Ecological Impact Assessment

Land East of Rayleigh Road, Thundersley, Essex

On Behalf of:
This Land Development Ltd.

January 2023

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Confidential: Contains sensitive information on badger sett locations

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Executive summary

1. Southern Ecological Solutions Ltd (SES) were commissioned by This Land Development Ltd. to carry out an Ecological Impact Assessment (EcIA) at Land East of Rayleigh Road, Thundersley , in Essex (referred to herein as 'the site'). This report presents the findings and recommendations of ecological surveys undertaken to inform a planning application for residential development of the site.

2. The study area covered 27.89ha and comprised predominantly of grassland field compartments. Field boundaries included woodland fragments, dense scrub and hedgerows. Other habitats present included buildings and hardstanding, limited areas of tall ruderal vegetation and bracken, as well as a fishing lake and stream. The site is located within designated Green Belt, with residential urban development to the west and south, commercial urban development to the north, and further Green Belt land to the east.

3. The site was allocated for residential purposes within the now withdrawn Castle Point Borough Council (CPBC) Local Plan under policy HO13 (CPBC, 2018) and is subject to an outline planning application The development of up to 455 new homes, a multi-use community hall, land for the provision of a healthcare facility, land for a stand-alone early years and childcare nursery, new vehicular/pedestrian access points from Stadium Way in the north and Daws Heath Road in the south, new greenways and green links, multi-functional open space, green infrastructure, surface water attenuation, landscaping and associated infrastructure. All matters reserved except access."The site also falls within the Hadleigh and Daws Heath Complex Living Landscape, an area identified for its network of wildlife-rich habitats (EWT, 2010).

4. The site falls within the Impact Risk Zone (IRZ) for four statutory designated sites of international importance, with Benfleet and Southend Marshes Special Protection Area (SPA) and Ramsar site the closest at 3.0km south of the site. A project level Habitats Regulations Assessment was undertaken and is reported on separately (SES, 2022a). Mitigation measures detailed within this report to reduce recreational impacts on these sites include the provision of 14.60ha of informal openspace that can be used for recreation within the scheme and a financial contribution in accordance with the Essex Coast Recreational disturbance Avoidance and Mitigation Strategy (RAMS). It is anticipated that given the distance from any other designated sites and the provision of the mitigation above there will be no significant impacts upon any designated sites.

5. There are six sites of national importance within 5km of the site with the closest (Thundersley Great Common Special Site of Scientific Interest) located 0.2km west. In addition, there are 21 non-statutory designated sites within 2km of the site, with Little Haven/Tile Wood Complex Local Wildlife Site bordering the site to the east. Mitigation will be required to minimise impacts on nearby sites of national and local importance. It is considered that such impacts can be fully mitigated through the provision of informal open space suitable for recreation within the development along with provisions such as dog waste bins, on site walking routes and wildlife sensitivity information boards. Wetland habitats and thorny scrub have also been located adjacent to the neighbouring reserve to prevent unrestricted access. In addition, the connection to the northern PRoW has been moved away from eastern boundary to further prevent unrestricted access while still allowing residents who wish to enjoy a longer walk within a natural setting to do so.

6. The habitats on site were dominated by improved grassland of limited ecological value. Habitats of higher value included semi-improved grassland to the east of the site currently used for horse grazing(W1, W2, W3, and W5 see Appendix 5 for location) are Habitats of Principle Importance (HoPI)

under the NERC Act 2006. Through the application of the mitigation hierarchy much of the habitat loss is limited to the improved grassland but the majority of the semi-improved grassland will be lost along with sections of hedgerow and plantation woodland to facilitate access.

7. The scheme has been designed to provide complementary habitats to those higher valuable habitats which will be retained and enhanced to create a habitat mosaic which connects to the wider landscape. Additional habitats include species-rich grassland, wet grassland, rough grassland and scrub, species rich scrub and a traditional orchard. These habitats will mitigate the loss of habitat resulting from the scheme. A Biodiversity Net Gain Assessment has been undertaken using the DEFRA Metric 3.1 the results of which have been summarised within this assessment but provided in a separate report (SES, 2023b). In summary, the Biodiversity Net Gain assessment predicts an increase of 10.48% in habitat units and at least 10% in hedgerow units.

8. Further surveys for great crested newts and dormice did not identify either species and they are considered likely absent from the site. The wintering bird survey identified an assemblage of species considered to be of low conservation value and comprising mainly common and widespread species. The breeding bird surveys identified a species assemblage of District value utilising the site. The open field habitats supported a typical breeding community principally associated with the overgrown hedges and trees with limited use of the tall grassland fields.

9. Several buildings and trees were identified as having potential to support roosting bats. Those likely to be impacted were subject to nocturnal emergence/re-entry surveys which identified roosts of low conservation concern within Buildings 1 and 5. In addition, the bat activity surveys identified low numbers of mainly common and widespread species. Given the presence of a roost within the two buildings, a Natural England licence will likely be required to develop the site. Furthermore, the retention and enhancement of woodlands, hedgerows and trees with a sympathetic lighting design will prevent any adverse impacts on local bat populations.

10. A peak count of five slow worm and two common lizard was identified during reptile surveys. A reptile mitigation strategy is included within this report. This includes the creation of a reptile receptor area within the site, trapping and translocation, and precautionary clearance of suitable habitats. Invertebrate surveys undertaken in 2020 and 2021 identified four species of conservation concern of which two are Nationally Scarce including the shrill carder bee, a priority species.

11. A total of thirteen badger setts have been identified on site following both the initial baseline assessment and a series of targeted badger surveys. Four of the thirteen setts were identified as active and included a main sett with over 40 entrances. In order to compensate for the loss of the main badger sett, an artificial badger sett will be built on the southern boundary of the application site. Any additional subsidiary or outlier setts located within the development area (that cannot be retained), will be monitored to establish whether they are in active use. Should these setts be in 'current use' they will be closed under a Natural England licence between July and November.

12. This report provides a summary of the baseline ecological conditions and outlines the importance of features recorded at the site. It also outlines the impacts, mitigation and enhancement measures to ensure biodiversity is protected during course of the development and enhanced following occupation. These recommendations will complement existing green infrastructure with a mosaic of complementary habitats and provide an ecologically diverse and coherent ecological network of habitats that will result in a Biodiversity Net Gain of 10.48%. Additional recommendations include the

production of a Landscape and Ecology Management Plan and Construction and Ecology Management Plan. Through implementation of the recommended measures, it is considered that all significant negative impacts as a result of the scheme upon protected and notable habitats and species would be mitigated in line with relevant wildlife legislation and national and local planning policy related to biodiversity.

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1.0 Introduction and Aims

1.1 Southern Ecological Solutions Ltd. (SES) was commissioned by This Land Development Ltd. to undertake a suite of ecological surveys and produce an ecological impact assessment (EcIA) report for Land East of Rayleigh Road, Thundersley, in Essex (Ordnance Survey Grid Reference TQ 80381 89140) (hereafter referred to as the site). A plan showing the approximate application site boundary is provided in Appendix 1.

1.2 The site was allocated for residential purposes within the now withdrawn Castle Point Borough Council (CPBC) Local Plan under policy HO13 (CPBC, 2019) and is subject to an outline planning application for the development of up to 455 new homes, a multi-use community hall, land for the provision of a healthcare facility, land for a stand-alone early years and childcare nursery, new vehicular/pedestrian access points from Stadium Way in the north and Daws Heath Road in the south, new greenways and green links, multi-functional open space, green infrastructure, surface water attenuation, landscaping and associated infrastructure. All matters reserved except access..

1.3 To complete an EcIA of the proposed development, a desk-based assessment, preliminary ecological appraisal (PEA) and subsequent protected species were undertaken in accordance with current guidance (CIEEM, 2018). Development proposals provided and the Parameter Plan Multi-functional Open Space is shown within Appendix 1. Parameter plans were reviewed to assess potential impacts and mitigation options are outlined in relation to legal and planning policy obligations and residual effects assessed. The aims of the report are to:

- Map the main ecological features within the site and classify habitat types based on standard Phase 1 Habitat survey methodology by compiling a plant species list for each habitat type;
- Determine the presence or likely absence of protected/priority species or habitats;
- Identify any legal and planning policy constraints relevant to nature conservation which may affect the development (see Appendix 2);
- Identify likely significant effects on ecological features; 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 within the withdrawn New Castle Point Local Plan 2018-2033.

Site Description

1.4 The site is located to the east of Rayleigh Road, Thundersley, Essex. It is 27.89 ha in area and comprises seven grassland fields with associated boundary hedgerows and ditches, with small fragments of broadleaved woodland and scrub. There are 13 buildings on site, used for a mixture of agricultural, equine, fishing and industrial purposes. A stream ran through the site, and a fishing lake was present in the north of the site. The site is designated as greenbelt land and is bordered by residential development to the west and south-west, a business park to the north, and further areas of grassland and woodland within further green-belt land to the south-east and east. There are two access points from Daws Heath Road to the south, with the site bordering Rayleigh Road to the west and Stadium Way to the north.

1.5 The site falls within the Hadleigh and Daws Heath Complex Living Landscape (EWT, 2010).

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 (2018). 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 have been identified and constraints and opportunities identified. This step-wise assessment process has informed likely mitigation and enhancement measures. Phase 2 ecological surveys have been 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.

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. Further detail on the assessment methods utilised in this report is provided in Appendix 4.

2.3 Ecological surveys are considered to be valid and robust but are being updated in 2022 and reported as an addendum in 2023 which will include updates to all protected species surveys. An update ecological walkover survey was undertaken in June 2022 and the results are included within this report. The habitat condition assessments and running of the DEFRA metric 3.1 to inform biodiversity net gain were undertaken in 2022 with the results summarised within this report and detail found within the biodiversity net gain design stage report (SES, 2023b)

2.4 The following geographical scale categories are considered appropriate:

- International;
- National (*i.e.* England);
- Regional (South East);
- County (Essex);
- District (Castle Point);
- Local or Parish (Thundersley); and
- Within Site or zone of influence only

Desk Study

2.5 SES commissioned a data search for records of protected and notable species from the Essex Field Club (EFC), as well as a data search for non-statutory protected sites from the Essex Wildlife Trust (EWT). The data search encompassed the study area, and up to 2km from the boundary. Data was received in

November 2019. Hazel dormouse records were also sought from the National Biodiversity Network (NBN) Atlas, 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. This data was used to supplement existing knowledge gained through historic surveys undertaken by SES. Great crested newt (GCN) records were also sought from the Natural England Open Data publication, which provides presence only records for GCN determined through class licence surveys. The data search is being updated in 2022.

2.6 A web-based search for statutory designated sites via the Multi Agency Geographic Information for the Countryside (MAGIC) spatial data resource magic.defra.gov.uk was undertaken in June 2022 for the following statutory designated sites: Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar sites (up to 22km from the site boundary, as per the maximal Zone of Influence (ZoI) for Essex coastal internationally designated sites, see Table 1) and Sites of Special Scientific Interest (SSSI) and LNR (5km from the site boundary). Locally importance sites were searched within a 2km zone from the application site.

2.7 The Essex Coast Recreational Disturbance Avoidance and Mitigation Strategy (RAMS) Habitats Regulations Assessment Strategy document for 2018-2038 (Place Services, 2019) was referred to in order to determine the Zone of Influence (ZoI) for coastal European Designated sites and hence the requirement for off-site mitigation (Table 1).

Table 1: Zones of Influence of Essex Coast European Designated Sites (Place Services, 2019)

European designated site	Underpinning SSSIs*	ZoIs (km)
Stour and Orwell Estuaries SPA and Ramsar	Orwell Estuary SSSI Stour Estuary SSSI Cattawade Marshes SSSI	13
Hamford Water SPA and Ramsar	Hamford Water SSSI	8
Colne Estuary SPA and Ramsar	Colne Estuary SSSI	9.7
Blackwater Estuary SPA and Ramsar	Blackwater Estuary SSSI	22
Dengie SPA and Ramsar	Dengie SSSI	20.8
Crouch and Roach Estuaries Ramsar and SPA	Crouch and Roach Estuaries SSSI	4.5
Foulness Estuary SPA and Ramsar	Foulness SSSI	13
Essex Estuaries SAC	Blackwater Estuary SSSI Colne Estuary SSSI Crouch and Roach Estuaries SSSI Dengie SSSI Foulness SSSI	-**
Benfleet and Southend Marshes SPA and Ramsar	Benfleet and Southend Marshes SSSI	4.3
Thames Estuary and Marshes SPA and Ramsar	Mucking Flats and Marshes SSSI	8.1
*Underpinning SSSIs are listed for Essex sites as these are what the Impact Risk Zones (IRZs) are aligned to. **The Essex Estuaries SAC comprises the Colne Estuary, Blackwater Estuary, Dengie, Crouch and Roach Estuaries and Foulness Estuary and so follow the respective ZoIs throughout.		

SPA = Special Protection Area; SSSI = Site of Special Scientific Interest; SAC = Special Conservation Area

2.8 Maps of the area of assessment and wider area, using the MAGIC online spatial data resource and aerial photographs on Google Earth (Google Inc., 2021), 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, 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.

Phase 1 Habitat Survey

2.9 An extended Phase 1 Habitat Survey was carried out on 5 and 12 November 2019 by suitably qualified ecologist Daniel Carne BSc (Hons) in appropriate weather conditions. This was updated on 21 July 2020 by ecologist Molly Dailide BSc (Hons) MSc and subject to an update ecological walkover in June 2022 by Andrew Pankhurst BA(Hons) ACIEEM..

2.10 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.

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 (2010).

Hedgerow Survey

2.13 During the Phase 1 Habitat Survey in 2020, all hedgerows within and surrounding the site were assessed to determine whether they qualify as 'Important Hedgerows' under The Hedgerow Regulations (1997). Detailed survey methods are provided in Appendix 4.

Badgers

2.14 A targeted badger survey was undertaken in 2020 to initial identify areas that might be used by badger Meles meles for foraging, commuting and sett creation, and to look for signs of badgers such as paths, hairs, latrines and setts on site.

2.15 Further monitoring of badger setts was undertaken in 2020 using 'sticky sticks' and trail cameras over a 21-day period. Detailed survey methods are provided in Appendix 4.

Bats

Preliminary Assessment

2.16 The site was initially assessed for its suitability to support roosting, foraging and commuting bats during the extended Phase 1 Survey and additional ground level tree assessments using guidelines issued by the Bat Conservation Trust (Collins, 2016). Detailed methodology is provided in Appendix 4.

Aerial Tree Climb

2.17 All trees with moderate or high suitability for roosting bats, which were also deemed safe to climb, were subject to an aerial inspection by a trained and qualified tree climbing and aerial rescue (NPTC level 2 certification) team.

Dusk emergence / dawn re-entry surveys of buildings and trees

2.18 Seven buildings and four trees likely to be demolished felled or subject to disturbance under the development proposals were identified as having a 'low' to 'moderate' suitability for roosting bats and hence further survey was recommended. Detailed methodology is provided in Appendix 4.

Activity Surveys

2.19 The site was assessed as having moderate suitability for foraging and commuting bats, therefore further activity surveys including monthly activity transects and accompanying five-night static bat detector deployments (two locations per transect) were carried out between June to October 2020 and again in April and May 2021 in accordance with best practice guidelines (Collins, 2016). Detailed methods are provided in Appendix 4..

Birds

Wintering Bird Survey

2.20 A wintering bird survey was undertaken following generic wintering bird monitoring methods given in Gilbert et al. (1998). This comprised two visits undertaken during December 2020 and January 2021. Detailed methods are provided in Appendix 4.

Breeding Bird Survey

2.21 A breeding bird survey was undertaken using a modified version of the standard Common Bird Census (CBC) methods, devised by the British Trust for Ornithology (BTO) (Marchant, 1983; Bibby *et al.,*1992). This comprised two visits in June and July 2020. Two further visits were completed in April and May 2021. Detailed methods are provided in Appendix 4.

Great Crested Newt

Habitat Suitability Index (HSI) Survey

2.22 A survey to determine the suitability of accessible ponds within 500m of the study area for great crested newt was undertaken in accordance with best practice guidelines (Oldham et al. 2000). Detailed methods are provided in Appendix 4.

Terrestrial Habitat Assessment

2.23 Terrestrial habitats on site were assessed for their suitability for great crested newt during the extended Phase 1 survey.

eDNA Surveys

2.24 Water samples were collected from two waterbodies (Ponds 1 and 4) in June 2020 and sent to an approved laboratory for analysis in accordance with approved field laboratory protocols (Briggs *et al.* 2014). Following an indeterminate result provided by the initial tests, a further sample was collected from Pond 4 on 28th April 2021. The full methodology is detailed within Appendix 4

Hazel Dormouse

2.25 Habitats were assessed for their general suitability for hazel dormouse *Muscardinus avellanarius* during the extended Phase 1 survey. 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 number of food sources, plants suitable as nest-building materials and good habitat connectivity.

2.26 Further targeted dormouse surveys were undertaken between July and November 2020. The full methodology is detailed within Appendix 4.

Invertebrates

Preliminary Assessment

2.27 The site was assessed for its potential to support rare or notable invertebrate species as part of the extended Phase 1 survey. Factors considered included the presence of uncommon habitats, particular food plant species, presence of deadwood, and the complexity and density of micro-habitats available.

Field Surveys

2.28 A total of five survey visits were undertaken in 2020 and 2021 by Dr Graham Hopkins FRES. Species identification was carried out by Dr Graham Hopkins FRES and Dr JI Thacker. The full methodology is detailed within Appendix 4.

Otter and Water Vole

2.29 The site was assessed for its potential to support otter *Lutra lutra* and water vole *Arvicola amphibious* during the extended Phase 1 Survey. Otters have been recorded exploiting virtually all types of waterbodies and waterways in the UK and are found on still waters (canals, lakes, ponds) as well as rivers and streams of all sizes. Water voles will inhabit most open water and wetland habitats including streams, canals, wet ditches and ponds.

Reptiles

Preliminary Assessment

2.30 The site was initially assessed during the extended Phase 1 Survey and update ecological walkover 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 lizard 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 snake 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

2.31 Given the suitability of the site for reptiles, seven-visit presence/likely absence survey was carried out to update this assessment. The survey was carried out in accordance with published guidelines (Froglife, 1999; Gent & Gibson, 2003; HGBI, 1998). Detailed survey methods, including dates and information regarding weather, are provided in Appendix 4.

Other Notable Species

2.32 The site was assessed during the extended Phase 1 Survey for its potential to support Natural Environment and Rural Communities (NERC) Act 2006 species of principal importance which are likely to occur in the local area, including hedgehog *Erinaceus europaeus*, brown hare *Lepus europaeus*, harvest mouse *Micromys minutus*, polecat Mustela putorius and common toad *Bufo bufo*.

2.33 In combination with the above surveys, incidental sightings of other notable species were also recorded.

Limitations

Bat Surveys

2.34 The bat surveys were completed with the assistance of bat detectors. Surveys using bat detectors have an advantage over other methodologies (such as radio tracking or trapping) in that they are 'non-intrusive' and will therefore not have an adverse effect on the conservation status or welfare of bats. However, all survey techniques for bats are subject to bias and bat detector surveys may under record species with weak echolocation calls, such as brown long-eared *Plecotus auratus* bats. Bats from the *Myotis* genus can be difficult to identify to species from call structure alone (Russ, 2012).

2.35 The results of static detector surveys are based on bat activity recorded at the location immediate to each static detector, and therefore only describe localised activity at the site. However, detectors were moved around the site each season to sample different areas therefore this constraint is not considered to be significant.

2.36 The suite of ecological surveys and their results are valid and robust but are being updated in 2022 (see methods section) and reported via an addendum in 2023. Given the consistent habitat

management, distribution of habitats, results of the surveys undertaken to date and limited passage of time intervening it is not considered likely that the update surveys will provide material changes that effect delivery of appropriate mitigation.

3.0 Baseline Ecological Condition

Designated Sites

3.1 The site falls within the Zone of Influence (ZoI) of Blackwater Estuary SPA and Ramsar site, Benfleet and Southend Marshes SPA and Ramsar, and Foulness Estuary SPA and Ramsar, which form part of the Essex Estuaries Special Area of Conservation (SAC). The aforementioned sites are listed within the Essex Coast RAMS and also designated as a **nationally** important Sites of Special Scientific Interest (SSSI). 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 2.

3.2 There were eight sites of **national** importance within the search area (5km), including seven SSSIs and a single national nature reserve. The closest of these was Thundersley Great Common SSSI c. 0.2km west, notified for its mosaic of wet and dry heathland, merging with acid grassland which supports a number of locally uncommon plant species.

3.3 There were four Local Nature Reserves (LNR) within 5km and 21 non-statutorily designated Local Wildlife Sites (LoWS) within 2km. Little Haven/Tile Wood Complex LoWS is closest, located on the far side of the main access track to the east of the site. Details of designated sites are provided in Table 3 below. Locally designated sites are considered important at a **county** level.

Table 2. European Designated Sites within up to 22km, Nationally Designated Sites within 5km and Statutory and Non-Statutory Locally Designated sites within 2km of the site.

Name and Site Designation	Approximate Distance and Direction from Site	Size (ha.)	Designated Features
European Statutory Designated Sites			
Essex Estuaries SAC	5.4km north	46111	The site is designated for the extensive areas of habitat present that are listed under Annex I of the Habitats Directive. These habitats include estuaries, mudflats and sandflats not covered by seawater at low tide, and Atlantic salt meadows, which are of European importance.
Benfleet and Southend Marshes SPA and Ramsar *Underpinned by Benfleet and Southend Marshes SSSI*	3.078km south	2251.31	Made up of several intertidal, subtidal, and terrestrial habitats that support internationally significant populations of overwintering waterfowl. The site supports internationally important numbers of non-breeding dark-bellied brent goose *Branta bernicla bernicla*, grey plover *Pluvialis squatarola*, and knot *Calidris canutus*; and nationally important populations of dunlin *Calidris alpina alpina* and ringed plover *Charadrius* hiaticula. The site supports internationally important assemblage of non-breeding waterfowl in excess of 27,000 birds.

Foulness SPA and Ramsar *Underpinned by Foulness SSSI*	8.258km east	10968.97	Foulness estuary is made up of extensive intertidal sand silt flats, saltmarsh, beaches, grazing marshes, rough grass and scrubland. The site is of international importance of six species and national importance for three species of wintering wildfowl. Nationally important numbers of little tern *Sternula albifrons*, common tern *Sterna hirundo*, sandwich tern *Thalasseus sandvicensis*, and avocet *Recurvirostra avosetta*. The site is used regularly by an international important over-wintering assemblage of more than 93,000 waterfowl.
Blackwater Estuary SPA & Ramsar *Underpinned by Blackwater Estuary SSSI*	15.719km northeast	4403	The habitats present include saltmarsh, mudflats, shingle and shell banks. The site is designated a SPA for supporting populations of importance of numerous bird species listed under Annex I of the Birds Directive, including breeding little tern *Sterna*, winter populations of avocet and hen harrier *Circus cyaneus*, and passage ringer plover *Charadrius hiaticula*. The assemblage at the site qualifies the SPA as a wetland of international importance.
UK Statutory Designated Sites			
Thundersley Great Common SSSI	0.2km west	8.9	Designated for its mosaic of wet and dry heathland, merging with acid grassland. These habitats have a very restricted distribution in Essex, and the site supports a number of locally uncommon plant species. The heathland habitats are currently under threat from encroaching scrub and woodland habitats.
Belfairs LNR	1.3km south-east	37.11	Largely overlaps with Great Wood and Dodd's Grove SSSI (see below).
Great Wood and Dodd's Grove SSSI	1.3km south-east	36.8	Largely overlaps with Belfairs LNR. Large area of ancient coppice-with-standards oak woodland. Part of Hadleigh Great Wood, one of the largest and best examples of ancient woodland in South Essex and supports the rare heath fritillary butterfly *Melitaea athalia*. Woodland features various locally uncommon plants and hazel dormouse *Mauscardinus avellanarius*.
Garrold's Meadow SSSI	1.5km east	5.0	Unimproved grassland with a diverse plant community, including several species which are uncommon or of restricted distribution in Essex.
Benfleet and Southend Marshes SSSI	2.1km south	2099.69	Comprises an extensive series of salt marshes, mud-flats, scrub and grassland which support a diverse flora and fauna. Supports international and nationally important numbers of wintering wildfowl and waders, together with nationally uncommon plants. Parts of the site are of outstanding importance for scarce invertebrates.
Hockley Woods LNR	3.0km north-east	91.5	Largely overlaps with Hockley Woods SSSI (see below).
Hockley Woods SSSI	3.0km north-east	91.3	Contiguous group of ancient coppice woods featuring a variety of lowland woodland stand types. The woodlands feature several scarce plant species typical of ancient woodlands and supports a good population of heath fritillary butterfly.
Belton Hills LNR	3.1km south-east	21.98	Mosaic of woodland and grassland habitats supporting scarce wildflowers and invertebrates.

Leigh NNR	3.9km south-east	257.51	Falls within Benfleet and Southend Marshes SSSI. Incorporates an extensive area of intertidal habitats and coastal grazing marsh and supports large numbers of wintering wildfowl and scarce invertebrates.
Canvey Lake LNR	4.7km south	8.27	Incorporates areas of reedbed and open water. Supports water vole *Arvicola amphibus*.

Table 3. Non-Statutory Designated Sites within 2km of the site

Name and Site Designation	Approximate Distance and Direction from Site	Size (ha.)	Designated Features
Non-Statutory Designated Sites			
CPT28 Little Haven/Tile Wood Complex LoWS	Adjacent to eastern boundary	55.4	Mosaic of ancient coppiced woodlands, hedgerows, hay meadows and rough grassland. The majority comprises a nature reserve managed by Essex Wildlife Trust. The site supports populations of heath fritillary and hazel dormouse.
CPT26 Cottage Plantation and Rag Wood LoWS	0.10km south	6.8	Likely secondary woodlands, but with a number of ancient woodland indicators particularly within Cottage Plantation such as hairy wood-rush *Luzula pilosa* and common cow-wheat.
CPT24 West Wood LoWS	0.15km south	33.1	Predominantly ancient woodland with varied ground flora including Essex Red Data List species common cow-wheat *Melampyrum pratense* and great wood-rush *Luzula sylvatica*.
CPT21 Thundersley Great Common Wood LoWS	0.20km west	5	Comprises the woodland that separates the two sections of the Thundersley Great Common SSSI. Diverse woodland structure with a small section of acid grassland.
CPT23 Thundersley Plotlands LoWS	0.25km south	18.5	Mosaic of grassland, woodland, and scrub habitats.
R1 Kingley Wood LoWS	0.80km north-west	1.7	Ancient lowland mixed deciduous woodland. Ground flora mostly dominated by bluebell *Hyacinthoides non-scripta*, with small population of wood anemone *Anemone nemorosa* and yellow archangel *Lamiastrum galeobdolon*.
CPT16 The Chase Paddocks LoWS	0.80km south-west	5.3	Lowland meadow paddocks supporting several plant species indicative of ancient, unimproved grassland including sneezewort *Achillea ptarmica*, heath grass *Danthonia decumbens*, and pepper saxifrage *Silaum silaus*.
CPT31 Pound Wood LoWS	0.90km east	23.4	Mostly managed as an Essex Wildlife Trust nature reserve, consisting predominantly of ancient woodland. Ground flora features a range of ancient woodland indicator species and the site supports heath fritillary and hazel dormouse.
CPT40 Thundersley Brickfields LoWS	1.0km west	4.8	Structurally diverse grassland with apparently ancient woodland and secondary woodland habitats. Site supports a diverse assemblage of invertebrates, including 30 considered to be Nationally Scarce.
CPT30 Coxall Wood LoWS	1.10km south-east	0.8	Remnant fragment of ancient woodland supporting ancient woodland indicator plant species and BAP Priority species southern wood ant *Formica rufa*.

Name and Site Designation	Approximate Distance and Direction from Site	Size (ha.)	Designated Features
CPT14 Thundersley Glen LoWS	1.40km south-west	13.6	Predominantly secondary woodland with some remnants of ancient woodland and ancient hedges. Supports some interesting ground flora characteristic of ancient woodlands, and likely supports a significant invertebrate assemblage.
CPT20 Coopers Wood LoWS	1.40km south-west	1.2	Secondary woodland on an ancient woodland site, with a small glade of species-rich unimproved acidic grassland along its western edge. Supports small numbers of notable plant species including devil's bit scabious *Succisa pratensis* and tormentil *Potentilla erecta*.
CPT43 Badger Hall Woods LoWS	1.40km south-west	5.9	Secondary woodland on an ancient woodland site, supporting a varied ground flora.
CPT18 Shipwrights Wood LoWS	1.60km south	12.1	Comprises two ancient woodland blocks with characteristic ancient woodland ground flora and abundant deadwood resource.
CPT33 Oakwood Reservoir LoWS	1.60km south-east	0.3	Constitutes a small strip of unimproved acid grassland immediately to the south of the Garrold's Meadow SSSI. Features a range of scarce plant species, most notable common milkwort *Polygala vulgaris*, an Essex Red Data List species.
CPT10 Coombe Wood LoWS	1.60km south-west	11.3	Predominantly ancient woodland with sections of more recent secondary woodland. Coppice-with-standards structure with many ancient woodland indicator species in the ground flora.
CPT15 Jervis Wood Lane LoWS	1.60km south-west	1.3	Ancient lane with remnant fragment of former ancient woodland. Forms valuable green connection within urban landscape.
CPT17 Shipwrights Meadow LoWS	1.70km south-west	1.2	Varied grassland communities including lowland meadow and areas of poorly drained permanent pasture.
CPT11 Mount Road Wood LoWS	1.75km south-west	3.9	Secondary woodland with some ancient woodland indicator species within the otherwise unremarkable ground flora.
R5 Grove Woods LoWS	1.80km north-east	16.6	Former plotland now dominated by hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa* scrub under a canopy of pedunculate oak *Quercus robur*. Features a wide variety of ground flora, including bluebell and yellow archangel.
CPT34 Belfairs Park Wood LoWS	1.90km south-east	15.4	Made up of two ancient woodlands. Ground flora features several ancient woodland indicator species.

Key: LoWS**:** Local Wildlife Site

Priority Habitats

3.4 A search for priority habitats on Magic Map within 1km of the site identified broadleaved woodland within the site boundary, and semi-improved grassland offsite adjacent the eastern boundary. Additional habitats within 1km included lowland heath and ancient woodland. Some of the sites woodlands habitats meet the criteria for Habitats of Principle Importance under the NERC Act 2006.

Extended Phase 1 Habitat Survey

3.5 The Phase 1 habitat map of the site and a selection of site images are provided within Appendix 5. The plant species recorded per habitat type are tabled in Appendix 5.

3.6 The Phase 1 Habitat types within and adjoining the site (JNCC, 2010) were:

- Broad-leaved plantation woodland
- Broad-leaved semi-natural woodland
- Dense scrub;
- Hedgerows;
- Line of trees;
- Running water
- Scattered scrub;
- Improved grassland
- Semi-improved grassland
- Standing water
- Tall non-ruderal vegetation; and
- Tall ruderal vegetation

Broad-leaved plantation woodland

3.7 There was a small area of plantation woodland along the northern boundary where the site borders Stadium Way (W4, Appendix 5) and within W2 in the south of the site. Wood W4 comprised mainly evenly aged single-stemmed young trees, with a uniform structure and very little understorey other than a narrow band of blackthorn scrub at the interface between the woodland plantation and grassland to the south (Field 1a). The thin canopy allowed significant light penetration to ground level, with more extensive ground flora than the more heavily shaded semi-natural woodland fragments on site. This area featured frequent greater stitchwort *Stellaria holostea* and occasional nipplewort *Lapsana communis*, as well as patches of bramble *Rubus fruticosa*. There are extensive spoil piles within the plantation woodland, resulting in numerous potential refugia for a variety of species.

3.8 Woodland W2a was part plantation comprising uniform stands of planted young oak *Quercus robur* trees with little shrub layer or understory. Common nettle *Urtica dioica* and cock's-foot *Dactylis glomerata* was present.

Broad-leaved semi-natural woodland

3.9 The site featured four distinct fragments of broadleaved semi-natural woodland considered to be lowland mixed deciduous woodland, numbered W1, W2, W3, and W5 within the Phase 1 Habitat Plan in Appendix 5. All woodlands on site comprised fairly narrow blocks. These areas of semi-natural woodland are a valuable local resource and likely play an important role in landscape connectivity.

3.10 W1 was centered around a dry pond and was dominated by crack willow *Salix fragilis* indicating that this area of the site remains damp. The ground flora comprised common and widespread species including abundant common nettle and bramble, suggesting enriched soil. This area of the site featured a large amount of refuse.

3.11 W2 featured part plantation as described above and part semi-natural broadleaved woodland. The latter had abundant pedunculate oak and frequent ash, with an understorey of elm (*Ulmus* sp) and blackthorn. At the time of the survey, the ground flora appeared reduced due to heavy shading, though the northern edge of the woodland supported large numbers of broad-leaved helleborine. There was a small glade in the south-eastern corner of W2, with a well-developed ground flora which was grassier, dominated by cock's foot and false oat-grass *Arrhenatherum elatius*.

3.12 W3 featured lines of mature oak and hornbeam which appeared to have been managed historically through coppicing, with some ash and oak standards. The understorey comprised smaller stands of hazel and field maple coppice, with scattered holly and bramble. The ground flora featured abundant ivy *Hedera helix* and frequent cow parsley *Anthriscus sylvestris*, with occasional bracken *Pteridium aquilinum*. Ditches were present within the woodland potentially indicating the presence of historic boundary features. A row of hornbeams of significant age was present on the north-western edge of the woodland. Frequent hybrid oak *Quercus x rosacea.* This species is a hybrid derived from pedunculate and sessile oak and is an ancient woodland indicator species.

3.13 W5 was a narrow band of woodland forming a riparian corridor along most of the length of the stream that runs through the site. The woodland had a varied structure with scattered standard oaks and hornbeam with frequent willow in places, and more diverse areas of ash and oak with a well-developed understorey featuring willow sp, hawthorn, elder and field maple. The composition of the woodland changed slightly towards the north-eastern end of the site, with crack willow *Salix fragilis* forming the canopy in this area. A strip of woodland developing from dense scrub was also present in between fields F4 and F5 adjoining the riparian corridor woodland. It comprised a row of mature trees including crack willow and oak with an understory of blackthorn, holly and elder. A dry ditch was also present with ground flora of ivy, cow parsley, bramble, nettle and field horsetail.

Dense scrub

3.14 The site featured small areas of dense scrub within the western portion of the site, with the largest patches around the Claydon's Farm work yard and Field 1 (Appendix 5). These areas were variable in their structure and species composition, though bramble was a major component throughout. Snowberry *Symphoricarpos albus*, an invasive species, was present along the western boundary of Field 1.

3.15 Dense scrub was noted dividing field compartments F1 and F2 in the west of the site. This area had likely developed from a outgrown hedgerow (H7). The dense scrub was mature and developing into a thin line of woodland. A few mature, and semi-mature trees were present along with young trees and shrubs. Species included oak, sorbus, and silver birch with hawthorn, willow, blackthorn, holly and hazel. Ground flora comprised mainly bramble with occasional nettle, hogweed, bracken, and pendulous sedge *Carex pendula.*

Hedgerows

3.16 A total of eight hedgerows were identified within or surrounding the site. Three of the hedgerows identified in the study area were classified as important under the Wildlife criteria of The Hedgerow Regulations 1997 due to the number of species, age and associated features. The remaining five hedgerows were too species poor to qualify.

