | sticks down | - | | - | | - | - | - | - | - | - | - | | - | sticks down |
| | | | | | | | | | | | | | | | | | | |

| Date | Visit number 1 | Surveyors | 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 | VW | | *Triggered* | - | | - | - | - | | - | - | - | - |
| | | | | | | | | | | | | | | |
| 30/05/2022 | 2 | JS | | - | - | | 1 stick down | - | triggered | | triggered | - | - | - |
| | | | | | | | | | | | | | | |
| 06/06/2022 | 3 | JS | | - | sticks down | | sticks down | - | triggered | | triggered, fresh spoil | 1 stick down, no fur | triggered, fresh spoil | |
| | | | | | | | | | | | | | | |
| 08/06/2022 | 4 | VW | | Debris blocking entrance | - | | - | - | Stick down | | Triggered | Triggered | Triggered | |
| | | | | | | | | | | | | | | |
| 10/06/2022 | 5 | JS | | - | - | | sticks down | sticks down | sticks down | | triggered | - | 1 stick down | |
| | | | | | | | | | | | | | | |

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



## Appendix 10: Biodiversity Net Gain Metric 3.1

**Biodiversity Metric 3.1 Calculations appended separately**

## Appendix 11: 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 |
| *llex 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 | |
| *Lotus corniculatus* | Bird's foot trefoil | N | HP | F | Well drained / dry | Sun | Y | | | | Y |

| Plant species | Common name | Native (N) | Type | Benefit | Soil | Light | Green roofs | Living walls | Rain gardens | Hedge/ trees | Beds/ borders |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *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 | | |