3.17 All of the hedgerows on site comprised 80% or more of at least one woody UK native species, and therefore are considered to qualify as HoPI under the NERC Act 2006. The majority of hedgerows were present in the south east of the site with H1, H3 and H6 in this area.

3.18 The hedgerow network is considered to be of importance at a **local** level. The results of the hedgerow surveys are provided in the table below:

Table 4. Hedgerow survey results

Ref	Species	Height/Width (m)	Approximate length (m)	Comments/Associated Features	Important under Wildlife Criteria of Hedgerow Regulations
H1	Cb, Cm, Qr, Qrx, Bp, Sn, Ia, Ca	4+ / 1	170m	Dominated by hornbeam with av. 5 sp per 30m. Several associated features inc. 1 standard tree per 50m, parallel hedge, ditch and bank and connections to woodland and other hedgerows	Yes
H2	Cm, Cb, Cm, Bp, Sn, Qxr	4+ / 0.5	150m	Significantly younger than parallel hedge H1. Dominated by unmanaged row of young hawthorn. Av 3 sp/30m. No ditch/banks present. Numerous connecting mature standards and no gaps	No
H3	Qr, Qxr, Cb, Ia, Ca, Cm,	2-4 /1-2	170	Unmanaged hedgerow with mature trees, considered substantial in age with coppicing present. Av. 5 species per 30m section, <10% gaps, 4 end connections, parallel hedge, ditch	Yes
H4	Cm, Ia, Cb, Qr, Qxr	4+ / 0.5	150m	Significantly younger than parallel hedge H3. Dominated by unmanaged row of young hawthorn. Av 3 sp/30m. No ditch/banks present. Numerous connecting mature standards and no gaps	No

Ref	Species	Height/Width (m)	Approximate length (m)	Comments/Associated Features	Important under Wildlife Criteria of Hedgerow Regulations
H5	Cm, Ps, Qr, Ia, Fe, Cb, Qxr	4+ / 0.5	160	Unmanaged young hedgerow with abundant hawthorn. Av. 4 species per 30m section, parallel hedge to south, >10% gaps, no ditch/bank.	No
H6	Qr, Ia, Cm, Cb, Sf, Qxr	2-4 /1-2	160	Unmanaged hedgerow with mature trees, considered substantial in age at western end where old hornbeams present. Av. 4 species per 30m section, <10% gaps, 4 end connections, parallel hedge, ditch + bank. Significant crack willow present	Yes
H7	Qr, Cm, Ia, Ps, Sorbus sp	4+ / 3	150m	Unmanaged outgrown hedgerow with numerous mature trees surrounded by dense scrub. Av. 4 species per 30m section, <10% gaps, no end connections, ditch	No
H8	Cb, Ia, Cm, Ps, Qr, Ca	4+ / 1	90m	Unmanaged hedgerow considered with mature hornbeams, along woodland edge. Av 4 sp/30m, ditch and bank present with numerous mature trees and connectivity to woodland	No

Species Key: Cm Crataegus monogyna – hawthorn; Fe Fraxinus excelsior – ash; Ia Ilex aquifolium – holly; Ps Prunus spinosa – blackthorn; Qr Quercus robur - pedunculate oak; Qxr Quercus x rosacea – hybrid oak; Sn Sambucus nigra – elder; Ca Corylus avellana - hazel ; Cb Carpinus betulus – hornbeam; Sb Betula pendula – silver birch; Sf Salix fragilis – crack willow

Line of trees

3.19 The lines of trees on site varied in age, with some being the result of recent planting and others likely representing historic degraded hedgerows. Line of trees 1 (L1 in Appendix 5) featured a mixture of mature oak and hornbeam at its western edge, with more recently planted Lombardy poplars *Populus nigra 'Italica'* towards its eastern end which falls outside of the site boundary. Line of trees 2 (L2) was a short section of mature oak trees while L3 was a short row of old hornbeams. L4 comprised mature oak and hornbeam while L5 was formed of mature hawthorn, oak and hornbeam. Line of trees L6 was mature oak, L7 early-mature ash and L8 late mature hornbeam coppice stools. Finally L9, along the south-eastern boundary comprised mature hornbeam, pedunculate oak and wild cherry *Prunus avium*

along with early mature ash and lime *Tilia cordata.*

Running water

3.20 The stream running through the site from the south-west to the north-east was narrow and largely obscured by leaf litter at the time of the survey. In places, the water was up to *c*. 15cm deep, but in others the stream appeared dry despite recent heavy rainfall. The stream was completely dry in October 2022 The stream was heavily shaded by woodland, scrub and lines of trees along most of its length, particularly along its southern bank, with small stretches of the northern bank abutting tall non-ruderal vegetation margins. The stream appears to connect to an underground system north of the site, feeding into larger stream approximately 370m to the north.

Scattered scrub

3.21 There were several patches of scattered scrub across the site, of varying structure and species composition. Within Field 5, patches of blackthorn, hawthorn, and dog rose were scattered towards the edge of the rough grassland pasture. The work yard associated with Claydon's Farm displayed extensive diverse patches of tall scrub, with low bramble growth encroaching into the southern portion of Field 1.

Improved grassland

3.22 Fields 1, 1a, 2 and 3 were managed for hay and exhibited evidence of agricultural improvement being dominated by a low number of coarse grass species including false oat-grass *Arrhenatherum elatius*, perennial rye-grass, soft brome, cock's-foot, Yorkshire fog and common couch with very few forbs present.

Semi-improved grassland

3.23 Field compartments 4-7 comprised intensively grazed horse paddocks. The paddocks held a grassland sward offering greater diversity than fields 1 to 3 and were semi-improved in nature. Frequently occurring species included crested dogs tail *Cynosurus cristatus*, creeping bent *Agrostis stolonifera*, soft brome, rats-tail fescue *Vulpia myuros* and tall fescue *Schedonorus arundinaceus.* Herbaceous species included frequent shepherds purse *Capsella bursa-pastorisas,* common Bird's-foot-trefoil *Lotus corniculatus* and black medick *Medicago lupulina* well as occasional great willowherb *Epilobium hirsutum* and hedge woundwort *Stachys sylvatica*. Field 5 displayed a varied sward, with heavily grazed areas grading into rough grassland and scrub around the perimeter of the field.

Standing water

3.24 The reservoir within the north-eastern portion of the site was managed as a fishing lake and appeared to be heavily stocked with fish. This habitat featured small stands of common reed *Phragmites phragmites*, with relatively little emergent and submerged vegetation evident.

Tall non-ruderal vegetation

3.25 The site featured areas of bracken adjacent to hedgerows and scrub.

Tall ruderal vegetation

3.26 There were three small areas of tall ruderal vegetation, distributed along the stream which crosses the site. These areas exhibited abundant common nettle and bramble, with scattered field horsetail *Equisetum arvense*.

Summary

3.27 The site features extensive areas of low value improved grassland bordered by native species-poor hedgerows and scattered fragments of woodland. The paddocks (field compartments 4 to 7) supported greater diversity and these fields were considered to be semi-improved in nature.

3.28 It is considered that the lowland mixed deciduous woodland, hedgerows, and semi-improved grassland habitats are of importance at a **local** level due to their role in maintaining landscape connectivity, as well as the hedgerows and lowland mixed deciduous woodland being Habitats of Principal Importance. The site is designated falls within the EWT Hadleigh and Daws Heath Complex Living Landscape (Living Landscape 47), for its high wildlife value and connectivity within a predominantly urban area (EWT, 2010).

3.29 The remaining habitats are considered to be of importance at a **site** level given their extent, limited botanical diversity, and local ubiquity. Confidence in this assessment is **high**.

Protected/Priority Species

Rare and notable plants

3.30 No species listed under Schedule 8 or Schedule 9 of the Wildlife and Countryside Act (WCA, 1981) were recorded on site. There were recent records of Schedule 8-protected species bluebell *Hyacinthoides non-scripta* within 1km of the site, and this species is considered likely to occur on site. The following invasive species listed under Schedule 9 have been recorded within 5km of the site, including; three-cornered garlic *Allium triquetrum*, water fern *Azolla filliculoides*, New Zealand Pigmyweed *Crassula helmsii*, Japanese knotweed *Fallopia japonica*, floating pennywort *Hydrocotyle ranunculoides*, Himalayan balsam *Impatiens glandulifera*, Parrot's feather *Myriophyllum aquaticum*, *Rhododendron ponticum*, and Japanese rose *Rosa rugosa*. Snowberry *Symphoricarpos albus*, an invasive species, was present along the western boundary of Field 1.

3.31 The data search also returned records of several scarce woodland, acid grassland, and heathland specialist plant species near to the site, including sneezewort *Achillea ptarmica*, heath milkwort *Polygala vulgaris*, and devil's bit scabious *Succisa pratensis*.

3.32 The site is considered to be of **local** importance for its botanical assemblage and confidence in this assessment is **high**.

Badgers

3.33 The EFC data search returned 132 badger records within 5km, most recently in 2019. A total of 12 badger setts were recorded during a targeted badger survey (Appendix 16). Further monitoring was undertaken on all setts in 2020 which identified 3 active setts and 9 disused setts. Details of the monitoring can be found within Appendix 15. In summary, the active setts consisted of sett 7 (an active outlier sett with two active entrances and two inactive), sett 10 (a subsidiary sett with two active entrances and three inactive) and sett 8 which had 40+ holes, although very few exhibited signs of activity during the monitoring period and therefore only a low number of entrances were considered active. Given the number of entrances this sett is likely to constitute a main sett. In addition, a single partially-used outlier (Sett 13) was discovered in January 2021.

3.34 A further targeted badger survey was undertaken in April 2021 (Appendix 16). In summary, this survey identified no additional setts within 30m of the site boundary but did identify an additional entrance within sett 13 (an outlier now comprising two entrances). A total of nine disused setts were recorded, including setts 1 to 6, sett 9 and both setts 11 and 12. The remaining four setts were either partially or well used. Outlier Sett 7 was found to have a single new-used entrance whilst the remaining three entrances now appeared to be partially used. Subsidiary Sett 10 held three partially-used entrances, while the remaining two entrances were well-used. The most recent badger survey confirmed the status of Sett 8 as a main badger sett. The sett consisted of 43 distinct entrances, of which, 33 entrances were well used. A further 11 of these, showed signs of recent use including fresh bedding and badger hairs. Outlier sett 13 was found to support two entrances both of which were well-used.

3.35 It is likely that the site forms a part of the territory of at least one family group of badgers. Foraging habitats are conspicuously absent within the wider urban landscape bordering the site to the north and west, however, the land immediately to the east comprises abundant grassland and woodland, which form part of Little Haven/Tile Wood Complex LoWS, with optimal habitat also extending away to the south-east beyond Daws Heath Road and Bramble Road.

Importance

3.36 Badgers are protected under the Protection of Badgers Act 1992. Given the presence of an active main sett as well as several active subsidiary or outlier setts within the site and the abundance of optimal habitat for badgers to the east and south-east, the habitats on site are considered of **local** importance for badgers.

Bats

3.37 The EFC data search returned records of at least eight bat species within 5km (Table 5).

Table 5.: Records of bat species within 2km of the site boundary

Bat species	Number of records	Last recorded
Brown long-eared *Plecotus auritus*	85	2018
Common pipistrelle *Pipistrellus pipistrellus*	90	2018
Daubenton's *Myotis daubentonii*	2	2018
Evening or vesper bat sp. *Vespertilionidae* sp.	2	2009
Leisler's *Nyctalus leisleri*	3	2017
Myotis sp.	4	2018
Natterer's *Myotis nattereri*	2	2018
Noctule *Nyctalus noctula*	13	2018
Serotine *Eptesicus serotinus*	14	2018
Soprano pipistrelle *Pipistrellus pygmaeus*	9	2018
Unidentified pipistrelle *Pipistrellus sp.*	66	2016

Preliminary Assessment

Roosting Bats: Trees

3.38 A total of 96 trees were assessed as having potential to support roosting bats, including 15 assessed as having moderate potential (Table 6). The remainder were considered to have low bat roost potential. Tree locations are depicted in the ecological constraints plan provided in Appendix 6.

Table 6: Trees with potential to support roosting bats

Tree number	Species	Potential roosting features (PRFs)	Bat roosting potential
1	Aspen *Populus tremula*	Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
2	Aspen *Populus tremula*	Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
5	Aspen *Populus tremula*	Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
6	Aspen *Populus tremula*	Tree featured several small holes and was of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
37	Oak *Quercus robur*	Small south-facing cavity of unknown depth less than 1m above ground. Tree of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
40	Ash *Fraxinus excelsior*	Cavity visible approximately 3m above ground at junction between trunk and east-facing limb. Tree of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
43	Oak *Quercus robur*	Dense ivy and hedge growing around and on tree may be obscuring potential roosting features not visible from the ground.	Moderate
51	Ash *Fraxinus excelsior*	Old multi-stemmed coppice stool with multiple small cavities and splits.	Moderate

60	Ash *Fraxinus excelsior*	Big north-facing hollow in trunk at ground level. Tree of sufficient size and age to contain potential roosting features not visible from the ground.	Moderate
64	Aspen *Populus tremula*	Dead spar with large west-facing hollow at ground level, with further large cavities likely where the trunk has split c. 3-4m high.	Moderate
66	Aspen *Populus tremula*	Big fissure on leaning trunk c. 1-2m above ground, which could lead to larger cavity. Tree of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
76	Ash *Fraxinus excelsior*	Large hollow of unknown depth at ground level facing north-west.	Moderate
87	Oak *Quercus robur*	Dead spar approximately 8m above ground, and numerous very small holes high up on trees. Tree of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
93	Oak *Quercus robur*	Small holes visible high in tree. Tree of sufficient size and age to contain additional potential roosting features not visible from the ground.	Moderate
96	Oak *Quercus robur*	Trunk cavity at 1.5m south	Moderate

3.39 Following the ground level tree assessment, the trees identified as having moderate potential (Table 6) were subject to aerial tree climb to further inspect potential roosting features. Following the inspection five trees were downgraded to negligible or low potential while 11 were considered to still have moderate roosting potential (Table 7). In addition, tree T76 was considered suitable for hibernating bats due to a large trunk cavity extending up approximately 80cm.

Table 7: Trees with potential to support roosting bats following aerial inspection

Tree number	Species	Bat Roosting Potential (Ground Level)	Bat roosting suitability (following aerial inspection)
1	Aspen *Populus tremula*	Moderate	Low
2	Aspen *Populus tremula*	Moderate	Negligible
5	Aspen *Populus tremula*	Moderate	Low
6	Aspen *Populus tremula*	Moderate	Low
37	Oak *Quercus robur*	Moderate	Moderate
40	Oak *Quercus robur*	Moderate	Moderate
43	Oak *Quercus robur*	Moderate	Moderate
51	Ash *Fraxinus excelsior*	Moderate	Moderate
60	Ash *Fraxinus excelsior*	Moderate	Moderate
64	Aspen *Populus tremula*	Moderate	Moderate
66	Aspen *Populus tremula*	Moderate	Moderate
76	Ash *Fraxinus excelsior*	Moderate	Moderate (hibernation)
87	Oak *Quercus robur*	Moderate	Negligible
93	Oak *Quercus robur*	Moderate	Moderate
96	Oak *Quercus robur*	Moderate	Moderate

Bats – roosting (buildings and structures)

3.40 There are 13 buildings across the study area, all of which were inspected from ground level to assess their potential to support roosting bats. Internal inspections were performed where possible, though internal access was not provided to some of buildings and a preliminary assessment was performed based on external inspections where this was the case. Nine buildings were considered to have low suitability with the remainder considered to hold negligible suitability for roosting bats. In addition to these buildings, a complex of concrete structures associated with skateboarding were considered to offer low suitability for roosting bats. Buildings 12 and 13 lie outside the application site and are to be retained. Therefore, these buildings were not subject to further survey. All buildings and structures are shown in Appendix 6, and considered in detail in Table 7, below.

Table 7: Building inspection

Building number	Description	Bat roosting potential
1	Open-fronted concrete framed barn with corrugate asbestos concrete walls and roof. Opportunistic roosting opportunities present in the form of gaps under ridge tiles, and some internal and external gaps between corrugate sheeting. Wooden planks fastened onto concrete eaves provide small cavities suitable for roosting bats – a house sparrow was observed emerging from one of these cavities.	Low
2	Corrugate iron shed in poor condition, with fragmented internal concrete wall.	Negligible
3	Small wooden shed in excellent condition, with no suitable ingress/egress points for bats.	Negligible
4	Long wooden stable with felt-lined plywood pitched roof. Subdivided into several compartments. Internal walls have been reinforced with additional wooden planks to create numerous internal cavities within the walls, accessible via small holes where the planks have been broken. Bats could access these areas using gaps around stable doors and small gaps where the external walls meet the eaves.	Low
5	Long wooden stable of identical design to Building 3, with similar features.	Low
6	Derelict wooden shed with corrugate iron sheeting. Lacks suitable sheltering opportunities for bats.	Negligible
7	Two storey fishing lodge with wooden barge boards on walls and thin plastic sheeting on roof, held down with wooden planks. Roof lined with sheet of plastic and plyboard internally. Bats may roost within roof, as there are multiple gaps within the thin plastic sheeting. All gaps beneath timber boards	Low
8	Single storey static caravan clad externally with timber in reasonable condition. No voids were identified within the building during the internal inspection. Externally the building offers possible roosting potential between external classing and walls of the caravan	Low
9	Iron corrugate lean-to shed, with numerous gaps offering potential access points for bats. Internal access found no suitable roosting locations internally	Low
10	Wooden workshop in reasonable condition with vertical cladding on south-west-facing wall near main entrance. Small gaps under cladding offer potential access points for bats.	Low
11	Wooden garden shed in reasonable condition considered to hold no potential for bats due to the lack of roosting features such as cracks, crevices and holes.	Negligible

Building number	Description	Bat roosting potential
12	Large asbestos-concrete corrugate pitched roof within SPM Granite compound. Visible broken skylight offering potential access point for bats and barn owls. Further potential access points in the form of gaps under eaves and ridge tiles. Internal access to SPM Granite compound was not provided, preventing close inspection.	Low
13	Large asbestos-concrete corrugate pitched roof adjacent to building 12, within SPM Granite compound. Potential access points in the form of gaps under eaves and ridge tiles. Internal access to SPM Granite compound was not provided, preventing close inspection.	Low
Skateboarding structure	Collection of concrete and brick structures, several of which were in poor condition with large cavities and missing mortar providing suitable crevices for roosting bats.	Low

Foraging and Commuting Bats

3.41 The field boundary habitats including hedgerows, mature trees and woodlands, along with waterbodies including the stream and lake were considered to offer opportunities for foraging and commuting bats. However, the centre and majority of the site was considered to offer very limited opportunities within species poor grassland. The site had good connectivity to suitable offsite habitats to the east however urban development bordered the rest of the site on all aspects with a wider landscape of a predominantly urban nature.

3.42 Given the presence of a network of hedgerows leading to suitable offsite habitat, the site was valued as being of moderate suitability for foraging and commuting bats and further monthly surveys were undertaken.

Further Surveys

Dusk Emergence / Dawn Re-entry Surveys

3.43 Bat roosts were recorded within buildings 1 and 5 which are likely to be impacted by the proposals. The details relating to these roosts are summarised in Table 8 with full details provided in Appendix 6.

Table 8. Summary of confirmed bat roosts in buildings

Building number	Species	Number of roost locations	Type of roost	Roost location
1	Common pipistrelle	1	Day	Within wall cavity on western side of the building
5	Soprano pipistrelle	1	Day	Within internal space of the building, likely in a crevice between roof beams

3.44 No bats were found roosting in the trees which were subject to survey (T51, T64, T66 and T93).

Activity Transects

3.45 Monthly transects were undertaken from June to October 2020. A further two transect surveys were carried out in April and May 2021 to provide a full season of survey data. A total of eight species were

recorded during transect surveys; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus*, Daubenton's *Myotis daubentoniid,* brown long-eared bat *Plecotus auratus,* barbastelle *Barbastella barbastellus* and noctule *Nyctalus noctula* along with *Ncytalus* sp, and *Myotis* sp. Activity was relatively low and consistent throughout the site with highest levels of activity were recorded along the site's field boundary habitats (woodland, scrub, hedgerow) and around waterbodies (especially the fishing lake). The majority of bat passes from common and soprano pipistrelles with the number of passes considered likely to be from a lower number of the same individuals foraging. Only low numbers of other bat species were recorded including a single barbastelle pass in May 2021. Detailed results including heat maps showing the species distribution within the site are provided in Appendix 6.

Table 9. Summary of transect survey results - passes per species per transect.

Month	P.pip	P.pyg	N.nyc	Nyc. sp	M.dau	P.aur	Myo sp.	B. bar	Total
June 2020	11	11	1	1	3	0	0	0	**27**
July 2020	11	21	2	0	3	2	0	0	**39**
August 2020	19	6	2	0	4	3	0	0	**34**
September 2020 (Dusk)	16	3	0	0	0	0	0	0	**19**
September 2020 (Dawn)	12	2	0	0	0	0	0	0	**14**
October 2020	3	1	0	0	0	0	0	0	**4**
April 2021	11	7	0	0	5	0	1	0	**24**
May 2021	15	29	0	0	6	0	0	1	**51**
Mean	**12.25**	**10**	**0.625**	**0.125**	**2.625**	**0.625**	**0.125**	**0.125**	**212**

P.pip = common pipistrelle, P.pyg = soprano pipistrelle, N.nyc = noctule, Nyc. Sp = Nyctalus sp., M.dau = Daubentons bat, P.aur – Brown long-eared bat, Myo sp. = Myotis sp., B. bar = barbastelle

Static Deployments

3.46 Analysis of data from static deployments increased the list of bat species associated with the site to nine with serotine *Eptesicus serotinus* also recorded. In addition, undetermined pipistrelle species were also recorded. Activity was generally low throughout the site with the great majority of activity from common and soprano pipistrelle, with only very low numbers of individual passes from other species. The majority of activity was associated with statics 8, 9 and 10 located along the hedgerow in the east of the site, the sites central woodland and woodland close to the onsite lake (Appendix 7).

Table 10. Summary of static survey results for June to October 2020, and April & May 2021- passes per species per night of recording (*standardised for differences in night length over season and combining data for two sampling locations*).

Bat species	June 2020		July 2020		August 2020		September 2020		October 2020		April 2021		May 2021		Total
Static Detector I.D.	1	2	3	4 (failed)	5	6	7	8	9	10	11	12	11 (failed)	12	
Common pipistrelle	67	62	17	0	18	61	55	487	290	570	21	56	0	5	1709
Soprano pipistrelle	37	38	0	0	14	3	16	61	3	422	15	1	0	7	617
Pipistrelle sp.	0	0	0	0	0	0	1	0	0	2	0	0	0	0	3
Noctule	1	1	13	0	26	4	1	4	0	0	0	0	0	0	50
Nyctalus sp.	0	0	0	0	1	0	1	4	0	0	0	0	0	0	6
***Myotis* sp.**	0	0	0	0	0	0	0	2	0	3	0	10	0	0	15
Serotine	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2
Brown Long-eared	1	1	0	0	0	0	3	1	0	0	0	0	0	0	6
Total	**107**	**103**	**30**	**0**	**59**	**68**	**77**	**559**	**293**	**997**	**36**	**67**	**0**	**12**	**2408**
Monthly Total	**210**		**30**		**127**		**636**		**1290**		**103**		**12**		**2408**

Importance

Roosting, Foraging & Commuting Bats

3.47 Bat species found on site are considered to be 'common' (common pipistrelle; soprano pipistrelle), 'frequent' (brown long-eared, Daubenton's) and 'rarer' (noctule, serotine, and *Myotis* sp.) and 'rarest' (Barbastelle) based on criteria for assessing rarity within range by Wray *et al.* (2010). Information on the distribution of the bat species in Essex is provided in Table 11.

Table 11. Distribution of bats in Essex (Dobson & Tansley, 2014; EBG, 2018)

Bat species	Status in Essex
Common pipistrelle	Widespread, occasionally common. One of the two species most likely to be encountered and regularly seen at dusk around gardens.
Soprano pipistrelle	Widespread, occasionally common. One of the two species most likely to be encountered and regularly seen at dusk around gardens.
Brown long-eared	Widespread, relatively frequent, but not often encountered outside of roosts.
Noctule	Widespread, but relatively scarce.
Barbastelle Bat	A scarce woodland bat, though possibly more widespread than appreciated in Essex.
Serotine	Widespread, but scarce. Thought to have declined greatly in the last thirty years.

Bat species	Status in Essex
Myotis sp.	Genus including six British species: Daubenton's *Myotis daubentonii* - Widespread, relatively frequent near still water. Natterer's *Myotis nattereri* - Widespread, relatively scarce. Whiskered *Myotis mystacinus* - One record, assumed to be very rare in Essex. Brandt's *Myotis brandtii* - Not recorded in Essex. Alcathoe *Myotis alcathoe* - Not recorded in Essex. Bechstein's *Myotis bechstenii* - Not recorded in Essex.

3.48 Common pipistrelle were the most commonly recorded bats during surveys with an average of 12 passes recorded per transect, and 142 passes per static sampling period. Activity was highest during both transects and static monitoring in the western extent of the site around the fishing lake and woodland edge.

3.49 Given the low levels of overall bat activity observed and also the very low numbers of passes recorded for 'rarer' species, the site is considered to be of only **site** level importance for foraging and commuting bats.

Birds

Preliminary Assessment

3.50 There were records of 159 bird species within 5km; 41 of which were red-listed Birds of Conservation Concern (BoCC) (Eaton *et al.,* 2021). Additionally, 41 species were listed in Schedule 1 of the WCA 1981.

3.51 The mosaic of grassland, scrub, standing water, and woodland habitats, together with the well-developed hedgerows provide nesting and foraging opportunities for a range of species, including red-listed species known to occur within the local area such as spotted flycatcher *Muscicapa striata* and turtle dove *Streptopelia turtur*, and the Schedule 1-listed barn owl *Tyto alba*. The large number of mature trees on site offer abundant potential nesting sites for cavity-nesting species.

Wintering Bird Survey

3.52 The wintering bird surveys recorded a total of thirty species using the site. Of these, twelve species (buzzard *Buteo buteo*, chiffchaff *Phylloscopus collybita*, coot *Fulica atra*, coal tit *Periparus ater*, great spotted woodpecker *Dendrocopos major*, grey heron *Ardea cinerea*, moorhen *Gallinula chloropus*, pheasant *Phasianus colchicus*, pied wagtail *Motacilla alba*, starling *Sturnus vulgaris*, song thrush *Turdus philomelos* and wren *Troglodytes troglodytes*) were only recorded once. Thus, the number of species using the site with some regularity was eighteen.

3.53 Of the thirty species using the site, the large majority were found in the hedgerow, scrub and woodland habitats with only eight species recorded exclusively in the open water or open field habitats namely cormorant *Phalacrocorax carbo*, coot, mallard *Anas platyrhynchos*, grey heron, lesser black-backed gull *Larus fuscus*, herring gull *Larus argentatus,* black-headed gull *Chroicocephalus ridibundus* and moorhen.

3.54 Eighteen of the thirty species have favourable conservation status and are Green listed in BoCC or in the case of pheasant are introduced species with no conservation listing. The remaining twelvespecies have notable conservation status and include species which are either on the Red and Amber lists in BoCC, England Biodiversity Priority Species (EBP) or listed in the Essex BAP (See Table 12).

3.55 Of the twelve species with notable conservation status:

- Six were associated with the open fields, hedgerows and scrub, namely, Woodpigeon *Columba palumbus* wren *Troglodytes troglodytes* dunnock *Prunella modularis*, fieldfare *Turdus pilaris*, house sparrow *Passer domesticus*, redwing *Turdus iliacus*, song thrush and starling.

- Two species were associated only with open water habitats including black-headed gull and mallard.

- Two species were recording just the open field habitats, namely, lesser black-backed gull and herring gull.

3.56 The hedgerows, scrub and woodland also supported a variety of Green listed species typical of these habitats, including; blackbird *Turdus merula*, blue tit *Cyanistes caeruleus*, common buzzard *Buteo buteo*, chaffinch *Fringilla coelebs*, great spotted woodpecker *Dendrocopus major*, great tit *Parus major*,

jay *Garrulus glandarius*, robin *Erithacus rubecula*, . The open field habitat also supported Green listed species such as carrion crow *Corvus corone* and magpie *Pica pica*. Results are summarised in Table 12 below. Full results and maps are provided in Appendix 7.

Table 12. Species with notable conservation status recorded on site during wintering bird surveys.

Species	Conservation Status				
	Schedule 1	BoCC Red	BoCC Amber	S41	Essex BAP
Black-headed gull			✓		
Dunnock			✓	✓	
Fieldfare	✓	✓			
Herring gull		✓		✓	
House Sparrow		✓		✓	
Lesser black-backed gull			✓		
Mallard			✓		
Redwing	✓		✓		
Song thrush			✓	✓	
Starling		✓		✓	
Wren			✓		
Woodpigeon			✓		

Importance

3.57 The application site is moderately sized (27.89ha) and contains a variety of habitats and was therefore likely to support a good range of bird species. The habitats present include a mosaic of woodland, semi-improved grassland, scrub, hedgerows and open water. The bird assemblage recorded is entirely typical of this lowland farmland landscape and is unexceptional, comprising mainly common and widespread species. Fuller (1980), considered a site having a winter species range of 25-54 species to fall within the lowest category of ornithological interest (Local importance). During the present survey thirty species were recorded during the surveys (18 regularly) thus falling within the **local** category, and overall the assemblage is considered to be of low conservation value.

Breeding Bird Survey

3.58 The breeding bird surveys recorded a total of 42 species of which 38 were considered likely to be breeding or utilising the site during the breeding season. The remaining species were not considered to be breeding within the site and were either recorded adjacent to the site or flying over. A single woodcock *Scolopax rusticola* was recorded during the visit on 2nd July 2020, however, this individual was not thought to be breeding within the application site. The site supports a possible breeding territory for pheasant *Phasianus colchicus*, with individual birds identified during both the visit in June 2020 and May 2021. No other ground nesting birds were recorded on site during any of the surveys.

3.59 There were eight red-listed Birds of Conservation Concern (BoCC) in accordance with the most recent conservation assessment (Eaton et al., 2021). These included herring gull *Larus argentatus,* house sparrow, common linnet *Linaria cannabina*, House martin *Delichon urbicum*, Greenfinch *Chloris chloris* , starling *Sturnus vulgaris*, willow tit *Poecile montanus* and woodcock. A herring gull was recorded passing over the site carrying food during the visit on 17th May 2021, however, it is considered unlikely that a pair were nesting within the application site. Both house sparrow and starling were considered likely to be nesting within the neighbouring residential development and utilising the site as a foraging resource. Both song thrush and common linnet were recorded within the site on more than one

occasion. While common linnet appear to primarily use the site as a foraging resource, it is possible this species and indeed song thrush hold breeding territories within the site boundary. Both willow tit and woodcock were recorded on a single occasion and whilst these species may utilise the site as a foraging resource, it is unlikely that either species actively breed within the site.

3.60 There were ten amber-listed BoCC, of which three were considered probable breeding species; Wren Moorhen Gallinula chloropus, Woodpigeon Song thrush Turdus philomelos dunnock Prunella modularis, kestrel Falco tinnunculus and mallard Anas platyrhynchos. Dunnock were considered likely to be breeding within the hedgerows and scrub across the site while mallard pairs were considered likely to be breeding on the fishing lake. Kestrels were noted perched within the treeline on the northern boundary and hunting over the grassland on two occasions and it is considered likely that these areas form part of a possible breeding territory for this species.

3.61 A single Schedule 1 species recorded on site, namely, green sandpiper *Tringa ochropus* during the surveys in June and July 2020. These individuals are thought to be mitigatory birds and are not considered to be breeding within the site. No barn owl activity was recorded during the survey and there was no evidence to suggest that this species was either roosting or nesting within Building 12 adjacent to the development site. The majority of activity was associated with the sites hedgerow and trees. Results are summarised in Table 13 below. Full results and a territory map are provided in Appendix 8.

Table 13. Summary data on conservation status.

Conservation Status	BoCC	
	Breeding	Non-breeding
Red	4	4
Amber	3	6
Total	**7**	**9**

Importance

3.62 The bird community size is a function of the size of the site and diversity of habitats. The open field habitats supported a typical breeding community principally associated with the overgrown hedges and trees with limited use of the tall grassland fields. The surveys did not record any notable farmland birds such as barn owl *Tyto alba*, lapwing *Vanellus vanellus* or skylark *Alauda arvensis*, however, common linnet was recorded on site during two of the four visits. The breeding bird community is hence considered as being of **District** value based on the criteria of Fuller (1980).

Table 14. Site value based on breeding bird community size (Fuller 1980).

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

Great Crested Newt

Habitat Suitability Index (HSI) Survey

3.63 The data search returned 21 records of GCN within 5km of the site boundary, with the closest record 1.8km away in 2018. The closest GCN class licence record on the Natural England Open Data database was approximately 2.6km to the north. A plan of nearby waterbodies is provided in Appendix 9.

3.64 The site offered suitable terrestrial habitat in the form of grassland, scrub, and woodland. In addition, there were several piles of loose earth, manure, and dead vegetation across the site, which could act as suitable refugia.

3.65 Aquatic habitat on site was limited to a single large reservoir stocked with large numbers of fish (Pond 1, Appendix 9). An additional pond basin (Pond 2) was recorded within the south-west of the site, though given that this was completely dry during the November site visit, following unusually high rainfall, it is likely that this former pond is always dry throughout the year.

3.66 Aquatic habitat within the wider landscape includes two ponds within 500m of the site (P3 & P4). Both are located within areas of optimal terrestrial habitat (woodland and grassland mosaic with mature hedgerows), with the closest (Pond 3) approximately 110m east of the site. Pond 3 was noted as dry in June 2020. Pond 4 was 320m south of the site across Daws Heath Road. Aerial imagery reveals several swimming pools within nearby residential properties, though these are unlikely to be suitable for GCN.

3.67 A Habitat Suitability Index (HSI) was calculated for Ponds 1 and 4 in order to assess their suitability for great crested newts (Oldham *et al*., 2010), which resulted in a 'below average' suitability for both ponds (full results are shown within Appendix 9).

eDNA Survey

3.68 Given the suitability of terrestrial habitats on site and the location of Pond 1 within the site and Pond 4 within 500m of the boundary, an eDNA survey was undertaken on both Ponds 1 and 4 in June 2020. While Pond 1 returned a negative result for GCN, Pond 4 provided an indeterminate result. A subsequent eDNA analysis of water samples collected from Pond 4 on 28th April 2021, recorded a negative result for GCN. Details of the eDNA analysis are presented in Appendix 9. The results provided by the eDNA analysis indicate the likely absence of GCN within both waterbodies. Given the low HSI scores and negative eDNA results associated with these Ponds, as well as the location of Pond 4, over 300m to the south beyond a main road considered a partial barrier to dispersal, this species is considered to be absent from the site.

3.69 As such the application site is considered of likely **negligible** importance for GCN which are not considered further in this report.

Hazel Dormouse

3.70 Dormice are known to occur within several of woods to the east and south-east of the site, with the closest record approximately 200m east of the site in 2016. The woodlands on site were found to generally display a dense canopy with a reduced understorey, indicating a lack of recent management and resulting in suboptimal conditions for dormice. Likewise, many of the hedgerows on site displayed a sparse structure towards ground level and some had degraded to the point where they comprised lines of mature trees within defunct linear scrub. However, many of the hedgerows featured scrubby outgrowths of blackthorn, hawthorn, and bramble, resulting in a rich and varied habitat considered suitable to support dormice.

3.71 Further surveys were undertaken for dormouse with 100 nest tubes strategically positioned across the site in areas of suitable habitat (Appendix 11). These were checked monthly from August to November 2020 delivering a probability index of 32 however no evidence of dormouse was identified and this species was considered likely absent from the site.

3.72 It is considered that the site is likely to be of **nil** importance for dormice and this species is not considered further in this report.

Invertebrates

Landscape Context

3.73 The Thames Gateway is an area of national importance for invertebrates and forms a tract of land alongside the River Thames from East London into Essex and Kent. Many of the species and assemblages of invertebrates are associated with open grassland (Harvey, 2000), with many of the most significant locations now found on brownfield sites. The wider region has a warm regional climate, while the brownfield sites retain habitats at an early-successional stage and include grassland with hot microclimates (Robins et al., 2015).

3.74 The Little Haven/Tile Wood Complex Local Wildlife Site (LoWS) abuts the site. This is a mosaic of ancient, coppiced woodlands, hedgerows, hay meadows and rough grassland. The majority comprises a nature reserve managed by Essex Wildlife Trust. The site supports populations of heath fritillary and shrill and brown banded carder bees.

Desk Study

3.75 The desk study returned records for 803 species of invertebrate with some form of conservation status at a national level or otherwise considered to be of note within Essex. This is a relatively large number and is suggestive of some high-quality sites locally.

3.76 The habitat characteristics of the species on the data search are summarised in Table 15. The invertebrates are associated with a wide range of habitats, including terrestrial, wetland and coastal. Only the terrestrial species are likely to be relevant to the current site, and the relevant habitats include grassland, scrub and tree-dominated habitats with the specialist species also assorted with a range of microhabitats and resources, including dead wood, grassland and scrub types.

Table 15. Pantheon Profile of the Data Search Records (not all species are listed).

Biotope	No of species	Habitat	No of species	Specific Assemblage Type	No of species
Open habitats	319	Tall sward & scrub	178	-	-
		Short sward & bare ground	121	Bare sand and chalk	30
				Open short sward	16
				Exposed sea-cliff	2
		Upland	1	-	-
		-	-	Rich flower resource	31
		-	-	Scrub edge	16
		-	-	Scrub-heath & moorland	7
		-	-	Epiphyte fauna	2
		-	-	Seepage	1
Tree-associated	190	Arboreal	108	-	-
		Shaded woodland floor	42	-	-
		Decaying wood	42	Bark & sapwood decay	22
		-	-	Heartwood decay	7
		-	-	Fungal fruiting bodies	1
		Wet woodland	3	-	-
Wetland	86	Acid & sedge peats	54	Reed-fen & pools	14
				Moss & tussock fen	1
				Open water on disturbed mineral sediments	1
		Marshland	35	Undisturbed fluctuating marsh	1
		Wet woodland	3	-	-
Coastal	54	Saltmarsh	49	Saltmarsh & transitional brackish marsh	23
		Brackish pools and ditches	17	-	-
		Sandy beach	3	-	-
		Sea cliff	2	-	-
		Rocky shore	1	-	-
		Saline lagoon	1	-	-

3.77 The species that are probably greatest note within the context of the site is the presence of two carder bee species, and the heath fritillary butterfly:

- Brown-banded carder bee Bombus humilis and shrill carder bee *Bombus sylvarum* (Hymenoptea: Apidae). These are associated with long but open grass swards for nesting, while requiring flower-rich grassland for foraging. The Thames Gateway is a stronghold for these two species nationally.
- The heath fritillary *Melitaea athalia* (Lepidoptera: Nymphalidae) is present within the woodland block to the south and east (Butterfly Conservation, 2015). This is a priority species restricted to a few woodlands in Cornwall/Devon and Kent/Essex and Exmoor and is associated with woodland rides and clearings where cow-wheat *Melampyrum pratense* and ribwort plantain *Plantago lanceolata* are the caterpillar foodplants.

Visual Appraisal 2020

3.78 The site appears to have been managed more intensively up until the mid-2010s, with mowing appearing to have been more intensive and possibly some increase in scrub cover since then. The site largely comprises improved fields, separated by hedgerows and narrow belts of woodland. These habitats have some higher quality features for invertebrates, in particular transitions between habitats, but each of the habitats also lacks some features typically associated with rich invertebrate assemblage, such as scarcer dead wood types in the woodland and rich herb diversity in the grassland and changes in topography.

Table 16. Summary of the Habitat-based Appraisal.

Phase 1 habitats	Description	Positive features for invertebrates	Negative features for invertebrates
Woodland, including semi-natural and plantation	Linear blocks of woodland with extensive edge habitat and transitional areas between woodland and open grassland, via scrub and ruderal vegetation. Dead wood is scarce, with only occasional fallen timbers greater than 20cm and few trees with features suggestive of heartwood decay. Rot holes and sap runs not noted. One block contained a small, heavily shaded stream, adding habitat diversity.	Transitional edge habitat. Associated with a small stream.	Little dead wood and few scarce dead wood types.
Hedgerows	Species rich and moderately large in stature	Large stature with abundance of spring blossom.	Little dead wood habitat within standard trees.
Scrub	Several patches of scrub, with transitions between dense scrub and grass-scrub matrix in places. The scrub also provides transition from woodland to open grass areas.	Transitions and matrix habitat conditions. Good blossom sequence from early-spring to early-summer.	Total extent is relatively low and much of it appears to be derived from recent relaxation of grazing and mowing.
Grassland	The main part of the site comprises grassland, some of which is short sward following grazing, but with extensive areas of rougher pasture including areas with a mosaic of sward conditions in close proximity (with exposed substrate and tussocky grass).	Mosaic of conditions in some locations and diversity of types across the site.	Mostly species poor, with few herbs. Uniform topography. Apparently more intensively managed until recent years.

2020 and 2021 Field Surveys

3.79 All of the sampling stations (1-5) comprise areas of transitions between woodland and scrub areas to open grassland (Appendix 12).

3.80 A total of 286 species were recorded, the assemblage profile of which are presented in Table 17. The species are mainly associated with grassland and trees and scrub, with a few vagrant hoverflies from

wetlands, plus a single coastal species which is found in a great range of habitats than classified in Pantheon. None of these are scored within Pantheon as being of high quality (termed favourable condition).

Table 17. Pantheon Profile of the Species Recorded by the Field Surveys (not all species are listed).

Biotope	No. of species	Habitat	No. of species	Specific Assemblage Type	No. of species
Open habitats	198	Tall sward & scrub	164	-	-
		Short sward & bare ground	37	Bare sand and chalk	2
				Open short sward	3
				Exposed sea-cliff	-
		Upland	2	-	-
		-	-	Rich flower resource	18
		-	-	Scrub edge	12
		-	-	Scrub-heath & moorland	1
Tree-associated	38	Arboreal	13	-	-
		Shaded woodland floor	19	-	-
		Decaying wood	11	Bark & sapwood decay	5
		Wet woodland	2	-	-
Wetland	18	Acid & sedge peats	11	-	-
		Marshland	7	-	-
		Wet woodland	3	-	-
		Running water	1	-	-
Coastal	1	Saltmarsh	1	Saltmarsh & transitional brackish marsh	1

3.81 The specialist species are listed in Table 18, and these are associated with six microhabitats of resource types, albeit noting that the species of saltmarsh & transitional brackish marsh is more generalist than this classification suggests. Also of note is that the rich flower resource is associated with 18 species of bee and wasp; several species are associated with more than one assemblage. Four broad groups of specialist species are present:

- Species of grassland (bare sand and chalk, and open short sward). These species are a small group of five species that are likely to be associated with conditions of open substate that generates a hot microclimate and also associated species including fine-leaved grasses and various herbs.
- Scrub -associated species are a diverse group that are likely to utilize the physical habitat for hunting and foraging, utilise various shrubs as foodplants, or indeed require the sheltered conditions created by scrub while feeding on the ground or low vegetation.
- Wood decay (bark and sapwood decay). Most of these species are beetles whose larvae either eat the decaying timber or are predators beneath bark; as adults most of these species feed on flowers. Also included are two species of bee that nest in dead wood but forage elsewhere.
- Species of rich flower resource require an abundance of blossom plus a sequence of blossom across the season. Many of these species are relative generalist in terms of the blossom required, although others are specialist. Most of these species otherwise utilize nearby habitats for their life-cycle, such as the carder bees which require tall grassland.

3.82 Species of each group are present across the different sampling stations, which suggests that the ecological condition (microhabitats and resources) are widespread across the site.

Table 18. Specialists (Species with Specific Assemblage Types) and their Occurrences.

Specific Assemblage Type	No. of species	Higher taxon	Sampling stations
Bare sand and chalk	*Longitarsus dorsalis*	Coleoptera: Chrysomelidae	4
	Corizus hyoscyami	Heteroptera: Rhopalidae	4
Open short sward	*Dioctria atricapilla*	Diptera: Asilidae	1, 2 and 5
	Podops inuncta	Heteroptera: Pentatomidae	1
	Coenonympha pamphilus	Lepidoptera: Nymphalidae	1 and 5
Rich flower resource	18 species of bee, including *Bombus sylvarum*		All
Scrub edge	*Heliophanus cupreus*	Araneae: Salticidae	3
	Heliophanus flavipes	Araneae: Salticidae	1
	Dioctria baumhaueri	Diptera: Asilidae	5
	Dioctria rufipes	Diptera: Asilidae	2 and 5
	Rhopalus (Rhopalus) subrufus	Heteropteara: Rhopalidae	2
	Andrena praecox	Hymenoptera: Andrenidae	5
	Ectemnius continuus	Hymenoptera: Crabronidae	5
	Gymnomerus laevipes	Hymenoptera: Vespidae	2
	Pararge aegeria	Lepidoptera: Nymphalidae	3
	Pyronia tithonus	Lepidoptera: Nymphalidae	2
	Meconema thalassinum	Orthoptera: Meconematidae	3
	Leptophyes punctatissima	Orthoptera: Phaneropteridae	5
Scrub-heath & moorland	*Harpalus rufipes*	Coleoptera Carabidae	5
Bark & sapwood decay	*Clytus arietis*	Coleoptera Cerambycidae	4
	Malachius bipustulatus	Coleoptera Malachidae	2, 3 and 5
	Mordellistena neuwaldeggiana	Coleoptera: Mordellidae	2
	Ectemnius continuus	Hymenoptera: Crabronidae	5
	Megachile versicolor	Hymenoptera: Megachilidae	2 and 5
Saltmarsh & transitional brackish marsh	*Anthicus antherinus*	Coleoptera: Anthicidae	4

Species of Conservation Concern

3.83 Four species of conservation concern were recorded (Table 19), two of which are Nationally Scarce species (one of which is also a priority species) and two are priority species based on national declines while nevertheless remaining widespread. These species are associated with different habitats and resources, but with the transitional areas between scrub /trees and grassland being the areas where these species were recorded, rather than the open field habitat.

Table 19. Specialists (Species with Specific Assemblage Types) and their Occurrences.

Order: Family	Scientific Name	Status	Sampling Station	Ecology
Coleoptera: Mordellidae	*Mordellistena neuwaldeggiana*	Nationally Scarce	2	**Decaying wood: bark and sapwood decay (A212)** Larvae saproxylic on moribund and dead branches of deciduous trees. Adults on blossom.
Hymenoptera: Apidae	*Bombus sylvarum*	Nationally Scarce Priority species	1	**Tall sward and scrub Rich flower resources (F002)** A carder bee of tall, but open sward grassland and requiring flower-rich areas of foraging.
Lepidoptera Nymphalidae	*Coenonympha pamphilus*	Priority species	1 and 5	**Short sward and bare ground: Open short sward (F112)** A butterfly whose caterpillars feed on fine-leaved grasses in hot situations.
Lepidoptera: Arctiidae	*Tyria jacobaeae*	Priority species	1, 2 and 5	**Tall sward and scrub** Moth with caterpillars on ragwort, in a range of grassland types.

3.84 The site is considered to provide habitats of **district** importance for invertebrates, with confidence in this assessment **high**.

Otter and Water Vole

3.85 The data search returned four recent records of water vole Arvicola amphibius within 5km of the site, though the closest record was 3.6km away in 2013. The most recent record of otter *Lutra lutra* was from 1979, and this species is considered unlikely to present within the local area given the absence of nearby waterways and lack of recent records.

3.86 No evidence of water voles was recorded on site. The stream on site was generally dry, with a maximum depth of approximately 15cm. It was heavily shaded along most of its length, with only small areas of bankside vegetation suitable for water vole. The stream is therefore considered to provide poor habitat, with the steep-sided reservoir providing more optimal habitat however there is little cover and regular disturbance from the public in this area reducing its suitability. Together with the lack of nearby records, and absence of suitable habitat within the site's wider surroundings, this suggests that both water vole and otter are absent from the site. The site is therefore considered to be of **nil** importance for these species, which are not considered any further in this assessment.

Reptiles

Preliminary Assessment

3.87 The data search returned records of four reptile species within 1km; slow-worm, grass snake, adder, and common lizard.

3.88 The site offered foraging and basking habitat for reptiles in the form of grassland, together with several piles of loose earth, manure, and dead vegetation across the site, which could act as suitable refugia. There was good habitat connectivity between the site and nearby areas of suitable habitat to the east, and the habitats on site were considered highly likely to form part of the range of a local reptile population. Given the suitability of the terrestrial habitats further presence/likely absence surveys were recommended consisting of seven visits.

Presence/ Likely Absence Survey

3.89 The majority of the woodland edge habitats on site was considered suitable to support reptiles. The horse paddocks in the southeast were heavily grazed with a very low sward and therefore provided no cover for reptiles and were considered of negligible value. 375 reptile mats were deployed across the 27.89ha site which is above the recommended density of 10 p/ha of suitable habitat (Froglife, 1999).

3.90 During the surveys, slow worm and common lizard were recorded within the site. The large majority of sightings were within the west of the site in field compartments 1 and 2 with lower numbers in compartment 3. Populations of both species were considered as 'low', according to the Froglife (1999) standard. Results are summarised in table 20 below, with detailed results and locations of reptile sightings provided in Appendix 12.

Table 20. Reptile survey results summary & population assessment (Froglife 1999).

Species	Peak Adult Count	Population Class
Common lizard	2	Low
Slow-worm	5	Low
Grass snake	0	N/A
Adder	0	N/A

Importance

3.91 Given the low numbers of reptiles recorded on site and abundance of suitable habitat for these species offsite to the east it is considered that the site is of **site** level importance for reptiles.

Priority Species

3.92 The EFC data search returned records of three notable mammals and amphibians listed under Section 41 of the NERC Act 2006 within 2km. The results are summarised below in Table 21.

Table 21. Records of other notable species within 2km of the site boundary

Species	Number of records	Last recorded
Common toad *Bufo bufo*	33	2018
European hedgehog *Erinaceus europaeus*	50	2014
Harvest mouse *Micromys minutus*	11	1998

3.93 The grassland, woodland, and hedgerows were considered to provide dispersal/foraging habitat for European hedgehog *Erinaceus europaeus*, and common toad *Bufo bufo*. The reservoir in the north-east of the site was assessed as being of below average suitability for GCN, however it may support common toad, which are known to be more resilient to the presence of fish.

Importance

3.94 Although no evidence of the above mentioned species was found, the site provides suitable habitat within a heavily urbanised area and low numbers of notable species could be present, therefore other priority species are considered to be of **local** importance.

Summary

3.95 A summary of the evaluation of important ecological features is provided in Table 22.

Table 22. Summary of the evaluation of important ecological features.

Feature	Summary Description	Importance
SPA / Ramsar/ SAC	The site lies within the Zone of Influence (ZoI) of Blackwater Estuary SPA and Ramsar site, Benfleet and Southend Marches SPA and Ramsar, and Foulness Estuary SPA and Ramsar, which form part of the Essex Estuaries Special Area of Conservation (SAC).	International
SSSI	Seven SSSI lie within 5km namely Benfleet and Southend Marshes SSSI, Foulness SSSI, Blackwater Estuary SSSI, Thundersley Great Common SSSI, Great Wood and Dodd's Grove SSSI, Garrold's Meadow SSSI, Hockley Woods SSSI	National
LNR / LoWS	Four LNRs and 21 LoWS lie within 5km, the nearest being Little Haven/Tile Wood Complex LoWS located adjacent to the application site on the far side of the main access track.	County
Habitats	Predominantly low value improved grassland with higher value semi-improved grassland paddocks. Lowland mixed deciduous woodland and boundary habitats (hedgerows and mature trees) provide higher value habitats as well as a fishing lake.	Local
Badger	A total of thirteen setts were recorded on site with nine disused setts and four setts that were either partially or well used. An active main sett consisted of 43 distinct entrances, of which, 33 entrances were well used was recorded in the centre of the site.	Local
Bats	Two roosts of low conservation concern identified in Buildings 1 & 5. Low levels of activity dominated by 'common' pipistrelle species. Roosting potential likely to be higher in surroundings given presence of numerous woodland blocks.	Site
Wintering Birds	Thirty species recorded during the surveys with 18 species regularly utilising the site. 12 species with notable conservation status (red or amber listed) recorded.	Local
Breeding Birds	Four red-list breeding species and three amber list breeding species. Breeding assemblage of 38 species.	District
Great Crested Newt	eDNA survey result was negative for the onsite waterbody. The only other pond within 500m was located over 300m from the site across a main road. The eDNA survey of this pond also returned a negative result.	Negligible
Hazel Dormouse	No hazel dormouse identified during targeted surveys and therefore considered likely absent.	Negligible
Invertebrates	Four species of conservation concern of which two are Nationally Scarce including the shrill carder bee, a priority species. Two widespread but declining species with priority status also. Transitional areas of grass-scrub mosaic are the habitat of greatest value.	District
Otter and water vole	Poor connectivity and suitability of habitats on site. Considered absent.	Negligible
Reptiles	Low population of slow-worm and common lizard	Site
Other Notable Species	Habitat suitable for common toad, hedgehog and harvest mouse.	Local

4.0 Impacts, Mitigation and Enhancement Measures

Description of Development

4.1 The site was allocated for residential purposes within the now withdrawn Castle Point Borough Council (CPBC) Local Plan Policy HO13 (CPBC, 2019) and is subject to an outline planning application for The development of up to 455 new homes, a multi-use community hall, land for the provision of a healthcare facility, land for a stand-alone early years and childcare nursery, new vehicular/pedestrian access points from Stadium Way in the north and Daws Heath Road in the south, new greenways and green links, multi-functional open space, green infrastructure, surface water attenuation, landscaping and associated infrastructure. All matters reserved except access.*"*.

4.2 The scope of the masterplan features a spine road with access points to Daws Heath Road to the south and Stadium Way to the north. The development is expected to have a phased approach and will seek to respect and retain the established hedge and tree-lined boundaries as far as possible, as specified within Policy 13 of the Local Plan. The masterplan is provided in Appendix 1. It is anticipated that a small amount of hedgerow and broad-leaved woodland plantation clearance may be required to create the spine road.

ECoW/ Biodiversity Champion

4.3 An ecological clerk of works will oversee the implementation of all ecological mitigation in conjunction with a nominated biodiversity champion (Principal contractor).

CEMP

4.4 A CEMP will be produced to mitigate construction impacts this CEMP will cover the following aspects:

- Air quality (including dust) management measures
- Surface water and groundwater protection measures
- Noise and vibration attenuation
- Topsoil management measures
- Waste management measures
- Invasive species control measures
- Lighting control measures
- Tree and hedgerow protection measures
- Hours of operation
- Construction traffic control
- Communication and engagement

4.5 A CEMP: biodiversity will also be produced for each phase which details but is not limited to the following:

- Risk assessment of potentially damaging construction activities
- Identification of 'biodiversity risk zones'
- Practical measures (both physical measures and sensitive working practises) to avoid or reduce impacts during construction (may be provided as assets of method statements)

- The location and timings for sensitive works to avoid harm to biodiversity features
- The times during construction when specialist ecologists need to be present onsite to oversee works
- Responsible persons and lines of communication
- The role and responsibilities of an ECoW or similarly competent person and BC (nominated via the principal contractor)

Designated Sites

European Designated Sites

4.6 A project level Habitats Regulations Assessment (HRA) (SES, 2022a) has been produced for the site which identifies the Likely Significant Effects resulting from the proposals on the qualifying features of nearby sites internationally important designated under the Conservation of Habitats and Species Regulations (2017as amended) and provides appropriate to mitigation impacts. A summary of information provided within the HRA is given below:

Construction Impacts

4.7 At 3km from the site, the closest designated site of international importance (Benfleet and Southend Marshes SPA and Ramsar) is at such a distance that impacts such as air pollution, disturbance from construction or habitat loss will not occur.

Occupational Impacts

4.8 The site lies within the Zone of Influence (ZoI) of Blackwater Estuary SPA and Ramsar site, Benfleet and Southend Marches SPA and Ramsar, and Foulness Estuary SPA and Ramsar, which form part of the Essex Estuaries Special Area of Conservation (SAC). The aforementioned sites are listed within the Essex Coast RAMS and are designated under the Conservation of Habitats and Species Regulations (Habitats Regulations, 2019) as **internationally** important sites. These sites are also designated as **nationally** important Sites of Special Scientific Interest (SSSI) under the Wildlife and Countryside Act (WCA, 1981). A further four SSSIs were located within a 5km radius of the application site.

4.9 In addition, the site falls within the IRZ (via DEFRA's Magic Map- magic.defra.gov.uk) for Thundersley Great Common SSSI. The IRZ criteria advise likely impacts as a result of residential developments of 100 units or more, and any residential developments of 50 or more houses outside existing settlements/urban areas, as well as well as pipelines, pylons, overhead cables and transport infrastructure. As the development is for up to 455 homes and is likely to require transport and energy infrastructure, the proposal meets the criteria for consultation with Natural England and it is possible that nearby nationally designated sites will suffer from indirect effects through increased recreational pressure and resulting in potential impacts such as soil erosion, damage to vegetation, disturbance to wildlife, water pollution, vandalism, and noise pollution. This could have an **adverse** effect at the **national** level.

Mitigation Measures

4.10 The scheme makes provision for 14.6ha of multi-functional open space will provided for informal recreation. These habitats will provide a range of different experiences including a lake, woodlands, traditional orchard, wet grasslands, scrub grasslands and meadow grasslands which are all interlinked

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

4.11 The orchard and lake area to the south will include two dog waste bins provided within this openspace to ensure the amenity of the area is maintained for all residents to enjoy. A further dog waste bin will be provided at the northern boundary of the site which links to the offsite PRoW network.

4.12 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 N Little Haven/Tile Wood Complex LoWS.

4.13 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, works schedules, details of funding and the body or organisation responsible for implementation.

Links to Adjacent Public Rights of Way (PRoW) & Greenspace

4.14 The site provides ample onsite open space for informal recreation but also has links to the wider offsite PRoW network for resident looking for wider exploration and recreation. These include links north of the site onto Stadium Way but also to the east via a PRoW which runs west to east along the northern boundary. This links into Little Haven/Tile Wood Complex LoWS and the network of way marked PRoW and permissive pathways providing a wide range of walking experiences for residents (including dog walkers).

4.15 Care has been taken to protect Little Haven/Tile Wood Complex LoWS from recreational pressure while still providing a connected landscape for residents to enjoy the great British outdoors. Such physical measures include:

- Locating the access to the northern PRoW away from the Little Haven/Tile Wood Complex LoWS site boundary to prevent unrestricted/ unmanaged access to the site, while still enabling residents who wish to enjoy a longer walk the opportunity to connect with nature to do so

- Strategically locating thorny scrub planting on the sites eastern boundary with Little Haven/Tile Wood Complex LoWS to deter unrestricted/ unmanaged access

- Strategically locating areas of wetland grasslands to the north east boundary of the site adjacent to the PRoW to deter unrestricted/unmanaged access to Little Haven/Tile Wood Complex LoWS

4.16 The Essex Coast RAMS indicates a financial contribution of £137.71 per net new dwelling (as of April 1st 2022). 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

Residual Effects

4.17 Construction impacts will be **nil**.

4.18 It is considered that operational phase impacts and residual effects upon national designated sites will be **nil**.

UK Statutory Designated Sites

4.19 There are four Local Nature Reserves (LNR) designated under Section 21 of the National Parks and Access to the Countryside Act (1949) within 5km of the site. The closest of these Belfairs LNR, lies approximately 1.3km to the south-east.

Construction Impacts

4.20 The UK statutory sites surrounding the application site are considered to be at such a distance that direct impacts such as pollution, disturbance from construction or habitat loss will not occur.

Occupation Impacts

4.21 Given the distances between these UK Statutory sites and the application site it is considered unlikely that people within the proposed development would walk to the designated sites. They are however considered within a reasonable driving distance and therefore the proposals could result in increased recreational pressure. This could have an **adverse** effect at the **county** level.

Mitigation Measures

4.22 Any potential impacts from increased recreational pressure on these sites is considered to be mitigated for through the provision of areas of open space as discussed within sections 4.7- 4.12 and the pHRA (SES, 2022a).

Residual Effects

4.23 Construction impacts will be nil**.**

4.24 It is considered that operational phase impacts and residual effects upon UK statutory designated sites will be **nil.**

Non-statutory Designated Sites

4.25 There are 21 non-statutory designated sites within 2km, all of which are designated as Local Wildlife Sites (LoWS).

Construction Impacts

4.26 There are no direct impacts predicted upon the 21 non statutory designated sites there is a risk of indirect adverse impacts such as pollution events.

Occupation Impacts

4.27 Given the scale of the proposed development and close proximity to a number of non-statutory designated sites, it is considered likely that increased recreational disturbance could occur once the development is occupied. Furthermore, it is likely that some of the new residents will own domestic cats, which predate many native species. Indirect impacts such as pollution events. Taken together these factors could have an **adverse** effect at **county** level.

Mitigation Measures

4.28 A CEMP will be prepared which will detail pollution prevention controls during the construction stage of the site. Indirect impacts such as recreational pressure will be mitigated via the measures detailed in sections 4.6 – 4.16 and the pHRA (SES, 2022a). The surface water drainage strategy has been designed (Stantec FRA & Drainage Statement Doc Ref 47268/4003) to ensure there is no offsite impacts as a result of the development. This is achieved by limiting and controlling discharge rates to the existing greenfield situation, achieved by the inclusion of SuDS at the site. The design has been delivered through consultation with both the Lead Local Flood Authority (LLFA) which for this site is Essex County Council and Anglian Water.

4.29 It is considered that, nil significant impacts at a **county** level are predicted on all non-statutory designated sites.

Residual Effects

4.30 With the implementation of the above measures, construction and operational impacts and residual effects will be reduced to **nil**.

Habitats

Construction Impacts

4.31 The habitats on site were dominated by improved grassland of limited ecological value. However, the paddocks comprising field compartments 4-7 supported semi-improved grassland. The sites native hedgerows and lowland mixed deciduous woodlands qualified as Habitats of Principle Importance under the NERC Act 2006 while other habitats of value included broad leaved woodland, mature broadleaved trees and the fishing lake at the eastern extent of the site.

4.32 Both the lines of trees (L1 and L2) and hedgerow H7, in the north-western corner of the site, were considered to be of value. While hedgerow H7 was species poor and therefore it wasn't considered 'Important' under the wildlife criteria of the Hedgerow Regulations Act 1997.

4.33 The development proposals suggest that while much of the lower value habitats, including the majority of the improved grassland along with areas of dense scrub will be lost to the proposed development, the majority of the woodland and hedgerow habitat, including those areas of significant biodiversity value mentioned above will be retained.

4.34 However, the paddocks in the south-eastern corner of the site fall within the development footprint and it is envisaged that the semi-improved grassland within field compartments 4-7 will be cleared to

facilitate the development. Furthermore, the indicative masterplan suggests an access road will created passing through H5 with a further access road and footpath that will require removal of sections of hedgerow H7. In addition, a number of individual trees will be removed, mostly notably, at the access point onto Stadium Way on the northern boundary of the site.

4.35 In addition to the direct loss of habitats, the construction phase of the development has the potential to impact the retained habitats on site through incidental pollution events as well as damage to retained trees, hedgerows and their roots and indirect impacts through increased lighting levels are also possible.

4.36 These impacts combined are considered potentially **adverse** at up to **local** level.

Occupation Impacts

4.37 Despite the retention of habitats, the impacts associated with the proposed development, including increased recreational pressure on retained habitats and indirect impacts through increased lighting levels, are considered potentially **adverse** at up to **local** level.

Mitigation Measures

4.38 The development proposal has sought to avoid and minimise impacts by retaining and buffering the most valuable habitat on site. All of the retained hedgerows, woodland and trees will be buffered by areas of open space. The woodland W5 adjacent the western boundary has a significant buffer from the developed areas through the provision of open space to the south and retention of the fishing lake to the north.

4.39 To address potential direct impacts during construction, such as risk of pollution events and damage to retained trees/hedgerows, a Construction Ecological Management Plan (CEMP) will be prepared prior to commencement. This will include protection for retained habitats including hedgerows, trees and grassland using heras fencing and in accordance with British Standard (BS) 5837; Trees in Relation to Design, Demolition and Construction.

4.40 The retained trees, hedgerows, woodland and the on-site fishing lake will be protected from potential indirect impacts of increased nocturnal lighting via the implementation of a wildlife-friendly lighting scheme throughout the development, which maintains 'dark zones' and avoids direct lighting of ecologically sensitive features such as tree canopies.

Enhancements

4.41 Significant measures to benefit biodiversity have been included within the design of the proposed scheme. Such measures will have a particular emphasis on the creation of a mosaic of interconnected multi-functional, semi natural green open spaces that benefit both people and wildlife. This green infrastructure will mitigate recreational impacts on nearby designated sites, create additional opportunities for protected and notable flora and fauna, including the key features identified on site namely badgers, bats, birds, invertebrates and reptiles and deliver a demonstratable Biodiversity Net Gain of 10.48% on site (SES, 2023b). Strategic enhancement of the habitats within the application site will ultimately improve connectivity to the wider landscape and across the site in a way that will benefit wildlife as a whole.

4.42 The overall enhancement strategy for the site will focus on the creation or restoration of the following habitats to create an ecologically permeable built landscape.

Woodland

4.43 The existing parcels of woodland will be retained across the site and subject to a woodland management plan to bring these woodlands back into active management (currently lapsed). This plan should be secured by planning condition but will include a regime of management to allow a multi-dimensional 3 storey woodland structure to develop.

4.44 Species rich scrub will be created providing ecological connectivity west to east, mimicking those species within lowland mixed deciduous woodland (suggested topline management can be found within Appendix 13 but details will be contained within the LEMP) which should be secured via planning condition. As previous mentioned the areas of woodland will be linked together by new hedgerows, newly planted areas of scrub, scrub grassland that create 'green corridors' across the site facilitating the movement of faunal species. The woodland edge along the eastern boundary adjacent to the LoWS will be grading into secondary woodland before transitioning into species-rich wet grassland. Specially created 'loggeries' within the woodland areas will provide specific habitat for stag beetles *Lucanus cervus.*

Rough Grassland & Scrub

4.45 Rough grassland seeded using an EM10 tussock grassland mix (or similar) along with native scrub planting in areas of open space will provide opportunities for birds such as barn owl, mammals including hedgehog, invertebrates, reptiles and amphibians including great crested newts. The mosaic of mixed species scrub will transition to bramble and rose, then tall herbaceous species before finally giving way to rough grassland. The aim will be to produce a habitat of varied age and structure that is capable of attracting a variety of species. Suggested management can be found within Appendix 13 but detail will be contained within the recommended LEMP.

Species-rich Neutral Grassland

4.46 Dedicated areas of open space along the eastern boundary of the site will be given over to the creation of species-rich MG5 neutral grassland. The grasslands will be seeded from a local source (where possible or similar species composition if not). Once established the grassland will provide opportunities for birds such as barn owl, foraging bats, reptiles and pollinators such as the carder bumble bee *Bombus pascuorum*. Suggested management can be found within Appendix 13 but details will be contained within the LEMP which should be secured via planning condition.

Standing Water

4.47 The retained fishing lake within the eastern portion of the site will be enhanced and managed for the benefit of wildlife. The margins for the lake will be enhanced through the planting of flowering riparian species such as yellow flag iris *Iris pseudacorus*, purple loosestrife *Lythrum salicaria* and meadowsweet *Filipendula ulmaria* providing valuable resources for invertebrates. The margins of the lake will be managed to maximise the extent of the reedbed habitat benefitting birds including reed warbler and waterfowl.

Wet grassland

4.48 Areas of wet grassland will be created in both the north-western corner and within areas used as SuDS which will hold water for a maximum of 48 hours in periods of wet weather (storm events water will be held longer in these basins). These areas will be seeded with an EM8 Wetland Meadow Mix with naturally drier areas oversown with an EM2 wildflower meadow mix (or similar mixes). The newly created habitats will benefit invertebrates, birds and reptile species including grass snake. Suggested management can be found within Appendix 13 but details will be contained within the LEMP which should be secured via planning condition.

Hedgerows

4.49 Wherever possible the existing hedgerows across the site will be retained and enhanced through regular hedge laying and infilling using a palette of native species. New species-rich hedgerows will also be created using native species. The newly planted hedgerows will create green corridors that facilitate movement across the site as well as improving connectivity to the wider landscape and creating additional habitat and resources for farmland bird species. Suggested management can be found within Appendix 13 but details will be contained within the LEMP which should be secured via planning condition.

Traditional Orchard

4.50 Traditional orchard habitat will connect the centrally located woodland to the parkland and woodland on the southern boundary. The orchard will be planted with species of local provenance to Essex and will create an attractive destination for recreation as well as a valuable biodiverse habitat. The orchard will be set within a newly seeded wildflower grassland. Given the anticipated footfall the selected wildflower mix will be a more robust blend containing trefoils and red and white clover. Mown pathways will guide visitors through the orchard whilst the remainder of the grassland will be cut on a bi-annual regime in high summer and late autumn.

4.51 In order for the orchard to flourish a variety of trees of varying age will be required. Fruit trees are generally, although not necessarily, short-lived trees compared to other hardwood species. This means that they begin to produce veteran tree features such as hollow trunks, rot holes, split bark, tears, lightning strikes and sap runs relatively quickly. Because of the wide tree spacing in orchards compared to woodland, the dead and decaying wood is usually in open, sunny locations. These conditions create good habitat for insects and other invertebrate species which depend on decaying wood habitats. Suggested management can be found within Appendix 13 but details will be contained within the LEMP which should be secured via planning condition.

Residual Effects

4.52 During construction it is considered that habitat loss associated with site clearance will represent an **adverse** effect at the **Local** level. Other potential construction impacts may be reduced to **negligible** through the measures advised.

4.53 Post-development, compensatory habitat and higher-value new habitats will be provided, addressing the habitat loss during construction. Through this and the implementation of the above additional measures, the residual effect on habitats is predicted to be **beneficial** to a **Local** level**.**

Protected Species

Badgers

Construction Impacts

4.54 Badgers are legally protected under the Protection of Badgers Act (1992) and as such, are of material consideration when applying the principals of the NPPF (MHDLG, 2021).

4.55 A total of thirteen badger setts have been identified on site following both the initial baseline assessment and a series of targeted badger surveys. Four of the thirteen setts were identified as active and included a main sett with over 40 entrances (Sett 8), two outlier setts one with 4 entrances (Sett 7) and one with two entrances (Sett 13) and a subsidiary sett with five entrances (Sett 10). Badgers are protected under the Protection of Badgers Act 1992, making it an offence to intentionally of recklessly damage or destroy a badger sett, obstruct access to it, or to disturb a badger when it is occupying a badger sett.

4.56 Damage or destruction of a sett, or killing, injury or disturbance to a badger occupying a sett are considered likely impacts during the construction phase representing an **adverse** effect at the **Local** level. Consequently, mitigation is proposed to ensure setts are adequately protected during construction.

4.57 Badgers are vulnerable to groundworks, noise disturbance, additional lighting, and vibration. Therefore, a 30m buffer zone should be established around all active badger setts where possible. The development will require the closure of several of the badger setts on site including the main sett (Sett 8) located within the centre of the application site (badger setts will be retained where they do not impact the facilitation of the proposed development).

4.58 In the case of the main sett (sett 8) located within the centre of the site, a replacement artificial sett will be provided. The artificial sett will be located on the southern boundary of the site adjacent to W1 with new thorny scrub planting undertaken to shield the sett. This location is considered suitable due to its proximity to the existing main sett and connectivity to the wider landscape. Before the existing main sett can be closed under licence evidence that badgers are successfully occupying the artificial sett must be provided to Natural England. The location and exact specification of the artificial badger sett will be agreed with Natural England under licence prior to works commencing.

Occupation Impacts

4.59 The proposed development will result in a reduction in suitable foraging habitat across the site in the form of rough grassland.

4.60 The proposed scheme will also require the clearance of portions of hedgerow, a number of individual trees and other boundary vegetation to facilitate new access roads. Occupation effects represent an adverse effect at the Local level.

Mitigation Measures

4.61 Badgers are vulnerable to groundworks, noise disturbance, additional lighting, and vibration. Therefore, a 30m buffer zone should be established around all active badger setts where possible. The development will require the closure of several of the badger setts on site including the main sett (Sett 8) located within the centre of the site (badger setts will be retained where they do not impact the facilitation of the proposed development). Therefore, a further period of 21 days monitoring, will be required to determine the current levels of activity within each of the setts. Should the closure of an active sett be required, it will be necessary to obtain a licence from Natural England. A licence can only to obtained from Natural England once planning permission (in most cases) has been granted and all badger related planning conditions met. If the setts requiring closure are found to be inactive following the advised 21 days of monitoring, then these setts may be closed or destroyed without the need for licencing.

4.62 In the case of the main sett (sett 8) located within the centre of the site, a replacement artificial sett will be provided. The artificial sett will be located on the southern boundary of the site adjacent to W1 with new thorny scrub planting undertaken to shield the sett. This location is considered suitable due to its proximity to the existing main sett and connectivity to the wider landscape. Before the existing main sett can be closed under licence evidence that badgers are successfully occupying the artificial sett must be provided to Natural England. The location and exact specification of the artificial badger sett will be agreed with Natural England under licence prior to works commencing on the existing main sett.

4.63 Precautionary measures will be put in place throughout construction, to ensure that in the event of a badger or other small mammals coming on to the site, the risk of injuring and killing is minimised. This will entail:

- Covering any trenches/pipes at night or leaving a plank of wood leant against the side to ensure they can escape if they were to accidentally fall in, and;
- Storing chemicals in a sealed compound (following COSHH guidance),
- Toolbox talks to contractors to ensure ability to identify and flag up any possible badger setts during construction;
- Night work should be avoided where possible, and any flood lighting should face away from the site boundaries;
- If any fresh sett digging is observed an ecologist must be notified immediately and a 30m buffer created around the area until an assessment can be made; and
- Regular clearance of litter from the site.

4.64 The proposed development will also result in increased human activity on site in the form of construction traffic, road traffic, and increased recreational disturbance. The landscape plan will include dense scrub thickets connecting to existing areas of suitable habitat to ensure the continued provision of sheltered foraging habitat. Traffic control measures such as a reduced speed limit (20mph) and will be included within the scheme in order to reduce the risk presented by increased traffic on the new road network, particularly where the roads cross existing field boundaries. In addition, badger underpasses will be installed under roads connecting W2 with W3 and W2 with W5 to facilitate movement corridors north and south and east to west.

4.65 Boundary habitats are to be largely retained. Habitats to be created and enhanced include woodland, orchards, hedgerow, scrub and grassland habitats through additional planting and a long-term management plan. Together, these measures are considered mitigate for the loss of existing habitats.

4.66 Due to the propensity of badgers to open up old setts / dig new ones, a pre-construction badger survey is recommended prior to works commencing.

Residual Effects

4.67 With the implementation of the above measures and the provision of improved foraging resources within retained and created habitats, it is predicted that the residual effects upon badger will be **negligible** at the **Local** level.

Bats

Construction Impacts

4.68 The site is assessed as being of **Site** importance for roosting bats, with two buildings (B1 and B5) found to support roosts of low conservation significance and a number of trees across the site with low to moderate suitability for roosting bats. Without mitigation, demolition of B1 and B5 could disturb, kill or injure bats, which are offences under the Conservation of Habitats and Species Regulations 2019 (amended), and would lead to the permanent loss of two pipistrelle day roosts. This is considered an **adverse** effect at the **Site** level.

4.69 All but two trees (both of which have 'low' suitability for roosting bats) are to be retained therefore the risk of direct impacts with regard to tree-roosting bats (i.e. disturbance, killing / injury, loss of roosts) is considered minimal. Nevertheless, two trees with 'low' suitability will be lost and therefore mitigation measures are recommended to minimise any potential impacts on roosting bats from tree felling / pruning works.

4.70 The site is assessed as being of **Site** importance for foraging and commuting bats. The majority of bat foraging/commuting activity was recorded around the waterbodies and mature hedgerows around the site. There is potential for the bat assemblage currently utilising the site for foraging and commuting to be adversely affected through increases in artificial lighting and habitat loss during the construction phase. Impacts could disrupt dark corridors present along the site boundary habitats, potentially having an adverse effect at the site level by driving abandonment of foraging and commuting pathways, as well as roosts (if present).

Occupation Impacts

4.71 During the occupation phase, there is potential for indirect effects through increased light levels which could result in the abandonment of foraging and commuting pathways, as well as roosts (if present) which would constitute an **adverse** effect at the **Site** level. Disturbance to roosting bats (both directly and indirectly) is an offence under the Conservation of Habitats and Species Regulations 2017 (amended).

Mitigation Measures – Roosting Bats

4.72 A Natural England issued mitigation licence will be required to develop the site. Until the licence is received, the below must strictly be followed:

- No demolition or alteration works should take place to B1 and B5.
- No existing trees or hedgerows in the vicinity of these buildings should be removed. Advice should be sought from the project ecologist if there is a need to fell any trees or hedgerows on site. Low lying vegetation below 2m may be removed.
- No new artificial light shall be directed upon any of the boundary vegetation, existing hedgerows, mature trees, or B1 and B5.

4.73 Natural England will further determine the exact mitigation design during the licensing process. Notwithstanding, the following is guidance on the mitigation considered to be required.

4.74 As it is not considered feasible to retain the existing roosts in-situ post-development, compensatory roosts will need to be provided. This will comprise four bat boxes installed on trees to be retained within the development. These could comprise, for example, 2F Schwegler General Purpose Bat Boxes (Figure 1), Schwegler 1FD (Figure 2), and / or Schwegler 1FF (Figure 3) or similar.

Figure 1. Schwegler 2F general purpose bat box

Figure 2. Schwegler 1FD bat box

Figure 3. Schwegler 1FF bat box

4.75 Bat boxes will be put in place on trees to be retained before the commencement of construction and demolition of existing roosts. The boxes will be left in situ in perpetuity thereafter to provide compensatory roost locations for bats.

4.76 Boxes will be located with appropriate connectivity to the wider landscape and where possible, close to where the original roosts were located. They will be situated at a minimum height of 3m above ground level.

4.77 In terms of the demolition of B1 and B5, this work can only begin once the Natural England licence is received and must avoid the bat hibernation season (when they are most vulnerable). Therefore, B1 and B2 can be demolished between in spring (approx. 1 March – 30 April) and autumn (approx. 15 September - 30 November).

4.78 Internal features (e.g. mortice and tenon joints in the frame of the buildings) will be inspected by the ecologist using torches, endoscopes, ladders and elevated working platforms, as appropriate. If any roosting bats are located, features will be fitted with exclusion devices where possible, to allow the bats to leave of their own accord overnight while preventing re-entry the following dawn.

4.79 The roof covering on B1 and B5 will be subject to a soft strip. The contractor will have a site meeting with the named ecologist ahead of works, where the ecologist will brief the roofers on safe methods of working with bats. The soft strip will be undertaken under the supervision of the named ecologist or accredited agent, avoiding periods of cold weather, high winds or heavy rain. Roof coverings will be lifted by hand, from the top down, to reduce risk of crush injury when lifted, and the use of tools to knock out mortar minimised wherever possible. The ecologist will be provided with safe access to the roof so that s/he can observe the roofers at work to ensure compliance and can get access if a bat is found.

4.80 Should a bat be found during works, if it is safe to do so, it will be taken by hand (by the named ecologist / accredited agent) and put into a ventilated holding box or bat holding bag. If the bat cannot safely be extracted, a 5m works exclusion zone will be put in place to allow the bat to leave overnight and the roost then sealed where possible as previously described. Any collected bats will be put into the pre-erected bat boxes on retained trees, with access points stopped off until the end of the working day or for at least 30 minutes to allow the bat to settle and reduce the risk of them leaving and day-flying (when they would be at risk from predation).

4.81 If bats are injured during works, the BCT helpline will be called (0345 1300 228) to organise care by a bat volunteer. The licensee commits to paying for reasonable expenses incurred by the carer and if necessary, veterinary bills.

Mitigation Measures – Foraging and Commuting Bats

4.82 The scheme will largely retain / enhance the most valuable habitats for foraging and commuting bats, including the waterbodies and woodland blocks throughout the site. The majority of the trees and hedgerows will also be retained, however the indicative masterplan suggests an access road will be created passing through H5 and the H6, with a further access road and footpath that will require removal of sections of hedgerow H7. Furthermore, a number of individual trees will be removed on the northern boundary to facilitate road access to Stadium Way.

4.83 Loss of these habitats and existing grassland habitats will be mitigated through compensatory planting, as detailed in the Habitats section above. Given that the majority of habitats where higher levels of activity were recorded will be retained / enhanced, this mitigation is considered to be sufficient to address the potential for any negative impacts on local bat populations.

4.84 The indirect impact of artificial lighting requires mitigation to ensure the local bat population are protected from disturbance. A sensitive lighting scheme has been designed to avoid light spill onto hedgerows, trees, scrub and woodland edge habitats which may be utilised for commuting/foraging/roosting bats.

4.85 Site lighting around key features likely to be used by roosting, foraging or commuting bats will be avoided during both the construction and occupation phases. If lighting is necessary, then there are a number of ways to minimise the effect of lighting on bats (and other nocturnal species such as badgers and owls). The following mitigation strategies have been taken 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:

- In general, light sources should not emit ultra-violet light to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging. Metal halide and fluorescent sources will not be used.
- LED luminaires should be used where possible. A warm white spectrum (ideally <2700Kelvin) will reduce blue light component. Luminaires should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- The height of lighting columns should be limited to 8m and the spacing of lighting columns should be increased to reduce spill of light into unwanted areas such as hedgerows and trees (Fure, 2006). Only luminaires with an upward light ratio of 0% and with good optical control should be used. Luminaires will always be mounted on the horizontal, *i.e.* no upward tilt.
- Other ways to reduce light spill include the use of directional luminaires, shields, baffles and/or louvres. Flat, cut-off lanterns are best. Additionally, lights will be located away from reflective surfaces where the reflection of light should spill onto potential foraging/commuting corridors. Internal luminaires can be recessed where installed in proximity to windows to reduce glare and light spill. Where windows and glass facades etc. cannot be avoided, low transmission glazing treatments may be a suitable option in achieving reduced illuminance targets.
- Lighting that is required for security or access should 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). A control management system can be used to dim (typically to 25% or less) or turn off groups of lights when not in use.

4.86 A bat mitigation plan is provided in Appendix 15j which details mitigation measures for roosting bats and provides a method statement for the recommended 'soft fell' approach to the removal of trees with 'low' suitability for roosting bats. This includes a sectional cut of the tree to avoid features suitable for bats with sections lowered to the ground using ropes and left for a minimum of 24 hours before removal.

Enhancements

4.87 An additional 16 boxes will be provided throughout the site on retained trees as shown in Appendix 15j. These boxes have been placed in optimal habitat that will be retained / protected / enhanced and with good connectivity through the site / to offsite habitats.

4.88 As outlined in this document, significant measures to benefit biodiversity have been included within the design of the proposed scheme. Such measures will have a particular emphasis on the creation of a mosaic of interconnected multi-functional, semi natural green open spaces that benefit both people and wildlife. This green infrastructure will create additional opportunities for bats, including the following:

- Linking of existing woodland / hedgerows with new species rich scrub/ hedgerows to create 'green corridors'
- Provision of wet grassland, rough grassland and native scrub planting in areas of open space
- Creation of a species-rich grassland along the southern boundary
- Retention and enhancement of the fishing lake
- Creation of a traditional orchard to connect the centrally located woodland to the parkland and woodland on the southern boundary

Residual Effects

4.89 Through the implementation of the above measures, construction impacts are predicted to be **nil.** Furthermore, provided the above measures are successfully implemented and provision is made for the improvement of foraging resources within retained and created habitats, it is predicted that the residual effects upon bat populations will be **beneficial** at the **site** level.

Wintering Birds

Construction Impacts

4.90 Perhaps not unexpectedly, the majority of species, were associated with the hedgerows, treelines, small woodland blocks and scrub located across the site. These areas form a network of connected habitats providing feeding, roosting and shelter as well as corridors for dispersal. The construction phase will lead to the partial loss of these roosting, sheltering and foraging habitats, including grassland, scrub, scattered trees and sections of hedgerow. This habitat loss is considered have an **adverse** effect at the **Local** level, given the limited assemblage of mainly common species currently utilising the site.

Occupation Impacts

4.91 It is possible that over wintering birds will be affected post-development through increased recreational disturbance (*e.g.* disturbance from dogs and other domestic animals). This is predicted to have an **adverse** effect at the **Local** level.

Mitigation Measures

4.92 The quantity of roosting, sheltering and foraging habitat lost will be minimised through the retention of the hedgerow, trees, areas of scrub and woodland where feasible. The retained hedgerow and trees will be protected from damage (e.g. through root compaction) during development through the erection of suitable fencing such as HERAS fencing.

4.93 The loss of existing scrub, tree and hedgerow habitats will be mitigated for through compensatory planting, to offset any such habitat losses. The planting scheme will include a range of native species that will provide new foraging resources for berry-eating bird species as well as attracting invertebrates for those species reliant on insects. Maintenance of the newly created hedgerows would be timed to take place in late winter ensuring that berries are retained as a winter food resource. In combination with retaining a proportion of the existing hedgerows and the creation of SuDs habitats and gardens associated with the properties, this measure should allow the long-term retention of most of the wintering bird species associated with hedgerows and scrub on the site. This would likely include species of nature conservation importance such as bullfinch, dunnock, willow tit, song thrush and starling.

4.94 Use of the site by redwings, fieldfares and kestrels was limited, although there is potential to enhance the availability of foraging habitats for these species. Kestrels hunt primarily for small mammals in areas of rough grassland which will be incorporated within areas of public open space, while redwings and fieldfares could benefit from the inclusion of berry-bearing shrubs and trees, like hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa,* within the planting scheme for the proposed development.

4.95 While the development proposals will likely lead to the unavoidable loss of at least a portion of the semi-improved grassland habitats on site, the surveys presented here demonstrate that these habitats are of importance for a narrow range of species, with the foraging resources in the associated hedgerows, scrub and woodland area being of greater importance. Providing that adequate provision for foraging birds is included in the proposals, the loss of the grassland fields under the development footprint will likely result in a significant adverse impact for only a few species. Overall, with appropriate nature conservation measures incorporated into the design and management of the proposed areas of public open space, there is potential for the site to enhance the winter foraging opportunities available to local bird populations.

Residual Effects

4.96 With the implementation of the above mitigation, the effect on over wintering birds is predicted to be **nil** during the construction phase and **positive** at the **Local** level during the occupation phase.

Breeding Birds

Construction Impacts

4.97 Impacts during construction consist of potential nest destruction and disturbance, which constitutes an offence under *The Wildlife and Countryside Act 1981* (as amended). In addition, construction will lead to loss nesting and foraging habitats, including open grassland, scattered trees, hedgerows and areas of woodland. These are considered **adverse** effects at the **district** level.

Occupation Impacts

4.98 It is possible that breeding birds will be affected post-development through increased recreational disturbance (*e.g.* disturbance from dogs and other domestic animals). This is predicted to have an **adverse** effect at the **District** level.

Mitigation Measures

4.99 Whilst the majority of the semi-improved grassland fields will be cleared to facilitate the development, the quantity of nesting and foraging habitat lost will be minimised through the retention of the hedgerow, trees, areas of scrub and woodland where feasible. Most notably the areas of woodland located around the site, and in particular the woodland running north to south in centre of the site (Appendix 5) are to be retained. The retained hedgerows and trees will be protected from damage (e.g. through root compaction) during development through the erection of suitable fencing such as HERAS fencing.

4.100 Where existing scrub, tree and hedgerow habitats will be lost, this will be mitigated for through compensatory planting, to include a range of native species that will provide new foraging resources for berry-eating bird species as well as attract invertebrates for those species reliant on insects. New tree and hedgerow planting will be in excess of losses to deliver a net gain in nesting habitat for the development. Additional habitats including SuDS, gardens and amenity grassland will also provide foraging opportunities for bird species.

4.101 To comply with current legislation and avoid nest destruction, vegetation clearance works affecting nesting habitat (including hedgerows, trees, scrub, tall grasses/ruderals and woodland) will be scheduled so that these do not occur during the bird breeding season (i.e. outside the period March-August inclusive). If this is not possible, a check will be carried out by a suitably qualified ecologist no more than 48 hours in advance of clearance works. If an active birds' nest is found within the proposed clearance zone, suitable avoidance measures will be installed, such as creating a buffer zone with barrier tape around the nest to ensure that the nest is not damaged or destroyed by the works. The nest will then be monitored until all chicks have fledged and a suitably experienced ecologist confirms the nest is now inactive and works can safely proceed.

4.102 Recreational impacts post-development will be mitigated for through measures outlined in the habitats section, i.e. retention and new planting of hedgerows and creation of dark corridors around sensitive habitats. In addition, retained and created habitats will be specifically managed to benefit wildlife (including nesting birds). Specific details will be provided in the strategic LEMP and will include measures such as a biennial and rotational approach to hedge maintenance to maximise berry production.

Enhancements

4.103 In order to enhance the site for birds, a nest box scheme will be incorporated into the development through the installation of the following boxes (or similar boxes):

- 10 small hole (6 x 26mm, 6 x 28mm and 6 x 32mm) boxes placed throughout the site on suitable trees and buildings will provide nesting opportunities for small passerines such as blue tit and great tit.
- 10 x small open fronted nest boxes should be placed on trees with ivy to provides cover/shelter from predators. These boxes typically attract robin *Erithacus rubecula*, blackbird *Turdus merula* and wren.
- 1 x stock dove *Columba oenas* box positioned 3m high with a clear line of site
- 4 x sparrow terrace on buildings under the eaves facing areas of open space
- 10 x house martin *Delichon urbicum* nest and:

- 20 x swift *Apus apus* brick will be placed on or built into suitable buildings throughout the development.

Residual Effects

4.104 With the implementation of the above mitigation, the effect on breeding birds is predicted to be **nil** during the construction phase and **positive** at the **district** level during the occupation phase.

Invertebrates

Construction Impacts

4.105 Impacts on invertebrate are likely to be proportional to the extent of habitat loss, in particular the grass-scrub transition areas, and are likely to result in killing and/or injury to the invertebrate assemblage present on site. Impacts are also likely to be greater where habitat losses occur towards the eastern extent of the site, with the potential loss of supporting habitat for the Little Haven/Tile Wood Complex LoWS. Given the relatively fragmented distribution of existing habitats around the site periphery, additional impacts through fragmentation are likely to be relatively low. This is predicted to have an **adverse** effect at the **district** level.

Occupation Impacts

4.106 During the occupation phase, there is potential for indirect effects through increased light levels which could result in the abandonment of habitat and negatively impact night-flying insects at the population level (Bruce-White and Shardlow, 2011). This is predicted to have an **adverse** effect at the **District** level.

Mitigation Measures

4.107 The key mitigation provision is an increase in the area of transitional grass-scrub habitats with a range of features including open sward conditions and resources such as flower-rich sward and scrub, with the locations chosen to support the off-site Little Haven/Tile Wood Complex LoWS.

4.108 These areas of transition grassland-scrub habitat should incorporate the following specific features:

- Open grassland. Open swards and bare substrates are important for many species and two species of conservation concern were associated with this habitat on-site. Such habitat areas would be of particular value on south-facing slopes and where it is possible to include mounds or other features to vary topography and increase local habitat diversity. These areas should be subject to periodic disturbance to maintain open conditions, which may be provided incidentally by pedestrians, bikes or children play areas.
- Planting of new flower rich areas. Throughout, invertebrates will benefit from areas able to offer an abundance of blossom across the season, with shrubs important in spring and then herbs providing a continuity to late summer. A continuity of blossom is thought particularly important for the shrill carder bee (Essex Field Club, 2017), with species such as vetches and red clover *Trifolium pratense* important for the queens in spring and the workers then foraging on species such bird's foot trefoils *Lotus* species, black horehound *Ballota nigra*, and lucerne *Medicago sativa.*

4.109 Artificial lighting will be kept to a minimum and designed to avoid lighting areas of semi-natural vegetation, with lighting columns of appropriate height, directional lighting and the use of baffles. Where possible wavelengths should include a minimal UV component, as previously discussed in the bat mitigation section above.

Enhancements

4.110 As discussed within the habitats section above (sections 4.39 – 4.49), significant measures to benefit biodiversity have been included within the design of the proposed scheme. Given the well-designed landscaping proposals set out in the indicative masterplan the invertebrate assemblage on site would experience an increase in available habitat and resources as well as improved connectivity at the local and landscape scale.

Residual Effects

4.111 With the implementation of the above measures, it is considered that the residual effects on invertebrates will be **beneficial** at the **District** level.

Reptiles

Construction Impacts

4.112 The results of the reptile survey indicate that the site supports both a low population of common lizard (peak count 2) and a low population of slow worm (peak count 5). The reptiles were identified within. The majority of this habitat will be lost to facilitate the proposed development. Connectivity will be maintained around the site boundaries through the creation of additional reptile habitat and within areas of retained grassland, species rich scrub and hedgerow along the northern and eastern boundaries (Appendix 14). Despite this, clearance of the sites grassland habitat could result in killing and / or injury to individuals, an offence under the *Wildlife and Countryside Act 1981*. These factors are predicted to have an adverse effect at the site level. This is predicted to have an **adverse** effect at the **Site** level.

Occupation Impacts

4.113 During the occupation phase there is a risk of disturbance during management of retained and created habitats, as well as increased predation of reptiles e.g. due to increases in the number of local pet cats, which may reduce their viability and thus constitutes an **adverse** effect at the **Site** level.

Mitigation Measures

4.114 To mitigate for the risk of killing and/or injury to reptiles during construction, a reptile mitigation strategy will be created detailing appropriate measures. Such measures will include habitat manipulation to limit the requirement for exclusion fencing and expediate the translocation process, trapping and translocation of reptiles from areas of suitable habitat to a receptor site within the areas of the site with suitable mature habitat such as scrub and tussocky grassland to provide foraging habitat and facilitate movement across the site.

Trapping & Translocation

4.115 To capture and translocate reptiles to the receptor site, a high density of reptile refugia will be placed throughout the donor site (development area). The area identified as the receptor site will also be ringed with reptile fencing to prevent animals moving back into the construction zone. The refugia will be checked daily until reptiles are considered to have been cleared from the site. Capture effort will total a minimum of 30 capture days or following 5 consecutive 'clear' trapping visits or at the judgement of the site ecologist.

4.116 Trapping effort will be restricted to periods of appropriate weather when reptiles are active, typically from mid-March to mid-September, although this is entirely dependent upon temperature. Trapping will be undertaken during suitable weather conditions, i.e. when temperatures are above 9^{o}C, and avoiding periods of rain or high winds. Reptiles located through refugia checks and observations of suitable habitat will be captured by ecologists experienced in reptile handling and translocation. Reptiles will be promptly transferred after minimal handling to a container containing loose vegetation to provide cover and minimise stress for captured animals during transport. Reptiles will be then transported to the receptor site for release.

Habitat Manipulation

4.117 To enable efficient capture effort, habitat manipulation techniques will be employed. This will involve the staged removal of habitats which will improve capture efficiency. These techniques will be applied approximately halfway through the capture effort. Prior to the start of works, all vegetation clearance contractors will receive a reptile awareness toolbox talk (from an experienced reptile worker) and a briefing on any other potential ecological constraints present on site. This briefing will include details of legal protection of reptiles, the precautionary methods of working to be implemented, identification of reptiles and procedures to be followed if reptiles are found within the work areas. The vegetation clearance activities will be overseen by the ECoW and will involve the directional strimming of all areas of suitable grassland and scrub habitat in two stages to allow any reptiles present to move out of the working/construction area naturally.

Destructive Search

4.118 To reduce the residual risk of harm to any reptiles remaining within the impacted suitable habitats post capture effort, a targeted destructive search supervised by an ECoW will be undertaken. Prior to the start of works, all vegetation clearance contractors will receive a reptile awareness toolbox talk (from an experienced reptile worker) and a briefing on any other potential ecological constraints present on site. The destructive search will involve potential reptile habitat being slowly scraped by an excavator using a toothed bucket while an ecologist supervises and safely removes any reptiles 'scraped-up' in the bucket or disturbed on the ground (Gent & Gibson, 2003). Discrete features such as log piles and rubble piles will be dismantled slowly, with sensitive features removed by hand by the ECoW where this is practicable. These animals will then be promptly relocated to the receptor site.

Enhancements

4.119 New hedgerow planting, the creation of a series of attenuation basins and low-intensity management of grassland and the addition of hedgerow and woodland grass/ scrub buffers will provide new suitable

habitat within the site for these species. The retained hedgerows together with new hedgerow planting will provide connectivity to the wider environment, fostering recolonisation of the site post development. The provision of log-pile hibernacula buffered by long-grass areas will also serve to reduce likelihood of predation post-occupation.

4.120 It is considered that the extent and quality of suitable reptile habitat on site will be increased post-development. The above mitigation should be detailed within a reptile mitigation strategy which can be secured by an appropriately worded planning condition.

Residual Effects

4.121 Provided the mitigation measures above are implemented successfully the impact upon reptiles is predicted to be **Beneficial** during the construction phase and beneficial to a **Site** level during the occupation phase.

Other Notable Species

Construction Impacts

4.122 Harvest mouse, common toad, and hedgehog are listed as Species of Principal Importance under the NERC Act 2006. Should these species be using habitats on site, impacts during the construction phase may include death / injury, habitat loss and fragmentation resulting in an **adverse** effect at the **Site** level.

Occupation Impacts

4.123 Impacts during the occupation phase are applicable to hedgehog, common toad and harvest mice, which may utilise the areas of retained grassland and colonise new grassland habitats created within the proposed open space to the north and east. Increased disturbance and predation by domestic animals, as well as increases in recreational disturbance, is possible during the occupation phase which is likely to have an **adverse** effect at the **Site** level. Although gardens will provide suitable foraging habitat for hedgehog, if access is restricted hedgehogs (and other small mammals) are likely to become isolated through fragmentation.

Mitigation Measures

4.124 The risk of construction impacts to hedgehog, harvest mouse, and common toad will be minimised through the retention and protection of areas of woodland, hedgerows and associated margins across the site. Habitats will be protected from potential construction impacts such as pollution events through methods to be detailed in the CEMP.

4.125 Where clearance of suitable habitat is necessary, precautionary measures will be followed in line with measures proposed for reptiles. During the destructive search, any harvest mouse nests and hedgehogs will be looked for and a two-stage cut of tall grasses made allowing time for any disturbed animals to move away from the area.

4.126 Recreational impacts during occupation will be mitigated through measures outlined in the habitats section, *i.e.* retention and enhancement of hedgerows and other retained habitats; creation of dark

corridors around sensitive habitats. In addition, retained and created habitats will be specifically managed to benefit wildlife.

Enhancements

4.127 The green space and garden habitats will provide preferred habitats for foraging hedgehog. Given the findings of recent studies (Johnson, 2015) highlighting the decline of hedgehogs throughout the UK in recent years, the provision of access points into residential gardens is an important measure providing access to foraging resources. To facilitate the movement of hedgehogs through the site, it is recommended that one 13cm x 13cm hole should be provided within all new lengths of garden (and where feasible boundary) fencing to permit movement of hedgehogs through back gardens. This size gap is too small for most pets and can be undertaken 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.

Residual Effects

4.128 With the implementation of the above measures, it is considered that construction and residual effects on other notable species will be **beneficial** to a **Site** level.

5.0 Summary and Conclusions

5.1 The proposed residential development at Land East of Rayleigh Road, Thundersley Essex has been assessed for its biodiversity value, as well as its potential to support ecological features. Further ecological surveys and assessments (badgers, bats, wintering and breeding birds, great crested newt, hazel dormouse, invertebrates and reptiles) have been undertaken and the results are discussed within this report.

5.2 Habitats of biodiversity value are considered to be hedgerows, semi-improved grassland, lowland mixed deciduous woodlands, mature trees and a lake. Ecological features of interest include a number of statutory and non-statutory designated sites within the zone of influence of the development; roosting bats identified within two buildings on site; foraging and commuting bats; trees with potential to support roosting bats; an assemblage of breeding birds; four active badgers setts including a main sett, a subsidiary sett and two outlier setts, the presence of four invertebrate species of conservation concern and a low population of two reptile species. Through application of the mitigation hierarchy, a coherent ecological network of habitats will be enhanced and created which is predicted to result in a 10.48% Biodiversity Net Gain using DEFRA metric 3.1.

5.3 Table 23 provides a summary of the impacts, mitigation and enhancement measures for each ecological feature and the residual effects.

5.4 Through implementing the recommended mitigation, compensation and enhancement measures, it is considered that all significant negative impacts from the proposed development upon protected and notable habitats and species would be mitigated and net gains in biodiversity achieved in line with relevant wildlife legislation and national planning policy (MFHLG, 2021), and now withdrawn local planning policy related to biodiversity.

Table 23. Summary of impacts, mitigation and residual effects.

Feature	Construction Impacts	Mitigation	Occupation Phase Impacts	Mitigation and Enhancement Measures	Residual effect
SPAs, SACs and Ramsar sites	None	None	Increased recreational pressure on internationally important protected sites within ZoI of the Essex Coast RAMS.	Contribution per net new dwelling (£137.71) to Essex RAMs; Inclusion of SANGS quality open space within the site which connects to recreational opportunities offsite. Provision of information to new residents through leaflets and information boards (including the provision of waymarked walking routes informal and formal), dog bins, a variety of walking routes including a circular 2.7KM route onsite which connects to a variety of circular walks offsite	Nil (C & O)
SSSI / LNR	None	None	Increased recreational pressure	Inclusion of SANGS quality open space within the site which connects to recreational opportunities offsite. Provision of information to new residents through leaflets and information boards (including the provision of waymarked walking routes informal and formal), dog bins, a variety of walking routes including a circular 2.7KM route onsite which connects to a variety of circular walks offsite	Nil (C & O)
LoWS	Pollution	CEMP to detail pollution control measures	Increased recreational pressure	Inclusion of SANGS quality open space within the site which connects to recreational opportunities offsite. Provision of information to new residents through leaflets and information boards (including the provision of waymarked walking routes informal and formal), dog bins, a variety of walking routes including a circular 2.7KM route onsite which connects to a variety of circular walks offsite. Sensitive siting of protective habitats such as wetland features and thorny dense scrub to prevent unrestricted access into the adjacent Little Haven/Tile Wood Complex LoWS. Connecting footpath to offsite PRoW moved away from eastern boundary.	Nil (C & O)

Feature	Construction Impacts	Mitigation	Occupation Phase Impacts	Mitigation and Enhancement Measures	Residual effect
Habitats	Loss of semi-improved grassland, section of plantation woodland and areas of dense scrub, removal of sections of hedgerow H5 and H7, removal of individual trees to facilitate access. Damage to retained hedgerows, woodland and trees Pollution events	Protection of retained hedgerows, trees and woodland Extensive new tree and hedgerow planting. Species-rich grassland, wet grassland, rough grassland/scrub, traditional orchard and SUDS creation. LEMP detailing how retained and created habitats will be sensitively managed for benefit of wildlife. Sensitive lighting strategy Production of a CEMP to include pollution prevention measures	Recreational/lighting disturbance	Creation of coherent ecological network of habitats providing ecological connectivity across the landscape. Achieved through the retention and enhancement of existing high value habitats and providing complementary habitats to create habitat mosaics. Including broad -leaved woodland/ scrub, wildflower meadow grassland, species rich scrub grassland, spices rich wet/ marshy grassland, species rich hedgerows and a traditional orchard. Woodland Management Plan Sensitive lighting strategy Provision of waymarked walking routes (informal and formal) Provision of signage	Nil (C) Beneficial (O)
Badgers	Killing/injury of badgers occupying a sett/disturbance/ destruction of setts Accidental death and injury of foraging/commuting animals. Loss of foraging / commuting habitat.	Sett monitoring and potential closure under licence of active setts within the development footprint. A replacement artificial sett will be provided to compensate for the loss of the main sett. This artificial sett is to be located close to the southern boundary. Pre-commencement badger survey. Standard precautionary measures; covering trenches overnight or installing a plank/mammal ladder, sensible storage of chemicals/equipment, avoidance of littering. Creation of habitats suitable for badgers (new hedgerows, fruiting trees)	Increased recreational pressure, impacts include increased footfall and the presence of domestic animals.	Provision of significant areas of open space Dense scrub thickets will be planted above the artificial sett connecting to existing areas of suitable habitat to ensure the continued provision of sheltered foraging habitat. Traffic control measures such as a reduced speed limit to reduce the risk presented by increased traffic on the new road network. Provision of badger underpasses	Nil (C & O)

Feature	Construction Impacts	Mitigation	Occupation Phase Impacts	Mitigation and Enhancement Measures	Residual effect
Bats	Killing / injury of individual bats, disturbance / destruction of roosts Loss of foraging / commuting habitat. Construction lighting impacts Tree roost disturbance (if present)	A Natural England issued mitigation licence will be required to demolish Buildings 1 & 5 Sensitive lighting scheme Retention and buffering of hedgerows Retention and protection of trees with suitability for roosting bats Soft fell/prune low suitability trees	Indirect impacts to roosting, foraging and commuting bats	Buffering of hedgerows Ecological connectivity through increased commuting routes via new hedgerows and woodland planting. Increased foraging opportunities through enhancement creation of high-quality habitats such as woodland edge, species rich grasslands, hedgerows, lake and an orchard Sensitive lighting scheme Provision of bat boxes within the development	Nil (C) Beneficial (O)
Wintering Birds	Loss of roosting, sheltering and foraging habitat.	Staged removal of foraging habitats	Increased recreational disturbance and increased predation, by domestic animals.	Planting of berry-bearing shrubs and trees. Creation of rough grassland habitat to provide foraging / hunting opportunities.	Nil (C) Beneficial (O)
Breeding birds	Construction impacts on nests of breeding birds including destruction and disturbance.	Appropriate pre-clearance checks if clearance required within breeding season (March to August inclusive) Retention and protection of hedgerows and trees.	Increased recreational disturbance and increased predation, by domestic animals.	Retention and creation of habitats suitable for nesting foraging birds such as a lake (incl. reedbeds), traditional orchard, broadleaved woodland, species rich hedgerows, species rich grasslands Provision of bird boxes within the development Sensitive lighting scheme	Nil (C) Beneficial (O)
Invertebrates	Loss of habitat resulting in killing and / or injury of common assemblage	Retention and protection of hedgerows and trees Sensitive lighting strategy	Indirect effects through increased light levels	Sensitive lighting scheme Retention and enhancement of creation of high-quality habitats such as a lake, traditional orchard, broadleaved woodland, species rich hedgerows, species rich grasslands	Nil (C) Beneficial (O)

Feature	Construction Impacts	Mitigation	Occupation Phase Impacts	Mitigation and Enhancement Measures	Residual effect
Reptiles	Death / injury during clearance Loss of suitable habitat.	Reptile Mitigation Strategy including methods for habitat manipulation as well as trapping and translocation to the designated receptor site.	Increased recreational disturbance and predation	Provision of suitable sheltering habitats such as reptile hibernacula and scrub grassland. Provision of interconnected reptile habitats	Nil (C) Beneficial (O)
Other notable species	Death injury during vegetation clearance of hedgehog, common toad, and harvest mouse.	Retention and protection of woodland and hedgerows Sensitive vegetation clearance	Potential increased mortality from domestic pets Isolation from new gardens	Creation of areas of open space and 'hedgehog highways' to allow access to gardens. Provision and enhancement of high-quality habitats such as a lake, traditional orchard, broadleaved woodland, species rich hedgerows and species rich grasslands Provision of hibernacula	Nil (C) Beneficial (O)

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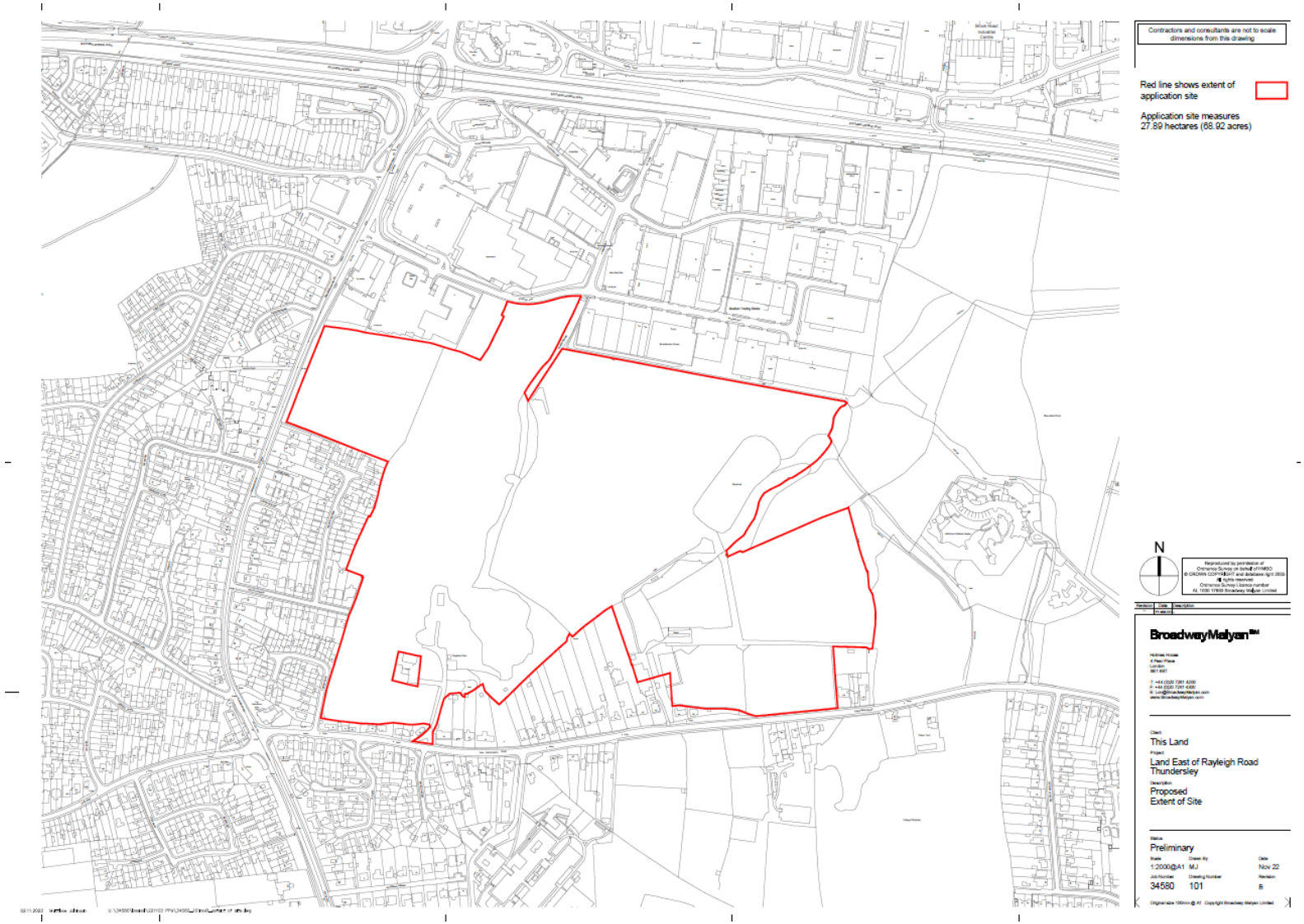
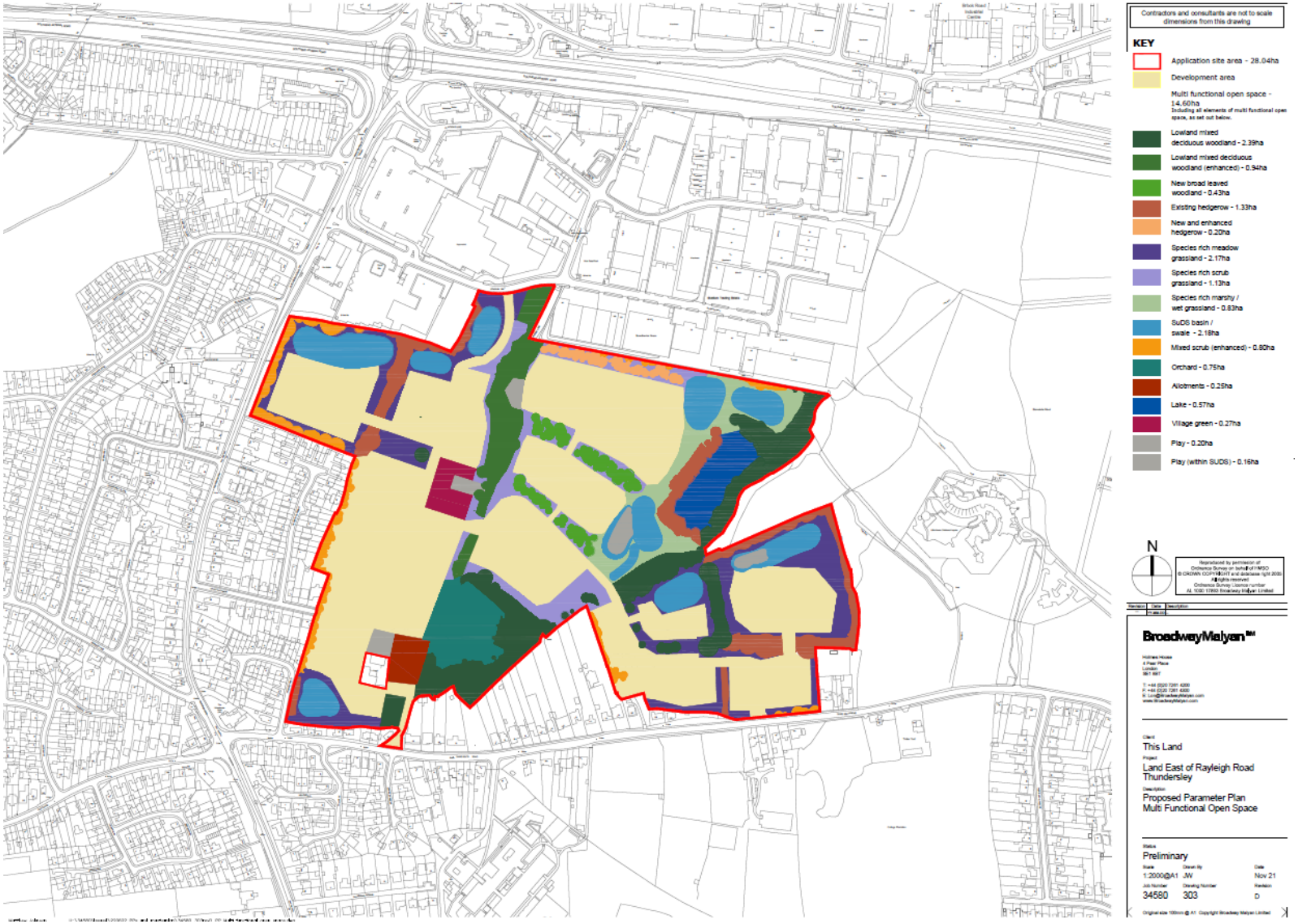
Appendix 1: Site Location & Development Proposal Plans

Site Location Plan



Parameter Plan (update once agreed)



Appendix 2: Legislation & Policy Context

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) outlines what the planning system should do to contribute to and enhance the natural and local environment through the following policy statements:

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 protect and enhance our natural, built and historic environment; including making effective use of land, improving 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 104

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 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 145

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

The policies related to nature conservation within the Castle Point Borough Council (CPBC) Adopted Local Plan (CPBC, 2007) and the CPBC Local Plan (2018) which has now been withdrawn related to biodiversity relevant to this assessment, and other selected policies which either concern the site specifically, or relevant designations.

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 EC4 – Pollution

Development which would have a significant adverse effect on health, the natural environment, or general amenity by reason of releases of pollutants to water, land or air, or by reason of noise, dust, vibration, light or heat, will be refused.

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 EC8 – The Green Lung

The area between haven road and thorny bay caravan site, Canvey Island, is designated as a "green lung", which the council will seek to protect from development that would adversely affect its open character, wildlife, or amenity 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 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.

Policy EC15 – Control of permitted development in sensitive areas

The council will seek a direction under Article 4 of the Town and County Planning General Permitted Development Order, 1995, where it is considered that any area of ancient woodland, Site of Special Scientific Interest or site of importance for nature conservation would be damaged by the exercise of those permitted development rights identified by the council in Appendix 6.

Policy EC21 – Woodland management and Tree Preservation Orders

The council will encourage the maintenance of existing woodlands through appropriate management. This objective will be pursued through liaison and management agreements with landowners. Tree Preservation Orders will be made to protect trees and woodland where appropriate.

Policy EC22 – Retention of trees, woodland and hedgerows

In schemes for new development, existing trees, hedgerows and woods shall be retained wherever possible. Where development takes place, loss of existing tree cover and hedgerows shall be kept to a minimum. All

trees and shurbs to be retained after development shall be suitable protected throughout the duration of construction.

Policy EC23 – Tree and shrub planting

In order to improve the physical environment, encouragement will be given to the planting of native trees and shrubs in appropriate cases.

Policy EC24 – Coastal protection

There shall be the most stringent restrictions on development on the rural and undeveloped coastline outside built-up areas and any development which is exceptionally permitted shall not adversely affect the open or rural character or wildlife of the area.

Policy LP HO 13 – Land east of Rayleigh Road, Hadleigh

1. Land East of Rayleigh Road, Hadleigh as identified on the Policies Map, is allocated for residential purposes, to deliver around 455 new homes by 2033.
2. It is expected that a masterplan approach to this site will be taken to ensure that the development is attractively designed, contributing to environmental quality, and that infrastructure is provided to support growth in this location. The masterplan must deliver the following:
    a. Access arrangements for the site, which also address peak time congestion at nearby junctions;
    b. An urban design framework using a mix of urban design approaches built around the Arcadia approach in areas located within the Historic Natural Landscape and in the vicinity of important landscape features, and the Boulevard and Major Entry Point approaches to the spine road through the site, to create an attractive green, parkland environment, integrated into the existing landscape and topography;
    c. Respects and retains as a far as possible the hedge and tree-lined boundaries established;
    d. An approach to wildlife that is consistent with policy LP NE 8 and results in a net gain in biodiversity;
    e. The provision of greenways through the site, linking to the existing network of green infrastructure;
    f. An increase in public open space provision across the site consistent with the requirement of policy LP HS 3, delivering additional accessible natural green space and children's play equipment;
    g. Surface water management on and adjacent to the site ensuring no increase in the risk of surface water flooding to the site or nearby properties; and
    h. The provision of a multi-use community building on site.
3. Detailed design proposals for the site must have regard to the Council's Residential Design Guidance.
4. Access arrangements for the site, before the first 250 homes are occupied.
5. Public transport waiting facilities and services must be improved on Rayleigh Road and Daws Heath Road.

Policy LP HS 7 – Open Spaces

1. The locations of existing open spaces are identified on the Policies Map, and a schedule of these open spaces is included at Appendix 4.
2. Existing open spaces, identified on the Policies Map, will be retained and opportunities to improve them will be pursued having regard to policy LP HS 3.
3. Regard should be given to Policy LP HS 11 when determining proposals for development on open space.

Policy SP GB 8 – Positive uses in the Green Belt

1. The Council will consider proposals favourably which seek to positively enhance the beneficial use of the Green Belt, by providing opportunities for:
    a. improved access; 194 Pre Publication Local Plan November 2018 Protecting Green Belt land;
    b. outdoor sport and recreation;
    c. landscape enhancements;
    d. improvements to visual amenity;
    e. improvements to biodiversity;
    f. sustainable flood risk management; or
    g. improvements to damaged and derelict land.
2. Such proposals must clearly demonstrate that the following criteria have been fulfilled:
    a. The Green Belt will continue to fulfil its purposes;
    b. There will be no material impact on the character, appearance or openness of the Green Belt;
    c. The design, siting and materials of any buildings are sympathetic to the surrounding built form and landscape;
    d. The proposal is an exemplar of high quality design and materials;
    e. The design and siting of any buildings ensures sufficient space around the building, between neighbouring buildings and between boundaries;
    f. It will not result in an unacceptable generation of traffic, noise, or other forms of disturbance; and g. The proposal is compliant with all other relevant policies in the plan.
3. The Council will consider favourably the provision of other appropriate forms of development in the Green Belt, subject to the fulfilment of the criteria set out above.

Policy LP NE 1 – Green Infrastructure and the undeveloped Coast

1. The Greater Thames Marshes Nature Improvement Area extends across the southern part of Castle Point, as identified on the Policies Map. Within this area, the Council will work with partners to deliver projects which contribute towards the aims and objectives of the Nature Improvement Area Partnership.
2. Elsewhere in Castle Point, the Council will work with partners to deliver projects which extend the network of Green Infrastructure and create new habitats, providing links for wildlife and people to the Nature Improvement Area. It will encourage the management and enhancement of existing habitats and the creation of new ones to assist with species migration and to provide ways to adapt and mitigate from climate change, such as shading during higher temperatures.
3. Through its partnership working, and when considering applications for development, the Council will be seeking to secure Green Infrastructure that offers multiple benefits to the environment and to the communities in Castle Point. In particular, the Council will be seeking to secure:
    a. The preservation and enhancement of ecological and heritage assets, and areas of nature conservation, landscape and heritage value; Pre Publication Local Plan November 2018 219 Conserving and enhancing the natural environment;

b. A net increase in biodiversity across the borough's area with a focus on priority habitats and priority species;
c. Management of and a reduction in pollution to air, water and soil;
d. Opportunities for local food production;
e. Management of flood waters consistent with policy LP CC 6;
f. Recreational benefits for local people, including access to coast, consistent with policy LP HS 3; and
g. Opportunities for people to use active travel modes to access education, employment and services, consistent with policies SP TP 1 and LP TP 3.

4. In securing Green Infrastructure provision, the Council will work with partners and the community, including specific user groups, in order to minimise conflict between human activities, including recreation, and sensitive ecological and heritage assets, and also between different types of human activity. The Council will seek to ensure that everyone can enjoy the borough's Green Infrastructure in a sustainable way.

Policy LP NE 2 – The Daws Heath Historic Natural Landscape

1. The extent of the Daws Heath Historic Natural Landscape is identified on the Policies Map. Pre Publication Local Plan November 2018 223 Conserving and enhancing the natural environment.
2. Within this landscape area, proposals which seek to enhance the quality of the landscape and its historic or ecological assets, or seek to provide greater public enjoyment of the landscape and its features will be supported.
3. Proposals for development that may impact on the visual quality of the landscape, or the quality of historic or ecological assets in this landscape area will be permitted where it can be demonstrated that:
    a. Harm to ecological assets will be avoided in accordance with policy LP NE 8;
    b. A precautionary approach to the identification and protection of archaeological assets has been taken in accordance with policies LP HE 4 and LP HE 5;
    c. Harm to the visual quality of the landscape will be minimised due to the scale, location and/or design of development;
    d. Any residual harm to the quality of the landscape will be mitigated through the provision of landscaping, which should comprise native species and must be sufficiently mature to integrate effectively into the environment and provide effective mitigation within 2 years of the development occurring. Where possible landscaping should provide wildlife corridors and greenways ; and
    e. All other relevant policies within this plan are complied with.

Policy LP NE 6 – Local Wildlife Sites

1. The extents of the Local Wildlife Sites and potential Local Wildlife Sites in Castle Point are identified on the Policies Map.
2. The Council seeks the conservation and enhancement of Local Wildlife Sites and will support proposals which ensure the active conservation and enhancement of biodiversity interest at these sites.
3. The Council will encourage proposals for the active conservation management and biodiversity enhancement of potential Local Wildlife Sites in order to meet the selection criteria for designation as a Local Wildlife Site at a future date.
4. Development proposals which would result in harm to either a Local Wildlife Site or a potential Local Wildlife Site will not normally be permitted unless the need for the development outweighs the harm

to biodiversity. In such circumstances proposals must fulfil the requirements of parts 3 and 4 of policy LP NE 8.

Policy LP NE 8 – Determining Applications affecting Ecologically Sensitive and Designated Sites

1. Proposals which can demonstrate a resultant net gain in biodiversity will in principle be supported, subject to compliance with other relevant policies in this plan.
2. Proposals resulting in any adverse impacts to European and internationally designated sites biodiversity including Ramsar sites, Special Protection Areas, potential Special Protection Areas, Marine Conservation Zones, Sites of Special Scientific Interest, Ancient Woodland, Local Nature Reserves and Special Roadside Verges will not be permitted except in exceptional circumstances when there are imperative reasons of overriding public interest. In such circumstances, adverse impacts should be controlled through avoidance, on-site management and on-site mitigation. Where this cannot be achieved development proposals will be refused.
3. Proposals which may result in adverse impacts to other sites with biodiversity interest, including those sites with protected species, priority species and/or priority habitats, will only be supported if they can meet the following requirements:

    a. Firstly, the developer must demonstrate that impacts to biodiversity cannot be avoided through the location of development on an alternative site with less harmful impacts;
    b. Where an alternative site is not available, the development proposal should seek to avoid adverse impact to biodiversity by virtue of the design and layout of the development. The Council must be satisfied that all reasonable opportunities to avoid impact to biodiversity have been taken;
    c. Where it has not been possible to avoid all impacts to biodiversity, as required by a) and b), the development proposal should seek to apply management and mitigation techniques which retain and enhance biodiversity on site. The Council must be satisfied that all reasonable opportunities to secure on-site management and mitigation have been taken;
    d. Where it is likely that impacts to a protected species, or BAP species is not fully addressed through a), b) and c), species relocation within the site, or to a site nearby will be required to address the remaining impacts to that species. The Council must be satisfied that the relocation site will provide a long-term suitable habitat for the species in question. A management plan must be put in place to manage the relocation site as a suitable habitat for a period of at least 20 years; then
    e. As a last resort, if the impacts to biodiversity in terms of both quantity and quality have not been fully addressed through a), b), c) and d) off-site compensation which would result in a net gain in biodiversity will be required. A compensation site must be identified which has the potential to be broadly equivalent to that habitat being lost, and a management plan prepared. Arrangements must be put in place to deliver that plan over a period of at least 20 years.

Policy LP NE 9 – Protecting and Enhancing the Landscape and Landscape Features

1. All development proposals must contribute positively towards creating a visually attractive green environment.
2. Development proposals must seek to protect and integrate key natural and semi-natural features including:
    a. Established field boundaries, hedgerows and tree lines;
    b. Established trees with a high visual amenity value;

    c. Established areas of woodland; and
    d. Topographical features including ridge lines, watercourses, ditch systems and bunds.
3. Development proposals must be designed to have regard to the character of the landscape, and seek to avoid harm to the landscape as a result of adverse impacts on:
    a. The degree of openness;
    b. The degree of tranquillity;
    c. The scale and nature of existing development; and
    d. The amount and density of existing vegetative screening.
4. The Council will also have regard to the specific requirements of the relevant policy LP NE 2 to LP NE 4 when the development proposal is located within a designated Historic Natural Landscape.

England Priority Species and Priority Habitats

The UK Post-2010 Biodiversity Framework, published in July 2012, has now succeeded the UK Biodiversity Action Plan. Much of the work previously carried out under the UK BAP is now focussed at a country level. England Priority Species and Priority Habitats are those that have been identified as being the most threatened and requiring conservation action under the England Biodiversity Strategy.

Badgers

Badgers have historically been given legal protection since 1973 however the Protection of Badgers Act 1992 consolidated and strengthened previous legislation. It is a criminal offence to:

- Wilfully kill, injure, or take any Badger.
- Possess or cruelly ill-treat a badger.
- Possess any dead badger or part of one.
- Possess or control a living, healthy Badger.
- Intentionally or recklessly damage, destroy or obstruct access to a sett, or disturb a Badger whilst it is occupying a sett.

The maximum fine per offence is £5000; the Countryside and Rights of Way Act 2000 (CRoW) amendment contains a provision for a custodial sentence of up to 6 months instead of, or in addition to, a fine. Along with a lengthy development delay until an appropriate mitigation programme has been agreed and completed.

Local authority planning departments should also meet the requirements of the National Planning Policy Framework (NPPF) 2018; which requires planners not only to protect biodiversity, but where possible to enhance it. Planning authorities are required to take into account of protected species so an ecological survey is normally required.

Bats

All UK bat species are protected under European and UK law (Conservation of Species and Habitats Regulations (CHSR) 2017; Wildlife and Countryside Act (WCA) 1981). Some are also Natural Environment and Rural Communities (NERC) Act 2006 /UK Biodiversity Action Plan (UK BAP) priority species and local BAP species. Protected and NERC/UK BAP/local BAP species are a material consideration under the NPPF (MHCLG, 2019).

Hazel Dormouse

Hazel dormice are protected under UK and European law primarily by the WCA (1981) as amended and regulation 41 of the CHSR (2017). Taken together it is illegal to:

- Deliberately kill, injure or capture any wild animal of European protected species;
- Deliberately disturb wild animals of any European protected species 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 a European protected species;
- Damage or destroy breeding sites or resting places of such animals;
- Deliberately take or destroy the pups of such an animal;
- Possess or transport any part of a European protected species, unless acquired legally; and
- Sell, barter or exchange any part of a European protected species.

Birds

All UK wild birds are afforded statutory protection under the WCA (1981) (below). In addition to this statutory protection British birds are also classified according to their conservation status, including their position on the Red and Amber lists of *Birds of Conservation Concern in the UK 3* (Eaton *et al*, 2009) and whether they have been identified as Priority Species under the England Biodiversity Strategy. All British birds are also covered by the EU Birds Directive.

EU Birds Directive

Under the EU Birds Directive all bird species naturally occurring on the European territory of the EU are protected. This means they must not be deliberately killed, caught or disturbed, and their mating, breeding, feeding and roosting habitats must not be destroyed. The taking and destruction of eggs is prohibited as well as keeping of wild-caught birds

A major provision of the Directive includes the identification and classification of Special Protection Areas (SPA's) for rare or vulnerable species which are listed in Annex I of the Directive. The Directive also regulates the hunting of certain species of birds listed in Annex II, while Annex III regulates the sale, transport, keeping and offering for sale of certain live or dead game birds. In the UK, the provisions of the 'Birds Directive' are implemented through the WCA (1981)

Wildlife and Countryside Act 1981.

Wild birds in the UK are protected under the WCA (1981). Under this legislation all birds, their nests and eggs are protected by law and it is an offence, with certain exceptions, to intentionally kill, injure, or take any wild bird or their eggs or nests (exceptions to this are listed in Schedule 2). In addition, a select group of species are further listed under Schedule 1 of the Act and these have additional protection that makes it an offence to disturb these birds at the nest, or to disturb their dependent young.

Birds of Conservation Concern:

Red list species are those that are Globally Threatened according to IUCN criteria, those with populations or ranges that have declined rapidly in recent years and those that have declined historically and not shown a substantial recent recovery.

Amber list species are those with an unfavourable conservation status in Europe, those whose population or range has declined moderately in recent years; those whose population has declined historically but made a substantial recent recovery; rare breeders; and those with internationally important or localised populations.

Green list species are all regularly occurring species that do not qualify under any of the Red or Amber criteria. The Green list also includes those species listed as recovering from Historical Decline in the last review that have continued to recover and do not qualify under any of the other criteria.

The Natural Environment and Rural Communities (NERC) Act 2006; Section 41

The Natural Environment and Rural Communities (NERC) Act came into force on 1 October 2006. Section 41 (S41) of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England.

England Priority Species on the list (see below) are those species found in England which have been identified as requiring action under the England Biodiversity Strategy. The list is used to guide decision-makers such as public bodies, including local and regional authorities, to have regard to the conservation of biodiversity in England.

GCN

GCN are protected under S9 of the WCA (1981) and regulation 41 of CHSR (2017). Taken together offences relevant to this project are likely to be:

- Deliberately kill, injure or capture any wild animal of European protected species;
- Deliberately disturb wild animals of any European protected species 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.
- Intentionally or recklessly disturb an animal while occupying a place used for shelter or protection;
- Damage or destroys breed sites or resting places of such animals;
- Deliberately takes or destroys the eggs of such an animal;
- Possess or transport any part of a European protected species, unless acquired legally.

Other Amphibians

Amphibians (common frog, common toad, smooth newt, palmate newt) are protected under Section 9(5) of the WCA (1981) against:

- Selling, offering or exposing for sale, or having in possession or transporting for the purpose of sale, any live or dead wild animal or any part of, or anything derived from, such an animal;
- Publishing or causing to be published any advertisement likely to be understood as conveying buying or selling, or intending to buy or sell, any of those things.

Invertebrates

Many invertebrates are listed as UK BAP priority species and as Species of Principal Importance (NERC S.41). Although such species do not receive protection under criminal law their presence is a material planning consideration, consequently (following Natural England, 2010):

- Regional Planning Bodies and Local Planning Authorities will use the Section 41 list to identify the species and habitats that should be afforded priority when applying the requirements of the NPPF (MHCLG, 2019) to promote the "*protection and recovery of priority species populations".*
- Local Planning Authorities will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under NPPF the aim of planning decisions should be to avoid minimise impacts to biodiversity.

Of wider relevance to biodiversity assessment is the presence of other rare and scarce invertebrates, of which potentially there are several thousand in the United Kingdom. These species comprise the majority of invertebrate diversity and conservation value, and their significance is poorly defined within legislation and planning policy.

Reptiles

Habitats found on/off site are suitable for common lizards, slow-worms, grass snakes and adders which are protected under the WCA (1981). These species are listed on schedule 5 and offences are outlined under S9 (1) and S9 (5) and are follows:

- Intentionally, or recklessly, kill or injure any of the above species, and/or;
- Sell, or attempt to sell, any part of the species, alive or dead.

The maximum fine per offence is £5000 and if more than one animal is involved, the fine is £5000 per animal (WCA 1981, S21). The CRoW amendment contains a provision for a custodial sentence of up to six months instead of, or in addition to, a fine, along with a lengthy development delay until appropriate mitigation has been agreed and completed.

The NERC (2006) also lists the above reptiles as a species of 'principle importance' under S41 and s40 requires every public body in the exercising of its functions (in relation S41 species) '*have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*'

Small and medium-sized mammals

Species highlighted for further consideration within this report are European hedgehog, harvest mice, brown hare and polecat which are all listed as UK Biodiversity Action Plan (UK BAP) priority species, Essex priority

(local BAP) species, and as species of principal importance (section 41) of the NERC Act 2006. Although such species do not receive protection under criminal law their presence is a material planning consideration. Consequently:

- Regional Planning Bodies and Local Planning Authorities will use the Section 41 list to identify the species and habitats that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF) (MHCLG, 2019) to promote the *"protection and recovery of priority species populations".*

Local Planning Authorities will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under NPPF the aim of planning decisions should be to minimise impacts to biodiversity

Hedgerows

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.

Appendix 3: Detailed Survey Methods

Hedgerows

All hedgerows within and surrounding the site were assessed under The Hedgerow Regulations (1997).

The Hedgerow Regulations 1997

The hedgerows were assessed under the ecological criteria given in the Hedgerow Regulations (HM Government, 1997). This was to determine whether any of the hedgerows are considered 'important' under the ecological criteria.

To qualify as important under the Hedgerow Regulations 1997, the hedgerow must comply with the following list of criteria:

- The hedgerow must have a continuous length of or exceeding 20m;
- Has a continuous length of less than 20m, but meets another hedgerow (by intersection or junction) at each end, and;
- The hedgerow must be over 30 years old.

Apart from the above, to be deemed important a hedgerow must meet one or more of the following criteria:

- The hedgerow marks the boundary of a historic parish or township existing before 1850;
- The hedgerow contains or is within an archaeological feature which is on the Sites and Monuments Record, or a pre-1600 manor or estate;
- The hedgerow is a part of or associated with a field system predating the Enclosure Acts;
- The hedgerow contains species in part I of Schedule 1; Schedule 5; or Schedule 8 of the Wildlife & Countryside Act 1981; or various other defined species including certain Red Data Book species;
- The hedgerow is adjacent to a public right of way (not counting an adopted highway) and includes at least four woody species as defined in Schedule 3 of the regulations plus at least two Associated Features;
- The hedgerow includes one or more of the following within a 30 m sample area:
    - At least seven woody species
    - At least six woody species plus at least three Associated Features (see below)
    - At least six woody species including a *Populus nigra* (Black-poplar), *Tilia platyphyllos* (Large-leaved Lime), *Tilia cordata* (Small-leaved Lime) and *Sorbus torminalis* (Wild Service-tree).
    - At least five woody species and at least four Associated Features

The associated features mentioned above, as part of the Hedgerow Regulations 1997, are as follows:

- A bank or wall for at least half the length of the hedgerow;
- A ditch for at least half the length of the hedgerow;
- Gaps over no more than 10% of the length of the hedgerow;
- On average, at least 1 standard tree per 50 m of hedgerow;
- At least three woodland species from a list of 57 woodland plants (as defined in Schedule 2 of the Regulations) within 1m of the hedgerow;

- Connections scoring 4 or more points, where connection with a hedgerow counts as one, a broad-leaved woodland or pond counts as two; and
- A parallel hedge within 15 m.

Under the Hedgerow Regulations 1997, the removal of any hedgerow to which the Regulations apply is permitted if it is required for carrying out development for which planning permission has been granted or it is deemed to have been granted.

Badgers

Surveys were carried out using standard guidelines for classifying badger setts and categorising entrance holes (Harris *et al.,* 1989; Scottish Badgers, 2018; Natural England, 2009). The survey comprised a detailed systematic walkover survey of the site with signs of badger noted. 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.
- Annex 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.

Monitoring Survey

Seven visits were undertaken over 21 days with the entrance visited and notes made on activity. Sticks were laid in front of entrances to see if any movements were made through the entrance. Hair sticks were placed inside the tunnels to trap hair from passing animals. Signs of badger including prints, hairs, latrines were also searched for and noted. Activity such as spoil heaps and debris blocking entrances were also noted. A trail camera was used to gain footage of activity at the sett entrance during the monitoring period.

The setts on site were monitored between 22nd July and 17th August 2020.

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) with potential to be impacted from the proposals were assigned a level of suitability according to the descriptions outlined in Table A3.1. There were no buildings on the site. The trees were initially assessed from ground level, using binoculars where necessary to identify potential roost features and bat access points.

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

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

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

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

Emergence/re-entry Surveys

Bat dusk emergence / dawn re-entry surveys were carried out on buildings and trees in accordance with current guidance (Collins, 2016). Surveys were focused on buildings and trees with which were due to be impacted (either directly or indirectly) by the proposed development. BCT guidelines recommends a series of dusk emergence or dawn re-entry surveys, carried out between May and September, depending on the level of suitability for roosting bats (see Table A3.2).

Table A3.2. Recommended further survey requirement for structures and trees with suitability for roosting bats (Collins, 2016).

Suitability	Number of survey visits required	Timing
Low	One survey visit (one dusk emergence or dawn re-entry survey) (structures). No further surveys required (trees).	May to August (inclusive).
Moderate	Two separate survey visits (one dusk emergence and a separate dawn re-entry survey) (structures and trees).	May to September with at least one of surveys between May and August and at least two weeks between each survey visit.
High	Three separate survey visits (at least one dusk emergence and a separate dawn re-entry survey. The third visit could be either a dusk emergence or dawn re-entry) (structures and trees).	May to September with at least two of surveys between May and August and at least two weeks between each survey visit.

Dusk emergence and dawn re-entry surveys were conducted on the dates provided in Table A3.3 and A3.4, with dusk emergence surveys commencing 15 minutes before sunset and continuing until approximately 1.5 hours after sunset. Dawn re-entry surveys commenced 1.5 hours before sunrise, and continued for 15 minutes after sunrise. The surveys were carried out under appropriate weather conditions (avoiding strong winds, cold temperatures and heavy rainfall).

Table A3.3. Dates, timings and weather conditions for dusk emergence / dawn re-entry surveys on buildings

Building	Suitability for roosting bats	Visit number	Survey date	Survey type	Timings	Weather conditions
1	Low*	1	06/05/2021	Dusk	Survey start: 20:15 Sunset: 20:30 Survey end: 22:00	9°C Cloud cover 20% Wind Beaufort 1 No rain
		2	03/08/2021	Dawn	Survey start: 03:50 Sunrise 05:24 Survey end: 05:39	13°C Cloud cover 100% Wind Beaufort 0-1 No rain
		3	17/08/2021	Dusk	TBC	TBC
4	Low	1	02/06/2021	Dusk	Survey start: 20:55 Sunset: 21:07 Survey end: 22:37	17°C Cloud cover 80-90% Wind Beaufort 1 No rain
5	Low*	1	02/06/2021	Dusk	Survey start: 20:55 Sunset: 21:07 Survey end: 22:37	17°C Cloud cover 80-90% Wind Beaufort 1 No rain
		2	03/08/2021	Dusk	Survey start: 03:50 Sunrise 05:24 Survey end: 05:39	17°C Cloud cover 10% Wind Beaufort 0-1 No rain
		3	24/08/2021	Dawn	TBC	TBC
7	Low	1	15/06/2021	Dusk	Survey start: 21:00 Sunset: 21:17 Survey end: 22:50	17°C Cloud cover 60% Wind Beaufort 0 No rain
8	Low	1	13/07/2021	Dusk	Survey start: 20:55 Sunset: 21:11 Survey end: 22:45	19°C Cloud cover 20% Wind Beaufort 2-4 No rain
10	Low	1	24/06/2021	Dusk	Survey start: 21:05 Sunset: 21:20 Survey end: 22:50	18°C Cloud cover 90% Wind Beaufort 0 No rain
Skateboard structure	Low	1	14/07/2021	Dawn	Survey start: 02:30 Sunrise: 04:57 Survey end: 05:15	14°C Cloud cover 20% Wind Beaufort 1 No rain

** Bat(s) seen emerging during first survey therefore an additional two visits were undertaken to characterise the roost, as per BCT guidelines.*

Table A3.4. Dates, timings and weather conditions for dusk emergence / dawn re-entry surveys on trees

Tree number	Suitability for roosting bats	Visit number	Survey date	Survey type	Timings	Weather conditions
51	Moderate	1	17/05/2021	Dusk	Survey start: 20:30 Sunset: 20:45 Survey end: 22:15	11°C Cloud cover 50% Wind Beaufort 1-2 No rain
		2	23/07/2021	Dawn	Survey start: 03:26 Sunrise: 05:04 Survey end: 05:19	14°C Cloud cover 20% Wind Beaufort 1 No rain
64	Moderate	1	20/05/2021	Dusk	Survey start: 20:40 Sunset: 20:55 Survey end: 22:25	12°C Cloud cover 10% Wind Beaufort 3 No rain
		2	20/08/2021	Dawn	TBC	TBC
66	Moderate	1	20/05/2021	Dusk	Survey start: 20:40 Sunset: 20:55 Survey end: 22:25	12°C Cloud cover 10% Wind Beaufort 3 No rain
		2	20/08/2021	Dawn	TBC	TBC
93	Moderate	1	17/05/2021	Dusk	Survey start: 20:30 Sunset: 20:45 Survey end: 22:15	11°C Cloud cover 50% Wind Beaufort 1-2 No rain
		2	27/07/2021	Dawn	Survey start: 03:44 Sunrise: 05:15 Survey end: 05:30	17°C Cloud cover 100% Wind Beaufort 2-3 No rain

Surveyors maintained static positions around the buildings and trees, focusing their attention on features that could potentially be utilised by roosting bats and watching closely for any emergence / re-entry, while also recording bat activity incidentally observed in the immediate surroundings. A surveyor location plan is provided in Appendix 6d.

Surveyors used Batlogger and Batbox Duet bat detectors with Edirol/Tascam digital recorders to record bat activity. Calls were subsequently analysed using Kaleidoscope and BatExplorer computer software.

Activity Surveys

The site was assessed as having moderate suitability for foraging and commuting bats therefore a suite of further activity surveys were required. The following surveys were recommended in line with published guidelines (Collins, 2016), see Table A3.5.

Table A3.5. Guidelines on the number of bat activity surveys recommended to achieve a reasonable survey effort in relation to a site with low habitat suitability, adapted from Collins 2016.

Survey type	Low suitability habitat for bats
Transect surveys	One survey visit per month (June to October 2020 as well as April and May 2021) in appropriate weather conditions for bats. At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) within one 24-hour period.
Automated surveys	Two locations per transect, data to be collected on five consecutive nights per month (June to October 2020 as well as April and May 2021) in appropriate weather conditions for bats

Transect surveys provide qualitative descriptive data which describes how bats use the site. A transect route (Appendix 7) was designed to cover all the best habitats for bats on and adjacent to the site. Given the extent and range of habitats present, one transect route was considered sufficient to sample the site.

The transect route was walked at a steady pace (so the sampling area is approximately the same per unit time). The transect start point and direction of travel was randomised for each survey to overcome the potential for results to be biased by systematic differences in the timing with which each habitat feature was sampled across the series of surveys.

Surveyors recorded observations of bats such as likely species, numbers, flight direction, flight height, behaviour (e.g. foraging or commuting), appearance and relative speed. Surveyors used Batloggers to record echolocation calls, which were subsequently analysed using Kaleidoscope computer software.

Five surveys were undertaken in 2020 with one per month from June to October as well as a further two surveys undertaken in April and May 2021 to provide coverage across the bat active season. All surveys were undertaken at dusk, when bat activity tends to be the highest, and in appropriate weather conditions for bats (no heavy rain, cold temperatures or high winds). In accordance with guidance, all surveys commenced at sunset and lasted until two hours after sunset. Results are reported in Appendix 6.

Table A3.6. Bat activity transect survey dates and timings

Survey month	Survey date	Survey type	Timings
April	27/04/2021	Dusk	Survey start / sunset: 20:15 Survey end: 22:30
May	20/05/2021	Dusk	Survey start / sunset: 20:51 Survey end: 23:00
June	24/06/2020	Dusk	Survey start / sunset: 21:20 Survey end: 23:20
July	21/07/2020	Dusk	Survey start / sunset: 21:02 Survey end: 23:15
August	26/08/2020	Dusk	Survey start / sunset: 19:57 Survey end: 22:00
September	23/09/2020	Dusk	Survey start / sunset: 18:53 Survey end: 21:00
September	24/09/2020	Dawn	Survey start / sunrise: 04:45 Survey end: 06:48
October	22/10/2020	Dusk	Survey start / sunset: 17:49 Survey end: 20:00

Automated Surveys

Automated static detectors provide quantitative data over longer periods of time useful for assessing the species assemblage in an area and the temporal changes in bat activity.

Two static detectors per transect were set up at different monitoring points and used to record bat activity within the habitats on site for at least five consecutive nights per season, in accordance with current guidance. Sampling was undertaken monthly between June and October 2020 and again in April and May 2021. Where possible, survey dates were selected when the predicted weather forecast indicated suitable weather conditions for foraging and commuting bats (*i.e.* air temperature above 10°C, no strong winds and no rain).

Anabat Express bat detectors were used to record bat echolocation calls. The units were set up to continuously record from 30 minutes before sunset until 30 minutes after sunrise. All recordings were stored on memory cards and analysed using computer software programs Analook and Kaleidoscope.

Echolocation calls were identified down to species or genus level depending on the type of bat encountered (often it is not possible to reliably identify species belonging to the genus *Myotis, Plecotus* and *Nyctalus*) and the quality of the recording.

The analysed data was then standardised to account for differences in night length and the number of nights over which activity was sampled per season. This was achieved by following procedure:

- dividing the total number of passes recorded per season (defined as a maximum 15 second bat recording) by the number of recording nights, to provide the number of passes per night
- then, dividing the number of passes per night by the night length, to provide the number of passes per night hour
- finally, multiplying the number of passes per night hour by the mean night length over the sampling period, to provide the standardised number of passes per night

Birds

Wintering Bird Surveys

SES conducted two wintering bird survey visits, with the first occurring during December 2020 and the second visit taking place in January 2021. The survey area included the whole of the application site and adjacent areas that could be surveyed from within the site, generally covering a buffer perimeter of 10-20m. The walkover surveys were based upon the generic wintering bird monitoring methods given in Gilbert *et al*. (1998). This method is primarily aimed at wetland species but can be applied to terrestrial species.

A standard route was walked and all birds seen or heard were recorded and their number and location plotted on field maps using standard British Trust for Ornithology (BTO) codes. Records of key species were later transferred to a summary species map (Appendix 8). Birds recorded flying over and not using the site itself were also recorded but not mapped.

The route was selected to cover a representative sample of all the habitats within the site, including fields, hedgerows, waterbodies and woodland blocks. The larger open areas, such as the grassland fields were frequently scanned with binoculars to detect more distant birds.

Both visits were undertaken in the morning with a total survey time of approximately three hours were visit. The two visits were undertaken 29 days apart which is considered a suitable interval for encountering all likely overwintering species. The fieldwork was undertaken in suitable weather conditions with days affected by strong winds or heavy rain avoided.

Breeding Bird Surveys

SES conducted two breeding bird survey visits during the 2020 bird breeding season in June and July. A further two breeding bird survey visits were undertaken in April and May of the 2021 bird breeding season. The survey area included the whole of the study area and adjacent areas that could be surveyed from within the site, generally covering a buffer perimeter of 10-20m. Thus, adjacent field boundaries and other potential bird nesting habitats where birds using the site during the breeding season may nest, and vice versa were generally also included. A transect was walked slowly pausing to record birds heard and observed, covering all areas of the study area, and route directions were varied between survey visits. Birds flying over and not using the site or surrounding area were recorded separately. All bird locations and behaviour were mapped onto photocopied OS maps (1:5000 scale) using the standard CBC notation.

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

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

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

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

Great Crested Newts

HSI Survey

Aquatic habitats were assessed for their suitability to support breeding GCN (as well as other amphibians) using the Habitat Suitability Index (HSI). This method was developed by Oldham *et al.* (2000) and provides a numerical index, between 1 and 0, based on a number of factors which influence great crested newt presence:

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

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

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

On the index, 0 indicates unsuitable habitat, while 1 represents optimal habitat. 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 GCN 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 A3.7. HSI score categories (Oldham et al., 2000) and predicated probability of GCN presence

HSI score	Pond suitability	Predicted presence of GCN (% 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	

eDNA Sampling

Water samples were collected from two ponds (Ponds 1 & 4) in June 2020 and sent to an approved laboratory for analysis in accordance with approved field laboratory protocols (Briggs et al. 2014). Following an indeterminate result for Pond 4, a subsequent eDNA analysis of this waterbody was undertaken in April 2021.

Twenty samples were collected from each pond using sterile equipment at points evenly spread out along the pond perimeter (where access allowed). The water at each sampling area was gently stirred using a sterile ladle before samples were taken, whilst ensuring that sediment on the pond base was not disturbed. The samples were then 'fixed' in an ethanol preserving solution and sent to an approved laboratory for analysis. To avoid contamination, the surveyors avoided entering the water. Latex gloves were worn when sampling, and only sterile equipment came into contact with the water. Separate sampling kits, and new gloves, were used for each of the water bodies sampled.

The presence or absence of GCN from each of the surveyed waterbodies was determined based on the results of the eDNA analysis and results are shown in Appendix 9. If eDNA is detected this provides confirmation of the presence and the relevant waterbodies are likely to represent a development constraint that requires further consideration. If eDNA is not detected, then this provides high confidence that there is no reasonable likelihood of great crested newts being present in the relevant waterbodies, and they require no further assessment with regard to this species.

Reptiles

Artificial refuges (0.5m x 0.5m felt squares) were laid in suitable habitat, using the surveyor's professional judgement. Artificial refuges were used to observe reptiles basking or taking refuge, these were laid in transects and left for fourteen days to settle before the survey commenced. Guidance recommends laying mats at density of 10p/ha of suitable habitat (Froglife, 1999), however in this case a larger number of mats (375 for approximately 27.89ha ha) were laid to provide adequate coverage of all suitable areas.

A total of seven visits for the presence/likely absence survey were undertaken during 'suitable' days for reptile activity; a 'suitable' survey day is determined by the weather, with temperature being the pre-eminent factor. Reptile surveys conducted between 9 and 18°C have the most chance of success and therefore all surveys were undertaken in these temperatures.

Table A3.8: Summary of reptile survey visit dates and weather conditions.

Visit	Date	Survey Conditions
1	22/07/2020	Good: 16°C (average), no precipitation, 1 wind, cloud 5/8.
2	29/07/2020	Good: 18°C (average), no precipitation, 1 wind, cloud 0/8.
3	03/08/2020	Good: 18°C (average), no precipitation, 0 wind, cloud 0/8.
4	05/08/2020	Good: 18°C (average), no precipitation, 1 wind, cloud 0/8.
5	17/08/2020	Good: 17°C (average), no precipitation, 1 wind, cloud 1/8
6	29/08/2020	Fair: 15°C (average), no precipitation, 1 wind, cloud 6/8
7	23/09/2020	Fair: 17°C (average), no precipitation, 1 wind, cloud 8/8

As presence was detected a categorical population assessment was carried out with the largest count within the first seven visits indicating the category of the recorded reptile species. This count was adjusted to determine the population class due to enhanced survey effort. The table below details the assessment categories:

Table A3.9. Froglife reptile population assessment.

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

Hazel dormouse

Surveys for hazel dormouse involved the installation of nest tubes in suitable habitat on site (hedgerows and woodland). The tubes were subject to routine monthly checks to determine presence or likely absence.

The thoroughness of a dormouse survey can be measured using an index of probability Table A3.10. 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. In this case, 100 tubes were deployed across the site. Tubes were checked monthly from August to November, enabling a final effort score of 32 points to be achieved.

Table A3.10 Index of probability to determine presence or likely absence of hazel dormouse

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

Invertebrates

A total of five survey visits were undertaken in 2020 and 2021 on 6th July and 4th August 2020 and 28th April, 11th May and 1st June 2021 by Dr Graham Hopkins FRES. Species identification was carried out by Dr Graham Hopkins FRES and Dr JI Thacker.

The broad sampling methodology followed the protocols relevant to the Invertebrate Species-habitat Information Service (ISIS) of Natural England as described by Drake et al. (2007) and consistent with the proposals of English Nature (2005). Sampling was undertaken at five sampling stations for terrestrial species on each visit, with a 40-minute timed sample, using a combination of hand searching, sweep netting. Incidental recording was also undertaken across the Site on each visit.

The data are analysed using the Pantheon package (Webb et al., 2018) and the Colin Plant Associates (2006) criteria are used as the basis for site evaluation. Species of conservation concern are referred to as either Nationally Scarce (mostly defined as species in <100 10-grid squares nationally) or NERC Act priority species). The species of conservation concern are identified via a manual screening of records against recent species

status reviews, which in practice downgrades the status of a small number of species compared to those identified by Pantheon.

Species of conservation concern are defined as: protected species, those satisfying rare or scarce criteria (Red Data Book or Nationally Scarce), and/or those listed as Species of Principal Importance as described below (Table A3.11).

Table 3.11: Summary of conservation statuses for invertebrates (see Drake et al., 2007 for full definitions).

Category	Definition
IUCN	
Endangered and Vulnerable	Species in danger of extinction or with small populations in Great Britain, and having undergone substantial declines in range or population size. The declines undergone by Endangered species are greater than experienced by Vulnerable species, as measured by various criteria.
Near Threatened	Species not currently considered to be 'Endangered' or 'Vulnerable' but may qualify for such in the near future.
GB Rarity Status	
Nationally Rare	Species recorded from between 1-15 hectads of the national grid since 1990. This is broadly equivalent to what were formerly termed Red Data Book species.
Nationally Scarce	Species recorded from between 16-100 hectads since 1990. This category is broadly equivalent to what were formerly Nationally Notable and Nationally Scarce, which in some instances were divided into -A and -B.
Priority Species	
Species of Principal Importance	Species included on Schedule 41 of the NERC Act, abbreviated as NERC S-41.

For invertebrates, the frame of reference is as described above with the evaluation following the criteria proposed by Colin Plant Associates (2006) (Table 3.12). Also available is the output from Pantheon, which provides scores with thresholds for determining 'favourable' status of assemblages, which is broadly equivalent to assemblages of Site of Special Scientific Interest (SSSI) quality or national value.

Table 3.12: The criteria used to define significance of invertebrate habitats.

Significance	Description	Minimum qualifying criteria
National	UK important site	Achieving SSSI invertebrate criteria or containing RDB2 (Vulnerable) or containing viable populations of RDB 3 (Rare) species or containing viable populations of any species protected under UK legislation or containing habitats that are threatened or rare nationally
Regional	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England	Habitat that is scarce or threatened in the region or which has, or is reasonably expected to have, the presence of an assemblage of invertebrates including at least ten Nationally Notable species or at least ten species listed as Regionally Notable for the English Nature region in question in the Recorder database or elsewhere or a combination of these categories amounting to ten species in total
County	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question	Habitat that is scarce or threatened in the county and/or which contains or is reasonably expected to contain an assemblage of invertebrates that includes viable populations of at least five Nationally Notable species or viable populations of at least five species regarded as Regionally Scarce by the county records centres and/or field club
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Notable species in the range from 1 to 4 examples are reasonably expected but not yet necessarily recorded
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes	Habitats or species unique or of some other significance within the local area

Significance	Description	Minimum qualifying criteria
Low Significance	_	Although almost no area is completely without significance these are the areas with nothing more than expected 'background' populations of common species and the occasional Nationally Local species

Appendix 4: 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 below sets out a non-exhaustive list of ecological features that are typically considered, along with key examples:

Table A4.1. 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

In assigning importance to an ecological resource the following geographic frames of reference are used:

- International;
- National (*i.e.* England);
- Regional (South East);
- County (Essex);
- District (Castle Point);
- Local or Parish (Thundersley); and
- Within Site or zone of influence only

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

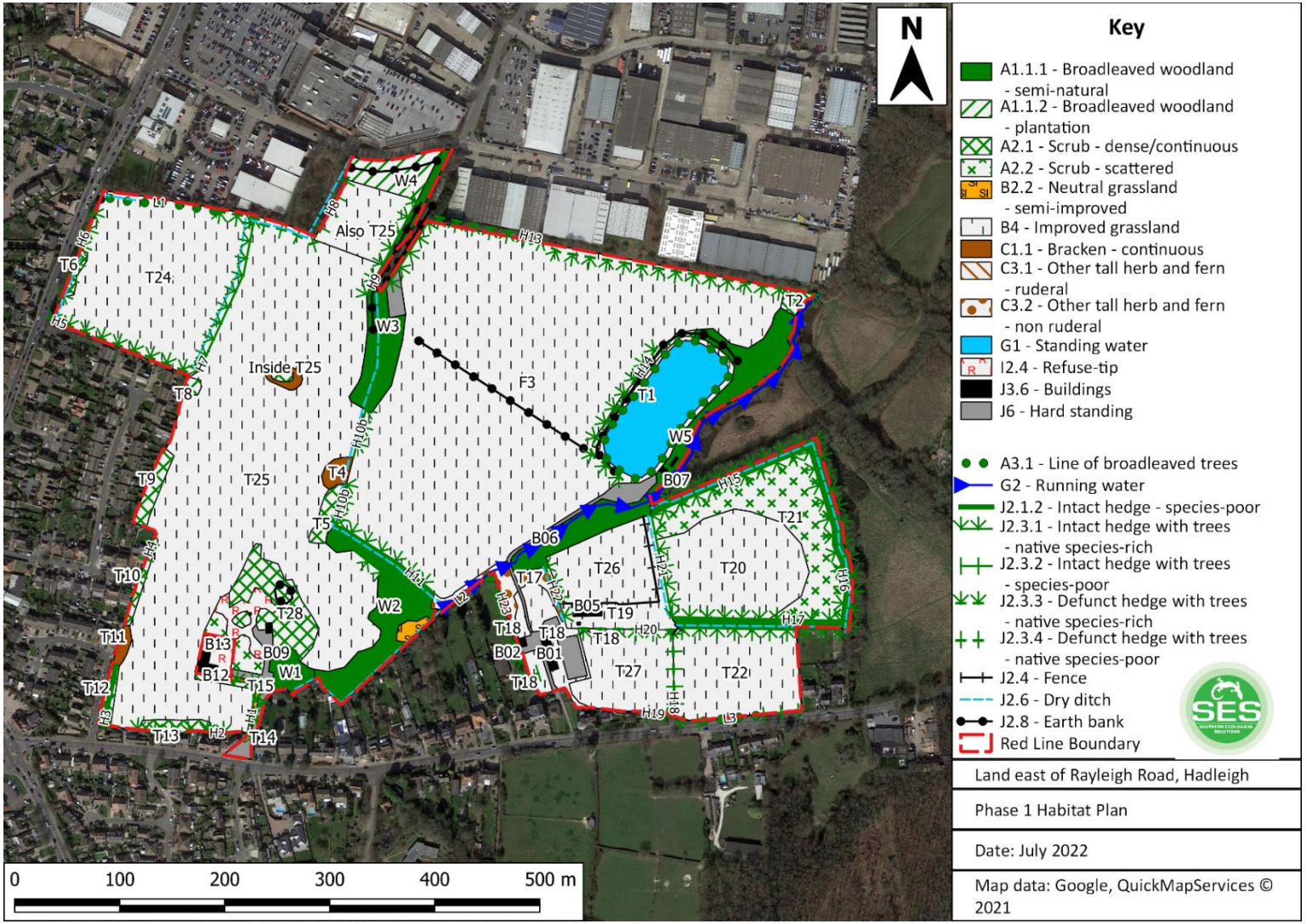
An ecologically significant effect is defined as an effect (adverse or beneficial) on the integrity of a defined designated site or ecosystem and/or the conservation status of habitats or species within a given geographical area.

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 5: Phase 1 Habitat Survey Results

Phase 1 Survey Plan



Species Lists

Table A5.1. Phase 1 Survey Species list

Common name	Latin name	Field 1	Field 1a	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7
Autumn hawkbit	*Scorzoneroides autumnalis*					F		O	
Bracken	*Pteridium aquilinum*	O	F	O		R			
Bramble	*Rubus fruticosus agg.*	O	R	O		R		R	
Bristly oxtongue	*Helminthotheca echioides*	O		F	O				
Broad-leaved dock	*Rumex obtusifolius*	O						O	O
Cocks foot	*Dactylis glomerata*	F	O	F	O	F	O	O	O
Common bent	*Agrostis capillaris*			R		O	O	O	A
Common centaury	*Centaurium erythraea*	R							
Common fleabane	*Pulicaria dysenterica*		R	F		O	O	O	
Common knapweed	*Centaurea nigra*	R	R					F	
Common mouse-ear	*Cerastium fontanum*						O		
Common nettle	*Urtica dioica*	O	R	R			O		
Couch grass	*Elymus repens*				O	O			
Cow parsley	*Anthriscus sylvestris*	O	O		O				
Cranesbill species	*Geranium sp.*	O							
Creeping bent	*Agrostis stolonifera*					O			F
Creeping buttercup	*Ranunculus acris*				F		F	F	F
Creeping cinquefoil	*Potentilla reptans*					O			
Creeping thistle	*Cirsium arvense*	R	R	O	O	O	O	O	
Crested dog's-tail	*Cynosurus crystatus*						O		F
Cut-leaved cranesbill	*Geranium dissectum*			O			O	O	
Dandelion	*Taraxacum officinale*	O			O				R
Dog rose	*Rosa canina*								R
False oat-grass	*Arrhenatherum elatius*	D	D	D	O				
Field horsetail	*Equisetum arvense*				O	O	R		
Goat willow	*Salix caprea*		O						
Goosefoot	*Chenopodium sp.*							O	
Greater plantain	*Plantago major*				O			F	

Common name	Latin name	Field 1	Field 1a	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7
Hogweed	*Heracleum sphondylium*	O		O	O	O	O		
Lucerne	*Medicago sativa*	O	O	O					
Meadow buttercup	*Ranunculus acris*				O			O	
Meadow foxtail	*Alopecurus pratensis*	R		O		R			
Meadow vetchling	*Lathyrus pratensis*		O						
Mugwort	*Artemisia vulgaris*	F	F	O		O			
Oxeye daisy	*Leucanthemum vulgare*				R				
Perennial ryegrass	*Lolium perenne*	O			A	A	O	O	F
Ragwort	*Senecio jacobaea*	O			O			F	O
Red bartsia	*Odontites vernus*					O	F	O	
Red clover (agricultural)	*Trifolium pratense*				F			O	
Ribwort plantain	*Plantago lanceolate*	R		O	O	O	O	A	O
Scentless mayweed	*Tripleurospermum inodorum*							O	
Self-heal	*Prunella vulgaris*						O		
Smaller cat's-tail	*Phleum bertolonii*					R	O		
Smooth tare	*Vica tetrasperma*		R	R	O			O	R
Spear thistle	*Cirsium vulgare*	R	O	R			O		
Stone parsley	*Sison amomum*							R	
Tall fescue	*Festuca arundinacea*				R	O	F		O
Timothy	*Phleum pratense*			R			O	F	
Yarrow	*Achillea millefolium*	O	R	R			O	O	F
Yorkshire fog	*Holcus lanatus*				O		O	O	O

Common name	Latin name	Woodland 1	Woodland 2	Woodland 3	Woodland 4	Woodland 5	Tall ruderal	Tall non-ruderal
Alder	*Alnus glutinosa*					O		
Ash	*Fraxinus excelsior*		F	F	F			
Aspen	*Populus tremula*			O		F		
Bird cherry	*Prunus padus*				O			
Blackthorn	*Prunus spinosa*		O	O	F	O		
Bracken	*Pteridium aquilinum*		O	F	O	F		
Bramble	*Rubus fruticosus agg.*	A	F	F	F	F	F	O
Bristly oxtongue	*Helminthotheca echioides*						A	

Common name	Latin name	Woodland 1	Woodland 2	Woodland 3	Woodland 4	Woodland 5	Tall ruderal	Tall non-ruderal
Broad-leaved dock	*Rumex obtusifolius*							O
Broad-leaved helleborine	*Epipactis helleborine*		F					
Broom	*Sarothamnus scoparius*					O		
Cleavers	*Galium aparine*						O	O
Cock's foot	*Dactylis glomerata*		O					
Common fleabane	*Pulicaria dysenterica*					O		
Common nettle	*Urtica dioica*	A					A	A
Cow parsley	*Anthriscus sylvestris*		O	F	O		F	O
Crack willow	*Salix fragilis*					F		
Creeping buttercup	*Ranunculus repens*							O
Dandelion	*Taraxacum officinale*						O	
Dog rose	*Rosa canina*			R				
Elder	*Sambucus nigra*	O		O	O			
Elm species	*Ulmus sp.*		R	O				
False oat-grass	*Arrhenatherum elatius*		O					O
Fescue sp.	*Festuca sp.*				O			
Field horsetail	*Equisetum arvense*					O		O
Field maple	*Acer campestre*			R	O	O		
Goat willow	*Salix caprea*	F				F		
Greater burdock	*Arctium lappa*						O	
Greater stitchwort	*Stellaria holostea*				F			
Hawkweed species	*Hieracium sp.*						O	
Hawthorn	*Crataegus monogyna*		O	O	O	O		
Hazel	*Corylus avellana*		O	O		O		
Hedge bindweed	*Calystegia sepium*						F	O
Hedge woundwort	*Stachys sylvatica*	O				O		
Hogweed	*Heracleum sphondylium*							O
Holly	*Ilex aquifolium*		O	F	O	O		
Hornbeam	*Carpinus betulus*		O	F	O	F		
Horse chestnut	*Aesculus hippocastanum*		R					
Ivy	*Hedera helix*	F	O	A	O	A		
Leyland cyprus	*Cupressus x leylandii*					O		
Nipplewort	*Lapsana communis*						O	

Common name	Latin name	Woodland 1	Woodland 2	Woodland 3	Woodland 4	Woodland 5	Tall ruderal	Tall non-ruderal
Pedunculate oak	*Quercus robur*		A	F	F	F		
Perennial sow-thistle	*Sonchus arvensis*				R			
Red dead-nettle	*Lamium purpureum*	O					O	
Rhodedendron	*Rhodedendron sp.*					R		
Silver birch	*Betula pendula*					O		
Sweet chestnut	*Castanea sativa*		O	R				
Sycamore	*Acer pseudoplatanus*	O				O		
White willow	*Salix alba*	F						
Wild cherry	*Prunus avium*			O				
Willowherb sp.	*Epilonium sp.*						O	A
Wood avens	*Geum urbanum*		F		O			

Common name	Latin name	Dense scrub	Scattered scrub (Field 1)	Scattered scrub (Field 5)	Scattered scrub (Claydons Farm workyard)	Line of trees 1	Line of trees 2	Line of trees 3 & 4	Line of trees 5
Alder	*Alnus glutinosa*	R							
Ash	*Fraxinus excelsior*		R		O	O		O	
Aspen	*Populus tremula*						O		
Black nightshade	*Solanum nigrum*				O	F			
Blackthorn	*Prunus spinosa*		O	O		O	A	F	
Bracken	*Pteridium aquilinum*	F	F						F
Bramble	*Rubus fruticosus agg.*	A	A	A	F				F
Broom	*Sarothamnus scoparius*	R		R		R			
Cocks foot	*Dactylis glomerata*				O				
Common buckthorn	*Rhamnus cathartica*		R					R	
Common nettle	*Urtica dioica*	O	A		O				
Crab apple	*Malus sylvestris*								
Crack willow	*Salix fragilis*								
Cranesbill species	*Geranium sp.*	F						R	
Creeping buttercup	*Ranunculus repens*				F		R		
Creeping thistle	*Cirsium arvense*		F						
Damson	*Prunus domestica*								
Dog rose	*Rosa canina*			O					
Elder	*Sambucus nigra*		F		O	A	O	O	

Common name	Latin name	Dense scrub	Scattered scrub (Field 1)	Scattered scrub (Field 5)	Scattered scrub (Claydons Farm workyard)	Line of trees 1	Line of trees 2	Line of trees 3 & 4	Line of trees 5
Elm	*Ulmus sp.*	R	O			O	O	O	
False oat-grass	*Arrhenatherum elatius*				O				
Field horsetail	*Equisetum arvense*	O							
Goat willow	*Salix caprea*		R		O		O	R	
Ground ivy					O		O		
Hawthorn	*Crataegus monogyna*	O	R	O		O		A	
Hazel	*Coylus avellane*	R	R			F			R
Hedge woundwort	*Stachys sylvatica*				F				
Herb Robert	*Geranium robertum*				O				
Hogweed	*Heracleum sphondylium*				O	F	O	F	
Holly	*Ilex aquifolium*	R	O				R		
Hornbeam	*Carpinus betulus*		R				R		
Ivy	*Hedera helix*	O	O						
Lombardy poplar	*Populus nigra 'Italica'*								F
Leyland cypress	*Cupressus x leylandii*								
Mugwort	*Artemisia vulgaris*				O		O		
Nipplewort	*Lapsana communis*				R	R			
Pendulous sedge	*Carex pendula*	O				O			
Pedunculate oak	*Quercus robur*	O	O	O	O		O		O
Perennial sow-thistle	*Sonchus arvensis*				O				
Ragwort	*Senecio jacobaea*				O				
Rowan	*Sorbus aucuparia*								
Silver birch	*Betula pendula*	R		O					R
Snowberry	*Symphoricarpos albus*	F			O				
Spear thistle	*Cirsium vulgare*				O				
Sweet chestnut	*Castanea sativa*			R	F				
Sycamore	*Acer pseudoplatanus*	R							
Tall fescue	*Festuca arundinacea*	O							
Wild cherry	*Prunus avium*	O							
Willowherb	*Epilobium sp.*								
Yarrow	*Achillea millefolium*	R			O				
Yorkshire fog	*Holcus lanatus*				O				

Common name	Latin name	Line of trees 6	Line of trees 7	Line of trees 8	Line of trees 9
Alder	*Alnus glutinosa*		D	O	
Ash	*Fraxinus excelsior*				
Aspen	*Populus tremula*				O
Black nightshade	*Solanum nigrum*				
Blackthorn	*Prunus spinosa*				
Bracken	*Pteridium aquilinum*	A			
Bramble	*Rubus fruticosus agg.*	A	F	O	
Broom	*Sarothamnus scoparius*				
Cocks foot	*Dactylis glomerata*				
Common buckthorn	*Rhamnus cathartica*				
Common nettle	*Urtica dioica*				
Crab apple	*Malus sylvestris*				O
Crack willow	*Salix fragilis*				F
Cranesbill species	*Geranium sp.*				
Creeping buttercup	*Ranunculus repens*				
Creeping thistle	*Cirsium arvense*				
Damson	*Prunus domestica*	F			
Dog rose	*Rosa canina*				
Elder	*Sambucus nigra*				
Elm	*Ulmus sp.*	O			
False oat-grass	*Arrhenatherum elatius*				
Field horsetail	*Equisetum arvense*				
Goat willow	*Salix caprea*	R			
Ground ivy					
Hawthorn	*Crataegus monogyna*	O	O		
Hazel	*Coylus avellane*	O		O	
Hedge woundwort	*Stachys sylvatica*				
Herb Robert	*Geranium robertum*				
Hogweed	*Heracleum sphondylium*				
Holly	*Ilex aquifolium*	R			
Hornbeam	*Carpinus betulus*			A	
Ivy	*Hedera helix*	F		F	
Lombardy poplar	*Populus nigra 'Italica'*				

Common name	Latin name	Line of trees 6	Line of trees 7	Line of trees 8	Line of trees 9
Leyland cypress	*Cupressus x leylandii*				
Mugwort	*Artemisia vulgaris*				
Nipplewort	*Lapsana communis*				
Pendulous sedge	*Carex pendula*				
Pedunculate oak	*Quercus robur*	O		O	
Perennial sow-thistle	*Sonchus arvensis*				
Ragwort	*Senecio jacobaea*				
Rowan	*Sorbus aucuparia*				O
Silver birch	*Betula pendula*				
Snowberry	*Symphoricarpos albus*				
Spear thistle	*Cirsium vulgare*				
Sweet chestnut	*Castanea sativa*			O	
Sycamore	*Acer pseudoplatanus*				
Tall fescue	*Festuca arundinacea*				
Wild cherry	*Prunus avium*				O
Willowherb	*Epilobium sp.*	O			
Yarrow	*Achillea millefolium*				
Yorkshire fog	*Holcus lanatus*				

Common name	Latin name	Hedge 1	Hedge 2	Hedge 3	Hedge 4	Hedge 5	Hedge 7	Hedge 8
Ash	*Fraxinus excelsior*			F	F	O		O
Aspen	*Populus tremula*	O	O			R		
Black bryony	*Dioscorea communis*							
Blackthorn	*Prunus spinosa*	O	O			F		F
Bracken	*Pteridium aquilinum*	O	O					
Bramble	*Rubus fruticosus agg.*	F	F	A	A	F	A	F
Broom	*Sarothamnus scoparius*	R	R				R	
Buddleja	*Buddleja davidii*							O
Bukhara fleeceflower	*Fallopia baldschuanica*							
Cocks foot	*Dactylis glomerata*							O
Common bent	*Agrostis capillaris*							
Common fleabane	*Pulicaria dysenterica*							

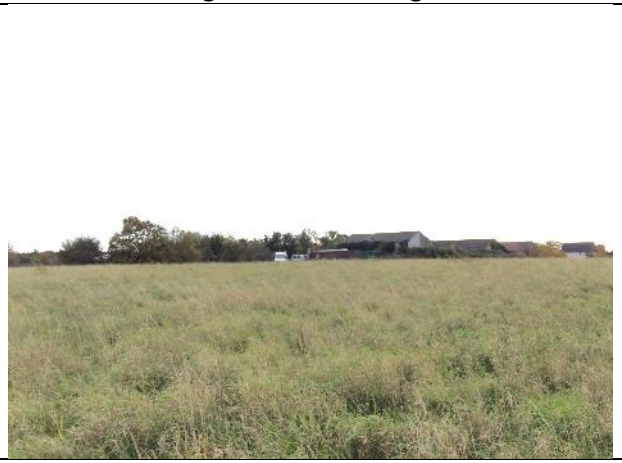
Common name	Latin name	Hedge 1	Hedge 2	Hedge 3	Hedge 4	Hedge 5	Hedge 7	Hedge 8
Common lime	*Tilia x europaea*							
Common nettle	*Urtica dioica*							
Crab apple	*Malus sylvestris*							
Damson	*Prunus domestica*					O		
Dog rose	*Rosa canina*			O	O			
Elder	*Sambucus nigra*							
Elm species	*Ulmus sp.*							O
Field horsetail	*Equisetum arvense*							
Field maple	*Acer campestre*							
Goat willow	*Salix caprea*	F	F	F	F		O	O
Hawthorn	*Crataegus monogyna*	F	F	F	F	F	O	O
Hazel	*Corylus avellana*					R	O	F
Hedge woundwort	*Stachys sylvatica*	R	R	O	O	O		R
Holly	*Ilex aquifolium*	O	O	F	F	O	O	
Honeysuckle	*Lonicera periclymenum*							
Hornbeam	*Carpinus betulus*	A	A	F	F	F	O	A
Horse chestnut	*Aesculus hippocastanum*			R	R			
Ivy	*Hedera helix*	O	O	F	F	F		F
Leyland cyprus	*Cupressus x leylandii*							
Lombardy poplar	*Populus nigra 'Italica'*						O	
Mugwort	*Artemisia vulgaris*							O
Pedunculate oak	*Quercus robur*	A	A	O	O	F	A	A
Pendulous sedge	*Carex pendula*							
Portuguese laurel	*Prunus lusitanica*							
Rowan	*Sorbus aucuparia*							
Scots pine	*Pinus sylvestris*							
Silver birch	*Betula pendula*	F	F					
Soft rush	*Juncus effuses*						O	
Sweet chestnut	*Castanea sativa*						R	
Sycamore	*Acer pseudoplatanus*					R		
Tall fescue	*Festuca arundinacea*							
Wild cherry	*Prunus avium*							
Willowherb	*Epilobium sp.*							

Common name	Latin name	Hedge 1	Hedge 2	Hedge 3	Hedge 4	Hedge 5	Hedge 7	Hedge 8
Wood avens	*Geum urbanum*	O	O	O	O	O		F
Yorkshire fog	*Holcus lanatus*							

Appendix 5c – Site Photographs

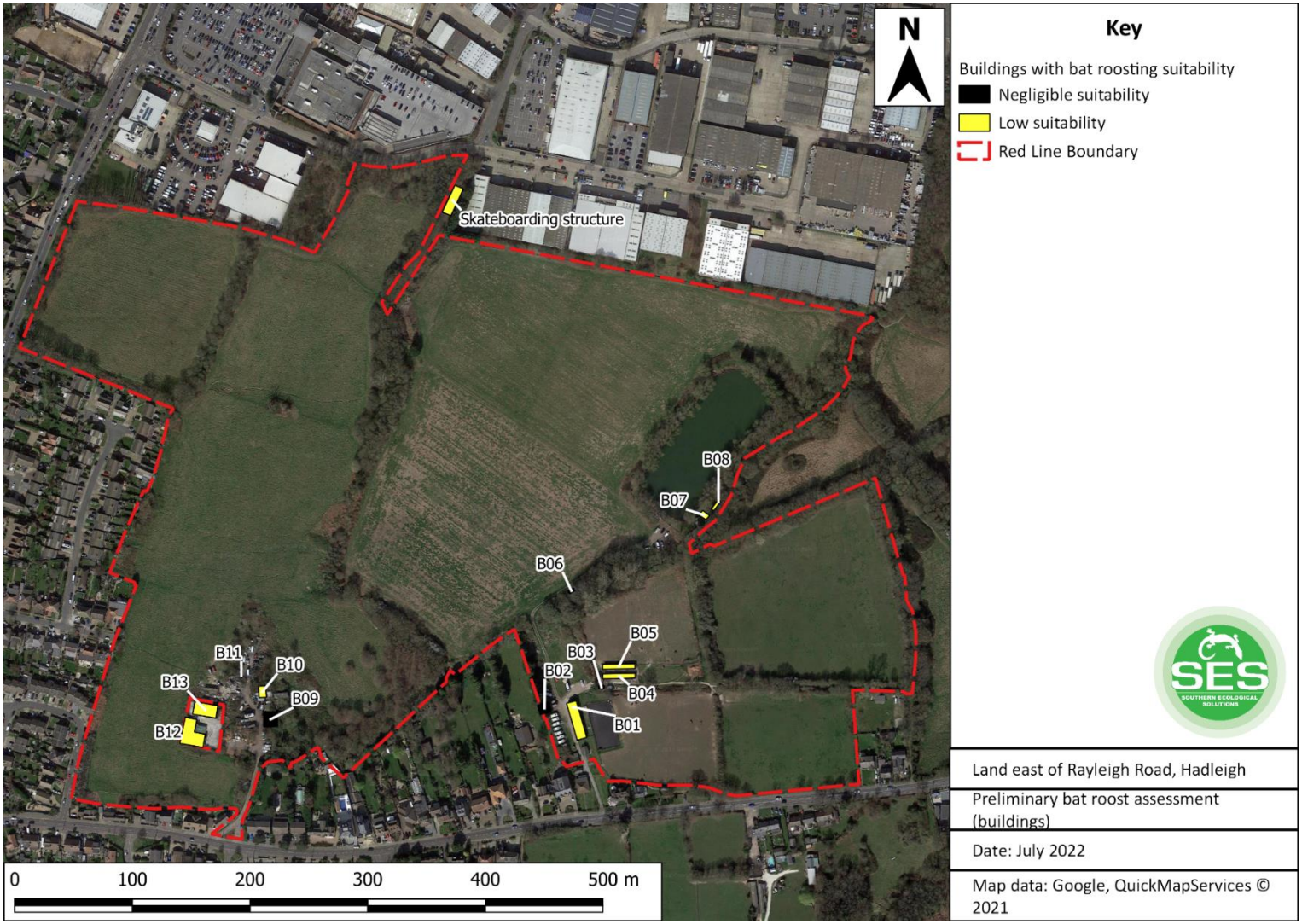
		
Plate 1: Semi-improved grassland habitat in Field 6, viewed looking east.	Plate 2: Building 1, viewed looking north.	Plate 3: Building 1 interior.
		
Plate 4: Hedgerow 23 viewed looking west, with potential reptile refugia in foreground.	Plate 5: Woodland 5, viewed looking north from Field 4.	Plate 6: Double hedgerow H15 viewed looking east from the north-east corner of Field 4.

		
Plate 7: Tree 10, with split in bark visible on eastern aspect.	Plate 8: Compost heap south of Field 4, providing potential hibernaculum and grass snake egg-laying habitat opportunities.	Plate 9: Building 4, viewed looking north-west.
		
Plate 10: Field 7 viewed looking east.	Plate 11: Field 5 viewed looking north-east, with hedgerow H16 in background.	Plate 12: Double hedgerow 16 viewed from eastern boundary, looking south.

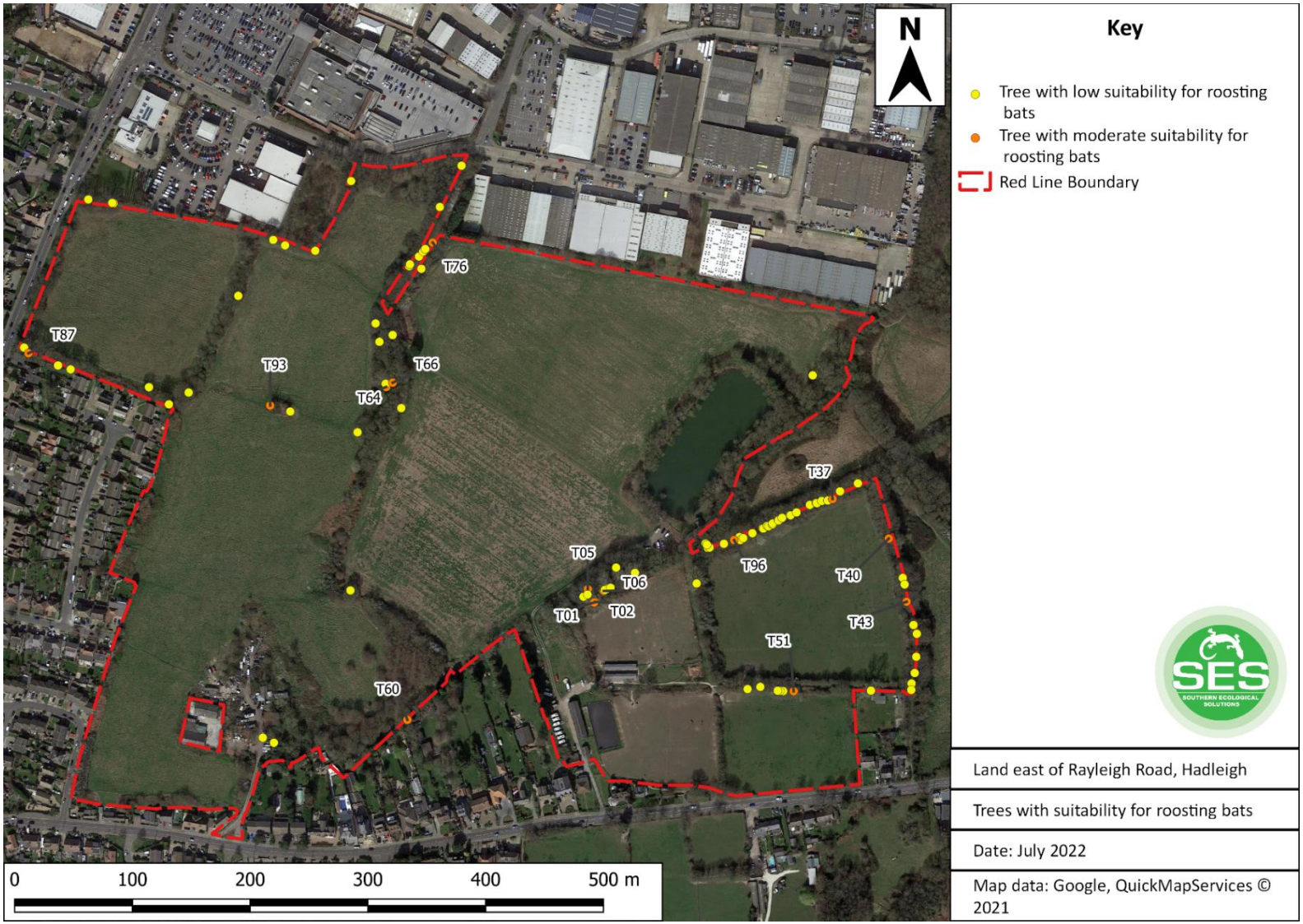
		
Plate 13: Field 7 viewed looking east.	Plate 14: Building 8 viewed looking south-east.	Plate 15: Reservoir viewed looking north.
		
Plate 16: Scrub along western boundary of Field 1, viewed looking north-west.	Plate 17: Field 1 viewed looking south-east, with Buildings 12 and 13 visible in background.	Plate 18: Scattered refuse among rough grassland and scattered scrub in south-west portion of site, viewed looking south-east.

Appendix 6: Bat Survey Results

Appendix 6a – Buildings and structures with bat roost potential



Appendix 6b – Trees with bat roost potential

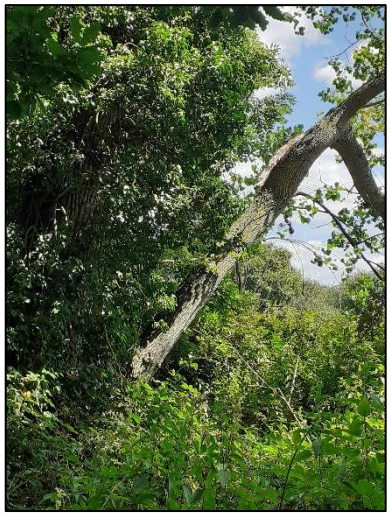


Appendix 6c – Trees with Suitability for Roosting Bats: Photographs

Table A7.1. Trees with Suitability for Roosting Bats

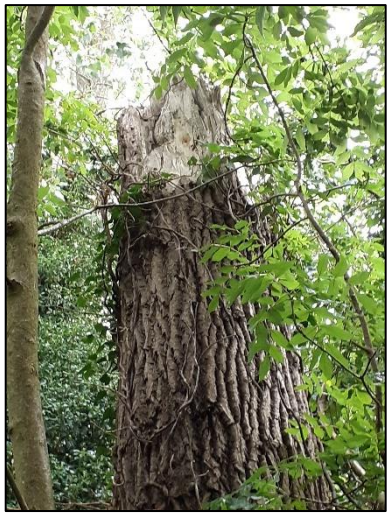
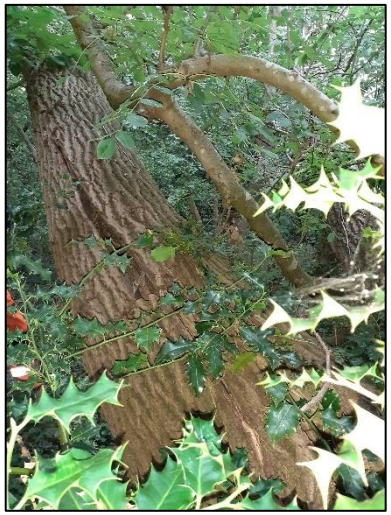
Tree Number	Species & PRFs	Photograph
T01	Aspen *Populus tremula* Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features.	

Tree Number	Species & PRFs	Photograph
T02	Aspen Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features.	
T05	Aspen Tree featured several small woodpecker holes and was of sufficient size and age to contain additional potential roosting features.	

Tree Number	Species & PRFs	Photograph
T06	Aspen Tree featured several small holes and was of sufficient size and age to contain additional potential roosting features.	
T37	Oak *Quercus robur* Small south-facing cavity of unknown depth less than 1m above ground. Tree of sufficient size and age to contain additional potential roosting features.	

Tree Number	Species & PRFs	Photograph
T40	Ash *Fraxinus excelsior* Cavity visible approximately 3m above ground at junction between trunk and east-facing limb. Tree of sufficient size and age to contain additional potential roosting features.	
T43	Oak Dense ivy and hedge growing around and on tree may be obscuring potential roosting features.	

Tree Number	Species & PRFs	Photograph
T51	Ash Old multi-stemmed coppice stool with multiple small cavities and splits.	
T60	Ash Big north-facing hollow in trunk at ground level. Tree of sufficient size and age to contain potential roosting features.	

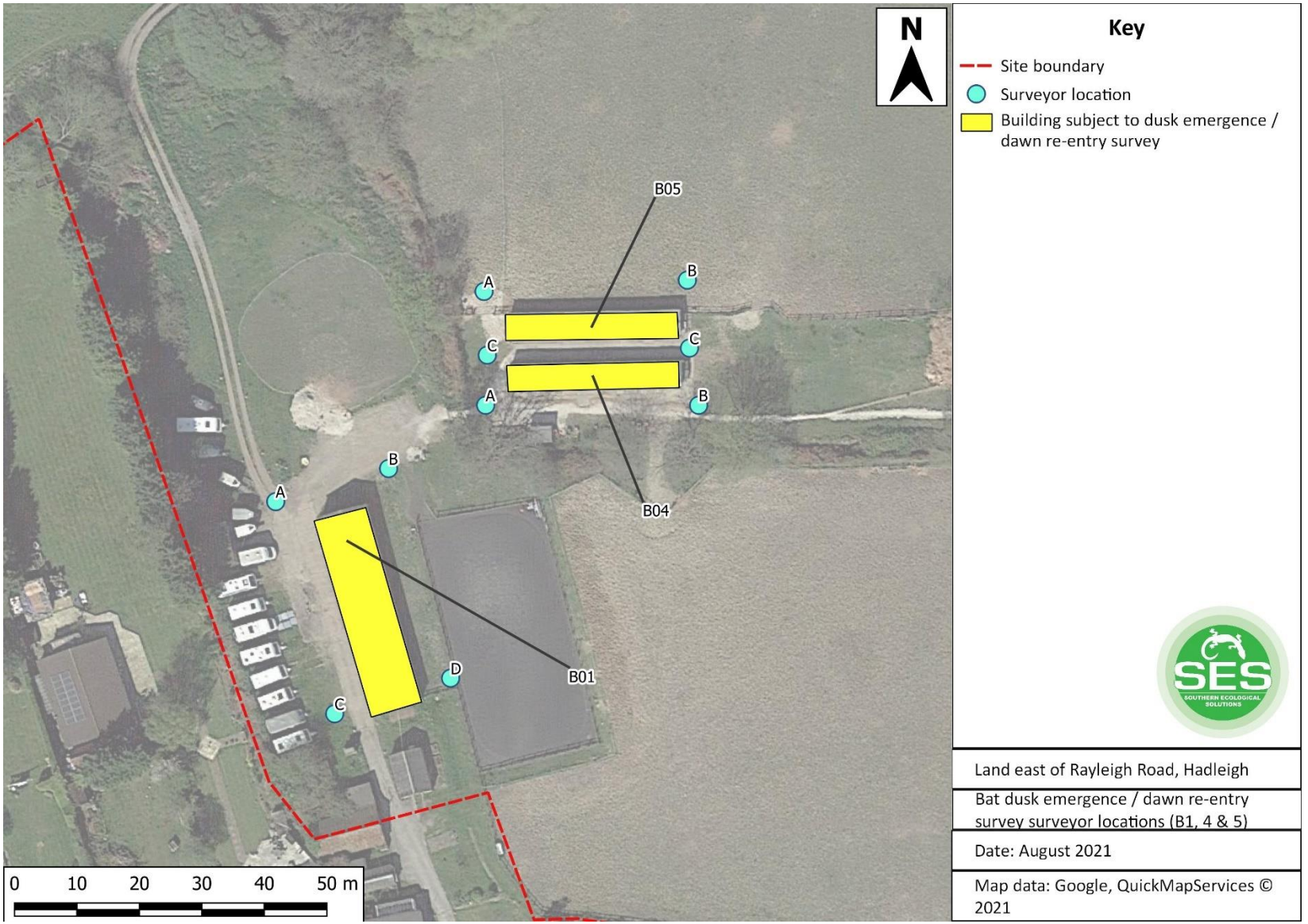
Tree Number	Species & PRFs	Photograph
T64	Aspen Dead spar with large west-facing hollow at ground level, with further large cavities likely where the trunk has split c. 3-4m high.	
T66	Aspen Big fissure on leaning trunk c. 1-2m above ground, which could lead to larger cavity. Tree of sufficient size and age to contain additional potential roosting features.	

Tree Number	Species & PRFs	Photograph
T76	Ash Large hollow of unknown depth at ground level facing north-west.	
T87	Oak Dead spar approximately 8m above ground, and numerous very small holes high up on trees. Tree of sufficient size and age to contain additional potential roosting features.	

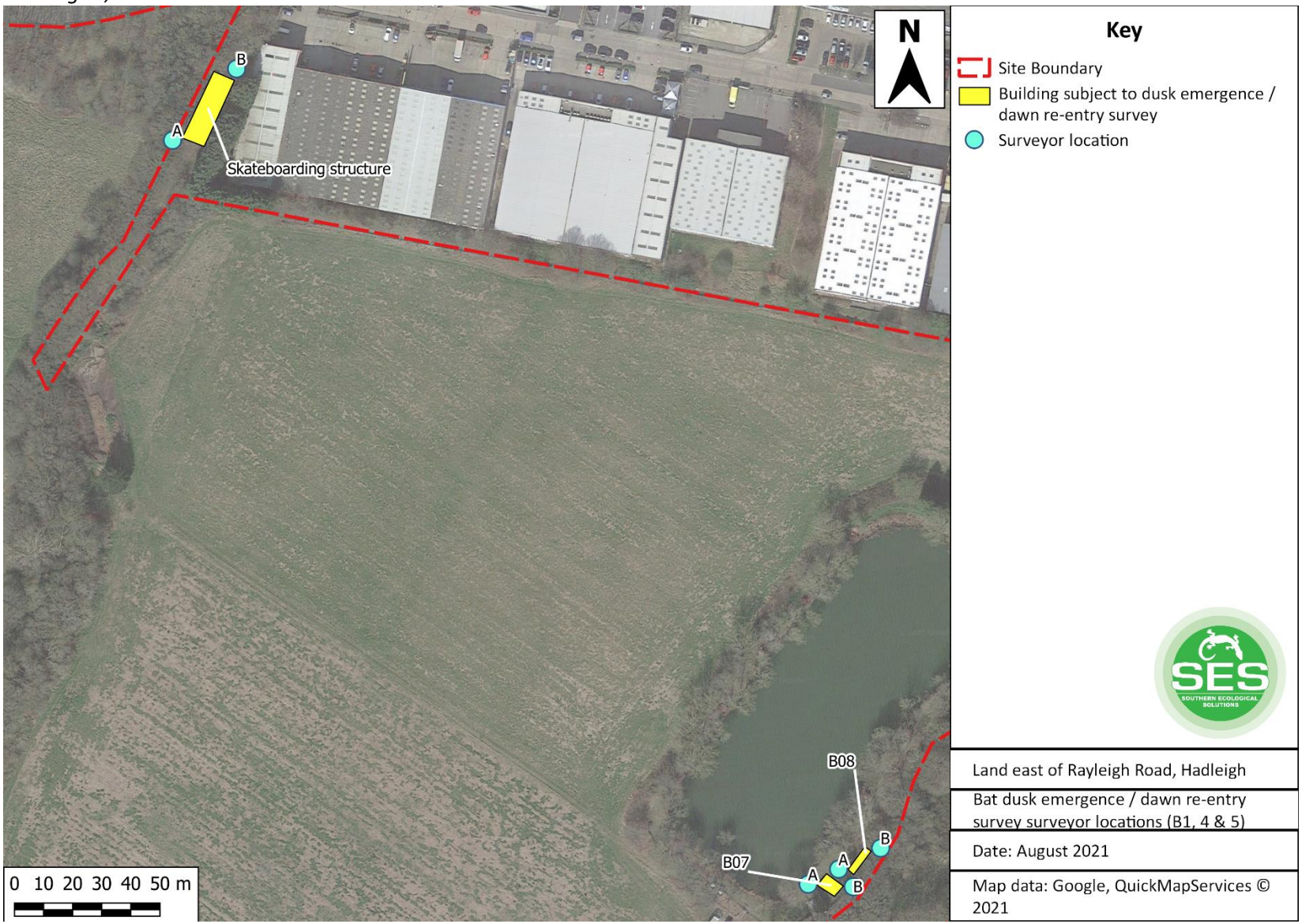
Tree Number	Species & PRFs	Photograph
T93	Oak Small holes visible high in tree. Tree of sufficient size and age to contain additional potential roosting features.	
T96	Oak Trunk cavity at 1.5m south.	

Appendix 6d – Dusk emergence / dawn re-entry surveyor location plans (buildings)

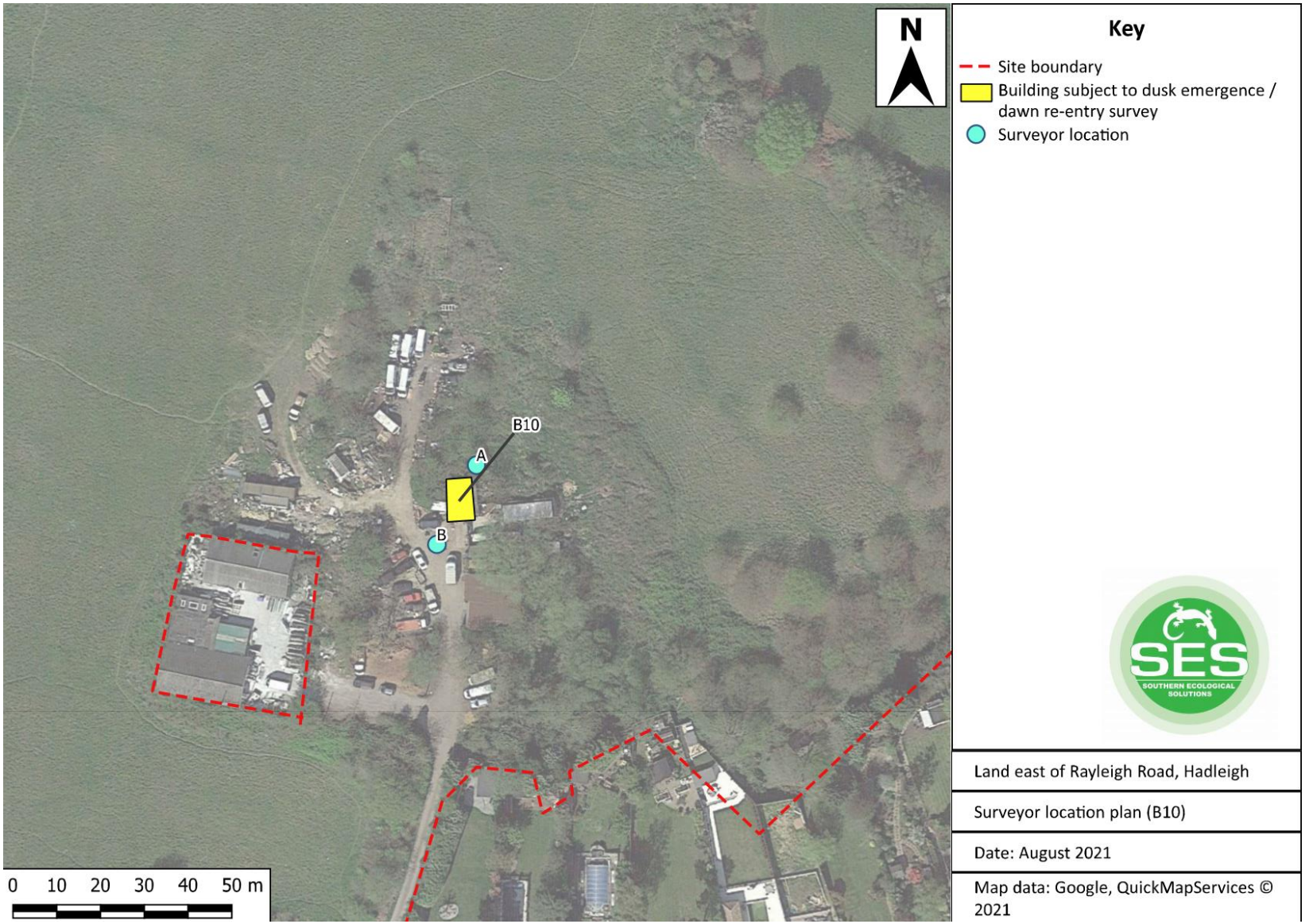
Buildings 1, 4 & 5



Buildings 7, 8 & Skateboard Structure



Building 10


N
B10
A
B
0 10 20 30 40 50 m
Key
Site boundary
Building subject to dusk emergence / dawn re-entry survey
Surveyor location
SES
SOUTHERN ECOLOGICAL SOLUTIONS
Land east of Rayleigh Road, Hadleigh
Surveyor location plan (B10)
Date: August 2021
Map data: Google, QuickMapServices © 2021

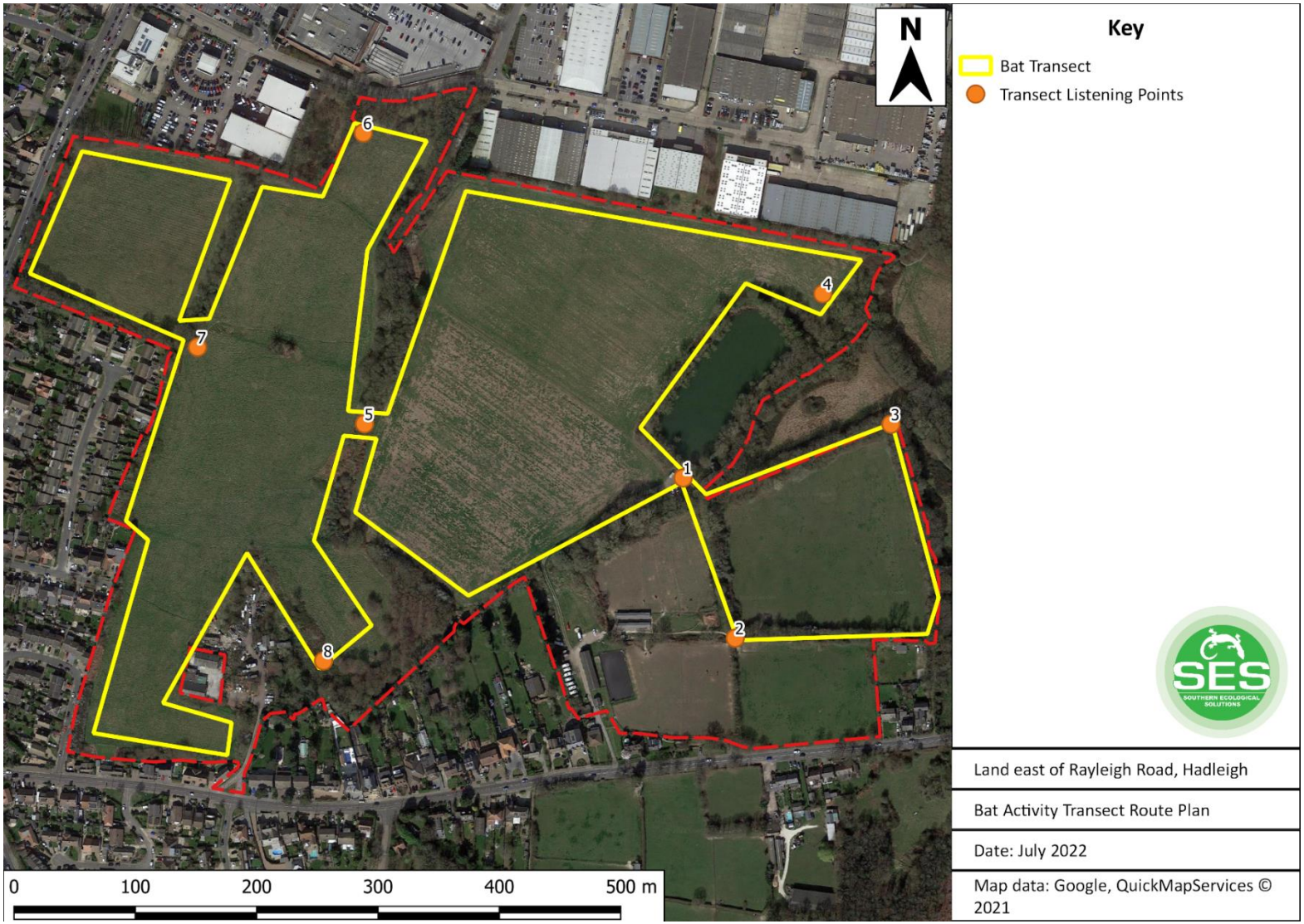
Appendix 6e – Dusk emergence / dawn re-entry detailed survey results (buildings)

Building number	Position	Visit 1	Summary of bat activity	Visit 2	Summary of bat activity	Visit 3	Summary of bat activity
1	A	Dusk 06/05/2021	**Single common pipistrelle emerged from wall cavity on western side of the building;** no other bats seen to emerge from building.	Dawn 03/08/2021	No bats seen returning to building; soprano and common pipistrelle foraging / commuting activity recorded.	Dusk 17/08/2021	No bats seen emerging from the building; soprano and common pipistrelle foraging / commuting activity recorded.
	B		No bats seen emerging from building; common pipistrelle foraging / commuting activity recorded.		As above		As above
	C		No bats seen emerging from building; common pipistrelle and BLE foraging / commuting activity recorded.		As above		As above
	D		No bats seen emerging from building; common pipistrelle foraging / commuting activity recorded.		As above		As above
4	A	Dusk 02/06/2021	No bats seen emerging from building; common pipistrelle foraging / commuting activity recorded.				
	B		No bats seen emerging from building; common pipistrelle foraging / commuting activity recorded.				
	C		No bats seen emerging from building; soprano and common pipistrelle foraging / commuting activity recorded.				
5	A	Dusk 02/06/2021	No bats seen emerging from building; soprano and common pipistrelle foraging / commuting activity recorded.	Dusk 03/08/2021	No bats seen emerging from building; soprano pipistrelle, common pipistrelle and noctule foraging / commuting activity recorded.	Dawn 24/08/2021	No bats seen returning to building; soprano and common pipistrelle foraging / commuting activity recorded.

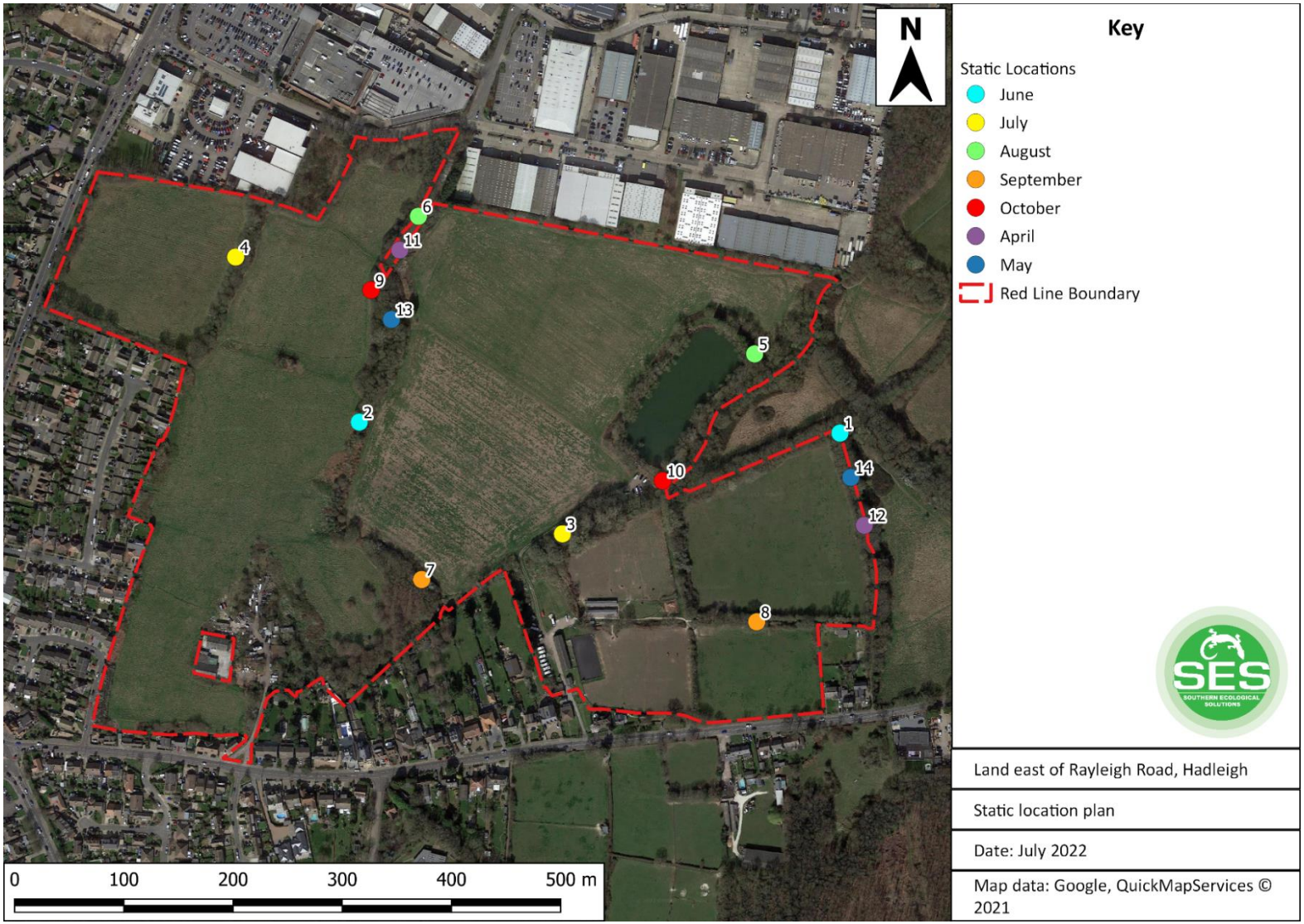
Building number	Position	Visit 1	Summary of bat activity	Visit 2	Summary of bat activity	Visit 3	Summary of bat activity
	B		No bats seen emerging from building; soprano and common pipistrelle foraging / commuting activity recorded.		As above		As above
	C		**Single soprano pipistrelle emerged from internal space of building;** no other bats seen to emerge from the building.		No bats seen emerging from building; soprano and common pipistrelle foraging / commuting activity recorded.		As above
7	A	Dusk 15/06/2021	No bats seen emerging from building; noctule, BLE & *Myotis* species foraging / commuting activity recorded.				
	B		No bats seen emerging from building; noctule, soprano and common pipistrelle foraging / commuting activity recorded.				
8	A	Dusk 13/07/2021	No bats seen emerging from building; BLE, *Myotis* species, soprano and common pipistrelle foraging / commuting activity recorded.				
	B		As position A.				
10	A	Dusk 24/06/2021	No bats seen emerging from building; common pipistrelle foraging / commuting activity recorded.				
	B		No bats seen emerging from building.				
Skateboarding structure	A	Dawn 14/07/2021	No bats seen emerging from building; common pipistrelle commuting activity recorded.				
	B		No bats seen emerging from building.				

Appendix 6f – Dusk emergence / dawn re-entry results plan (buildings with confirmed roosts)

Appendix 6g –Bat Activity Survey Transect Route



Appendix 6h – Static Detector Locations



Appendix 6i – Activity Transect Survey Results and Heat Maps

June 2020

Table A7.2: Summary of June 2020 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
24/06/2020	June dusk transect	Start/Sunset: 21:20 Finish: 23:20	20^{o}C 0% Cloud 3 Beaufort	Anti-clockwise
Time	**Comments**			
21:20-21:25				
21:25-21:30				
21:30-21:35	4x Soprano pipistrelle			
21:35-21:40				
21:40-21:45	1x Soprano pipistrelle			
21:45 – 21:50				
21:50 – 21:55				
21:55 – 22:00	1x Soprano pipistrelle			
22:00 – 22:05				
22:05 – 22:10	1x Common pipistrelle, 1x Soprano pipistrelle			
22:10 – 22:15	4x Soprano pipistrelle			
22:15 – 22:20	2x Common pipistrelle, 1x Soprano pipistrelle, 1x Daubenton's bat			
22:20 – 22:25	2x Common pipistrelle			
22:25 – 22:30	2x Common pipistrelle			
22:30 – 22:35	3x Common pipistrelle, 1x *Myotis sp.* Daubenton's bat			
22:35 – 22:40	3x Common pipistrelle			
22:40 – 22:45				
22:45 – 22:50				
22:50 – 22:55				
22:55 – 23:00	1x Noctule			
23:00 – 23:05	2x Common pipistrelle			
22:05 – 23:10	2x Common pipistrelle			
23:10 – 23:15				
23:15 – 23:20	4x Common pipistrelle, 2x Soprano pipistrelle, 1x Noctule, 1x Daubenton's bat			

July 2020

Table A7.3: Summary of July 2020 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
21/07/2020	July dusk transect	Start/Sunset: 21:02 Finish: 23:07	19°C 20% Cloud 0 Beaufort	Clockwise
Time	**Comments**			
21:02 – 21:07				
21:07 – 21:12				
21:12 – 21:17				
21:17 – 21:22				
21:22 - 21:27				
21:27 – 21:32				
21:32 – 21:37	1x Soprano pipistrelle			
21:37 – 21:42				
21:42 – 21:47	1x Common pipistrelle, 1x Soprano pipistrelle			
21:47 – 21:52	2x Common pipistrelle, 2x Soprano pipistrelle			
21:52 – 21:57	1x Soprano pipistrelle			
21:57 – 22:02				
22:02 – 22:07	2x Daubenton's bat			
22:07 – 22:12	2x Common pipistrelle, 1x Noctule			
22:12 – 22:17	1x Common pipistrelle, 4x Soprano pipistrelle			
22:17 – 22:22	1x Soprano pipistrelle			
22:22 – 22:27	2x Soprano pipistrelle, 1x Daubenton's bat			
22:27 – 22:32	1x Common pipistrelle, 4x Soprano pipistrelle			
22:32 – 22:37	2x Soprano pipistrelle, 1x *Nyctalus sp.*			
22:37 – 22:42	2x Common pipistrelle, 4x Soprano pipistrelle			
22:42 – 22:47	5x Common pipistrelle, 4x Soprano pipistrelle			
22:47 – 22:52	3x Common pipistrelle, 2x Soprano pipistrelle, 2x Brown long-eared bat			
22:52 – 22:57	1x Soprano pipistrelle			
22:57 – 23:02	1x Soprano pipistrelle			
23:02 – 23:07	2x Soprano pipistrelle			

August 2020

Table A7.4: Summary of August 2020 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
06/08/2020	August dusk transect	Start/Sunset: 19:56 Finish: 22:04	19°C 90% Cloud 1 Beaufort	Anti-Clockwise
Time	**Comments**			
19:56 – 20:01				
20:01 – 20:05				
20:05 – 20:10				
20:10 – 20:21	1x Soprano pipistrelle			
20:21 – 20:26	2x Common pipistrelle			
20:26 – 20:29				
20:29 – 20:34	2x Soprano pipistrelle			
20:36 – 20:41	1x Common pipistrelle, 2x Soprano pipistrelle			
20:41 – 20:46	2x Common pipistrelle, 1x Daubenton's bat			
20:46 – 20:52	1x Common pipistrelle			
20:52 – 20:57	1x Soprano pipistrelle			
20:57 – 21:04	1x Common pipistrelle, 2x Daubenton's bat			
21:04 – 21:09	1x Noctule			
21:09 – 21:16	6x Common pipistrelle			
21:16 – 21:21	1x Common pipistrelle, 2x Brown long-eared bat			
21:21 – 21:46	1x Noctule, 1x Daubenton's bat			
21:46 – 21:51				
21:51 – 22:04				

September 2020

Table A7.5: Summary of September 2020 dusk bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
22/09/2020	September dusk transect	Start/Sunset: 18:55 Finish: 20:55	20°C 30% Cloud 2 Beaufort	Clockwise
Time	**Comments**			
18:55 – 19:00				
19:00 – 19:05				
19:05 – 19:10				
19:10 – 19:15	1x Common pipistrelle			
19:15 – 19:20	1x Soprano pipistrelle			
19:20 – 19:25	1x Soprano pipistrelle			
19:25 – 19:30	2x Common pipistrelle			
19:30 – 19:35	1x Soprano pipistrelle			
19:35 – 19:40				
19:40 – 19:45				
19:45 – 19:50	1x Common pipistrelle			
19:50 – 19:55				
19:55 – 20:00	1x Common pipistrelle			
20:00 – 20:05	2x Common pipistrelle			
20:05 – 20:10				
20:10 – 20:15				
20:15 – 20:20				
20:20 – 20:25	2x Common pipistrelle			
20:25 – 20:30				
20:30 – 20:35	1x Common pipistrelle			
20:35 – 20:40	2x Common pipistrelle			
20:40 – 20:45	1x Common pipistrelle			
20:45 – 20:50	2x Common pipistrelle			
20:50 – 20:55	1x Common pipistrelle			

Table A7.6: Summary of September 2020 dawn bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
23/09/2020	September dawn transect	Start/Sunset: 04:46 Finish: 06:46	16°C 100% Cloud 0 Beaufort	Anti-Clockwise

Time	Comments
04:46 – 04:51	2x Common pipistrelle
04:51 – 04:56	1x Common pipistrelle
04:56 – 05:01	
05:01 – 05:06	1x Common pipistrelle
05:06 – 05:11	
05:11 – 05:16	
05:16 – 05:21	1x Common pipistrelle
05:21 – 05:26	1x Common pipistrelle
05:26 – 05:31	1x Common pipistrelle, 1x Soprano pipistrelle
05:31 – 05:36	2x Common pipistrelle
05:36 – 05:41	
05:41 – 05:46	1x Common pipistrelle
05:46 – 05:51	1x Common pipistrelle
05:51 – 05:56	1x Common pipistrelle, 1x Soprano pipistrelle
05:56 – 06:01	
06:01 – 06:06	
06:06 – 06:11	
06:11 – 06:16	
06:16 – 06:21	
06:21 – 06:26	
06:26 – 06:31	
06:31 – 06:36	
06:36 – 06:41	
06:41 – 06:46	

October 2020

Table A7.7: Summary of October 2020 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
22/10/2020	October dusk transect	Start/Sunset: 17:52 Finish: 19:52	14°C 75% Cloud 1 Beaufort	Clockwise
Time	**Comments**			
17:52 – 18:05				
18:05 – 18:10				
18:10 – 18:24				
18:24 – 18:29				
18:29 – 18:36				
18:36 – 18:45	1x Common pipistrelle			
18:45 – 18:50	1x Common pipistrelle			
18:50 – 18:55				
18:55 – 19:00				
19:00 – 19:05				
19:05 – 19:13				
19:13 – 19:29	1x Common pipistrelle, 1x Soprano pipistrelle			
19:29 – 19:34				
19:34 – 19:40				
19:40 – 19:47				
19:47 – 19:52				

April 2021

Table A7.8: Summary of April 2021 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
27/04/2021	April dusk transect	Start/Sunset: 21:15 Finish: 22:30	10°C 70% Cloud 2 Beaufort	Clockwise
Time	**Comments**			
20:15-20:20				
20:20-20:25				
20:30-20:35				
20:35-20:40	1x Common pipistrelle			
20:40-20:45				
20:45 – 20:50	1x Common pipistrelle			
20:50 – 20:55	2x Common pipistrelle			
20:55 – 21:00				
21:00 – 21:05				
21:05 – 21:10	1x Daubentons bat			
21:10 – 21:15				
21:15 – 21:20	1x Daubentons bat			
21:20 – 21:25				
21:25 – 21:30	2x Daubentons bat			
21:30 – 21:35	1x Common pipistrelle			
21:35 – 21:40	4x Common pipistrelle, 1x Soprano pipistrelle, 1x *Myotis sp.* 1x Daubenton's bat			
21:40 – 21:45	1x Common pipistrelle			
21:45 – 21:50				
21:50 – 21:55				
21:55 – 22:00				
22:00 – 22:05	2x Soprano pipistrelle, 4x *Myotis sp*			
22:05 – 22:10	4x *Myotis sp*			
22:10 – 22:15				
22:15 – 22:20	2x Soprano pipistrelle			
22:20 – 22:25	2x Soprano pipistrelle			
22:25 – 22:30				

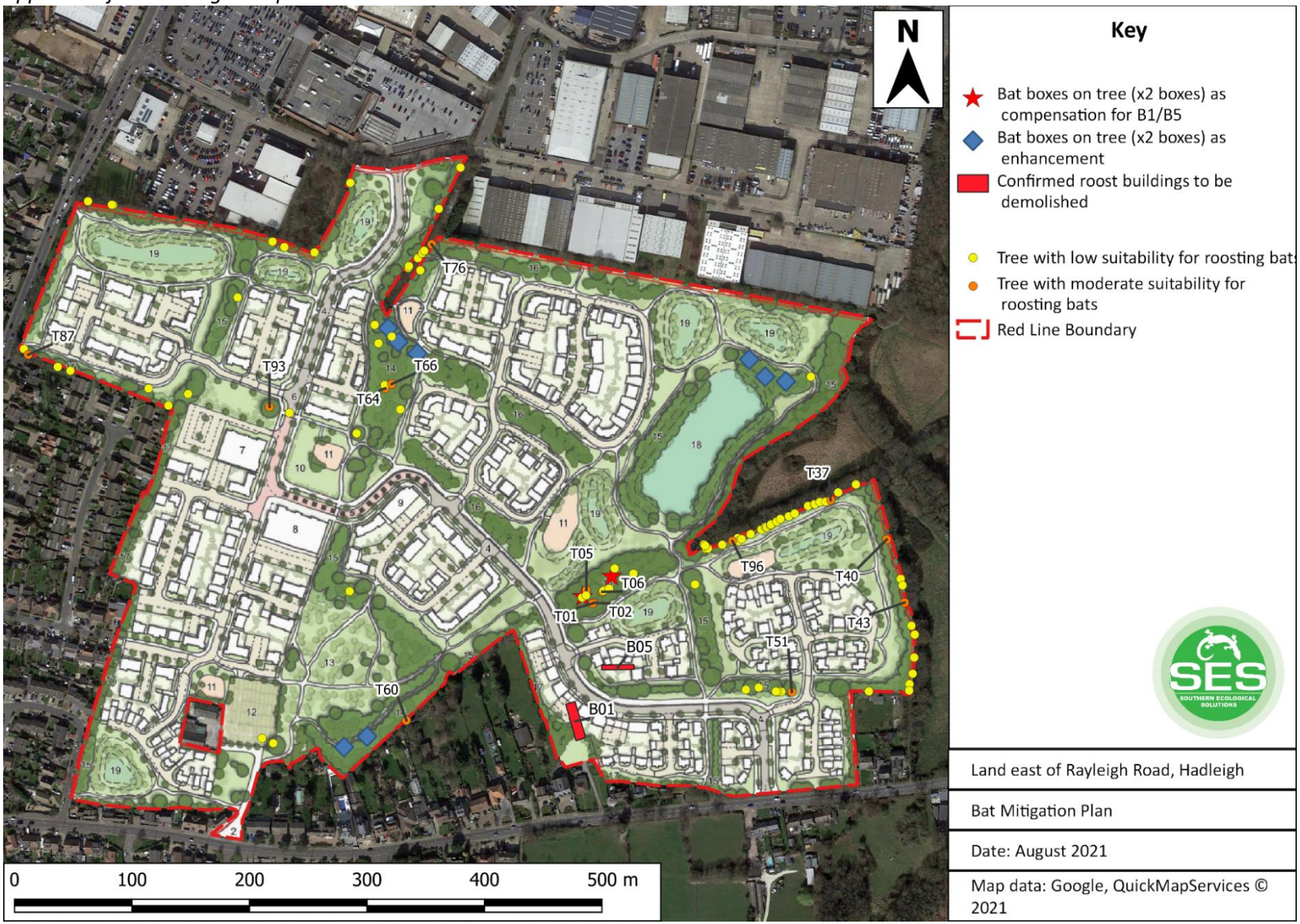
May 2021

Table A7.9: Summary of May 2021 bat transect results.

Date	Survey type	Survey timings	Weather	Route Direction
20/05/2021	May dusk transect	Start/Sunset: 20:51 Finish: 22:51	12°C 90% Cloud 4 Beaufort	Clockwise
Time	**Comments**			
20:50-20:55				
20:55-21:00				
21:00-21:05				
21:05-21:10				
21:10-21:15				
21:15 – 21:20				
21:20 – 21:25	1x Soprano pipistrelle			
21:25 – 21:30				
21:30 – 21:35				
21:35 – 21:40	1x Soprano pipistrelle			
21:40 – 21:45				
21:45 – 21:50	1x Soprano pipistrelle, 1x Barbastelle			
21:50 – 21:55				
21:55 – 22:00	6x Soprano pipistrelle, 6x Common pipistrelle			
22:00 – 22:05				
22:05 – 22:10	6x Common pipistrelle, 7x Soprano pipistrelle, 1x Daubentons bat			
22:10 – 22:15	1x Soprano pipistrelle, 4x Daubentons bat			
22:15 – 22:20	11x Soprano pipistrelle, 1x Daubentons bat			
22:20 – 22:25	2x Common pipistrelle			
22:25 – 22:30				
22:30 – 22:35	1x Common pipistrelle			
22:35 – 22:40	1x Soprano pipistrelle			
22:40 – 22:45				
22:45 – 22:50				
22:50 – 22:55				

Bat Activity Hotspots

Appendix 6j – Bat mitigation plan



Appendix 7: Wintering Bird Survey Results

Appendix 7a – WIntering Bird Survey Results and Weather Conditions

Table A8.1: Status of wintering birds within the site.

Species	BoCC	S. 41	V1	V2	Comments
Fieldfare *Turdus pilaris*	**Red**		1	10	Foraging in the paddocks and surrounding hedgerows.
Herring gull *Larus argentatus*	**Red**	✓	1	14	Foraging and shelter within the fields.
House Sparrow *Passer domesticus*	**Red**	✓	1	4	Low numbers within areas of scrub adjacent to residential development.
Starling *Sturnus vulgaris*	**Red**	✓	2	1	
Black-headed gull *Chroicocephalus ridibundus*	**Amber**		1	5	Flying over site and present on the lake
Dunnock *Prunella modularis*	**Amber**	✓	5	6	Associated with the hedgerows and scrub across the site.
Lesser black-backed gull *Larus fuscus*	**Amber**		0	2	
Mallard *Anas platyrhynchos*	**Amber**		3	3	Foraging and sheltering on the lake.
Wren *Troglodytes troglodytes*	**Amber**		0	1	
Redwing *Turdus iliacus*	**Amber**		1	25	Foraging in the paddocks and surrounding hedgerows.
Song thrush *Turdus philomelos*	**Amber**	✓	2	1	
Woodpigeon *Columba palumbus*	**Amber**		1	20	
Blackbird *Turdus merula*	**Green**		10	4	
Blue tit *Cyanistes caeruleus*	**Green**		3	8	
Buzzard *Buteo buteo*	**Green**		1	1	Hunting over site
Carrion crow *Corvus corone*	**Green**		7	2	
Chaffinch *Fringilla coelebs*	**Green**		1	2	
Chiffchaff *Phylloscopus collybita*	**Green**		0	1	
Cormorant *Phalacrocorax carbo*	**Green**		0	2	Hunting in the lake.
Coal tit *Periparus ater*	**Green**		0	1	
Coot *Fulica atra*	**Green**		2	1	Foraging and sheltering on the lake.
Great tit *Parus major*	**Green**		3	4	
Great spotted woodpecker *Dendrocopus major*	**Green**		1	0	
Grey heron *Ardea cinerea*	**Green**		0	1	Hunting in the lake.
Jay *Garrulus glandarius*	**Green**		2	2	Foraging on site.
Magpie *Pica pica*	**Green**		3	3	
Moorhen *Gallinula chloropus*	**Green**		1	0	Foraging and sheltering on the lake.
Pied wagtail *Motacilla alba*	**Green**		0	1	

Species	BoCC	S. 41	V1	V2	Comments
Robin *Erithacus rubecula*	**Green**		5	6	
Pheasant *Phasianus colchicus*	**Introduced**		0	1	

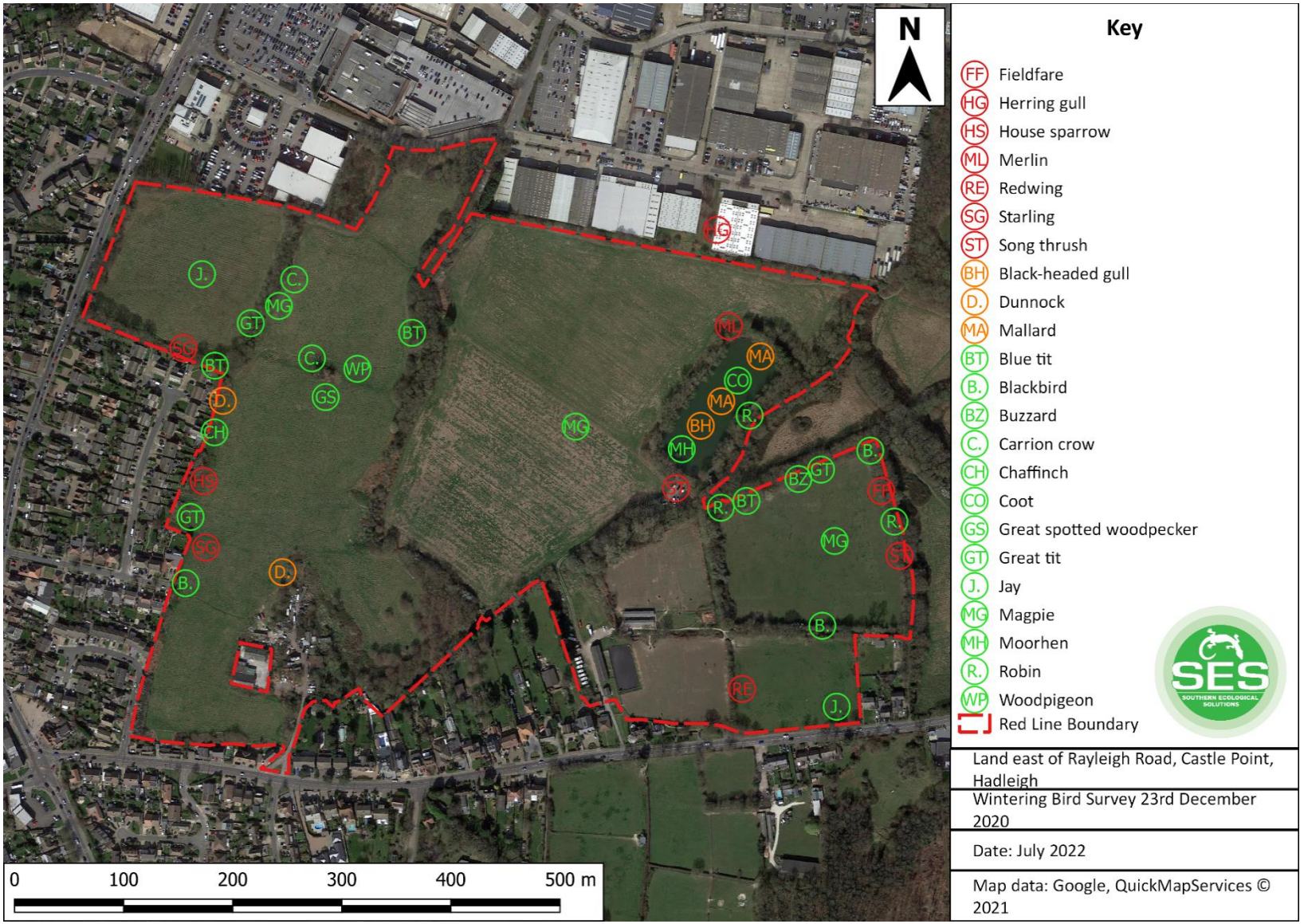
Red rows are BOCC red-list, Amber rows are BoCC amber-list, Green rows are BoCC green-list.
BoCC: Birds of Conservation Concern as defined and listed in Eaton *et al.,* (2021)

Table A8.2: Summary of wintering bird survey visit dates and weather conditions.

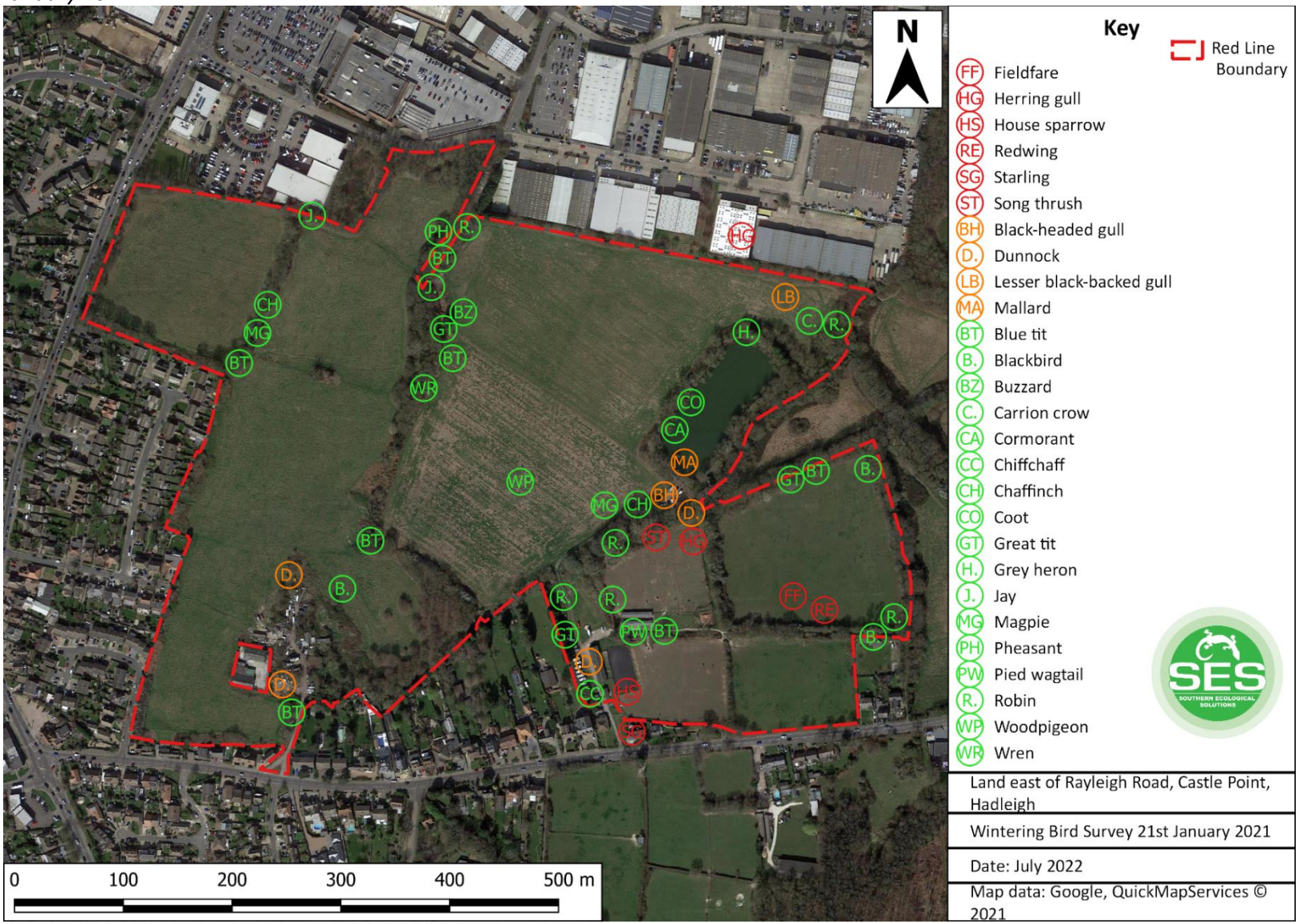
Visit	Date	Survey Conditions
1	23/12/2020	Fair: 11°C (average), little precipitation, 2 wind, cloud 8/8, good visibility.
2	21/01/2021	Fair: 6°C (average), no precipitation, 4 wind, cloud 1/8, good visibility.

Appendix 7c – Wintering Bird Survey Maps

December 2020



January 2021



Appendix 8: Breeding Bird Survey Results

Appendix 8a – Breeding Bird Survey Results and Weather Conditions

Table A9.1: Status of breeding birds within the site.

Species	BoCC	S. 41	V1	V2	V3	V4	Status
Herring gull *Larus argentatus*	Red	✓	1	0	2	1	Foraging on the site
House Sparrow *Passer domesticus*	Red	✓	5	16	10	14	Small colony adjacent to site and foraging in boundary hedgerows and scrub
Common linnet *Linaria cannabina*	Red	✓	1	0	6	0	Foraging on the site
Starling *Sturnus vulgaris*	Red	✓	2	0	4	7	Pairs in housing adjacent to site; foraging within site
Willow tit *Poecile montanus*	Red	✓	0	0	0	3	Foraging on the site
Woodcock *Scolopax rusticola*	Red		0	1	0	0	Foraging on the site
House martin *Delichon urbicum*	Red		0	1	0	0	Foraging over the site.
Greenfinch *Chloris chloris*	Red		0	0	2	1	Possible breeding - 1 territory
Song thrush *Turdus philomelos*	Amber	✓	1	2	1	0	Probable breeding – 1 territory
Black-headed gull *Chroicocephalus ridibundus*	Amber		0	0	1	0	Flying over site
Dunnock *Prunella modularis*	Amber	✓	7	2	4	1	Probable breeding – 2 territories
Green sandpiper *Tringa ochropus*	Amber		1	2	0	0	Foraging on site.
Kestrel *Falco tinnunculus*	Amber	✓	0	1	0	2	Hunting over site
Lesser black-backed gull *Larus fuscus*	Amber		0	0	0	1	Flying over the site
Mallard *Anas platyrhynchos*	Amber		3	0	4	0	Probable breeding – 2 territories
Stock dove *Columba oenas*	Amber		0	2	0	0	Flying over the site
Moorhen *Gallinula chloropus*	Amber		2	0	0	0	Foraging on site.
Woodpigeon Columba palumbus	Amber		1	1	0	0	Foraging on the site
Blackbird *Turdus merula*	Green		8	3	2	4	Probable breeding – 2 territories
Blackcap *Sylvia atricapilla*	Green		2	1	5	4	Probable breeding - 1 territory
Blue tit *Cyanistes caeruleus*	Green		15	2	14	8	Probable breeding - 3 territories
Carrion crow *Corvus corone*	Green		3	0	2	0	Foraging on site
Chaffinch *Fringilla coelebs*	Green		1	0	1	0	Foraging on site
Chiffchaff *Phylloscopus collybita*	Green		2	0	4	5	Probable breeding - 1 territory
Coot *Fulica atra*	Green		0	0	3	1	Probable breeding - 1 territory
Feral pigeon *Columba livia*	Green		1	0	0	1	Flying over the site
Goldfinch *Carduelis carduelis*	Green		4	2	2	2	Probable breeding – 2 territories
Great tit *Parus major*	Green		4	0	5	1	Probable breeding - 1 territory
Great spotted woodpecker *Dendrocopus major*	Green		2	0	0	0	Probable breeding - 1 territory
Jackdaw *Corvus monedula*	Green		0	0	1	1	Foraging within the site
Jay *Garrulus glandarius*	Green		1	0	3	0	Foraging within the site
Long-tailed tit *Aegithalos caudatus*	Green		5	4	5	4	Possible breeding - 2 territories

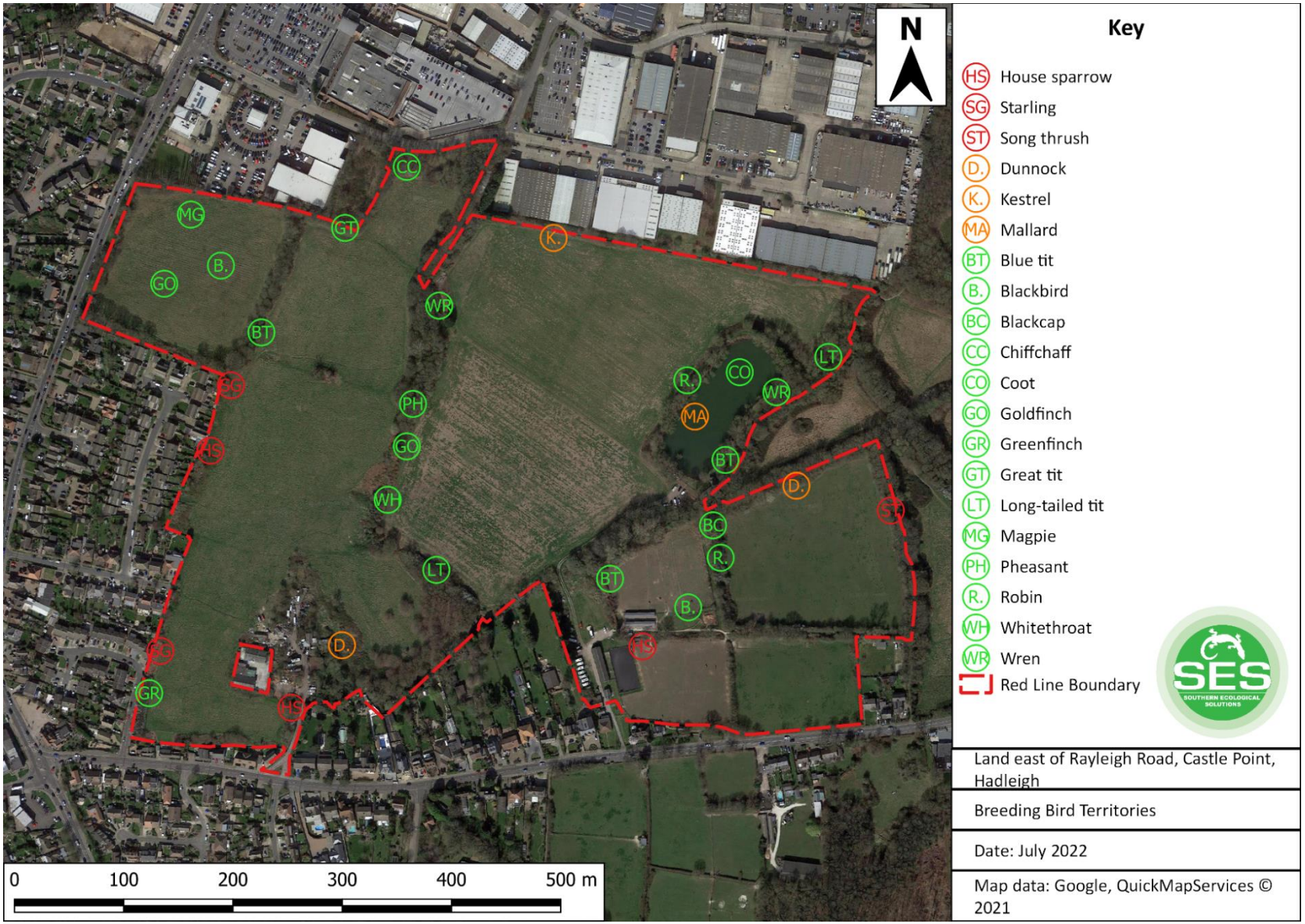
Species	BoCC	S. 41	V1	V2	V3	V4	Status
Magpie *Pica pica*	**Green**		6	14	3	0	Possible breeding – 1 territory
Pied wagtail *Motacilla alba*	**Green**		0	0	0	1	Foraging on the site
Reed warbler *Acrocephalus scirpaceus*	**Green**		0	0	0	1	Foraging on the site.
Robin *Erithacus rubecula*	**Green**		3	1	8	5	Probable breeding - 2 territories
Swallow *Hirundo rustica*	**Green**		2	2	1	0	Pairs in housing adjacent to site; foraging within site
Whitethroat *Sylvia communis*	**Green**		3	0	0	0	Possible breeding - 1 territory
Woodpigeon *Columba palumbus*	**Green**		1	1	0	0	Foraging on the site
Wren *Troglodytes troglodytes*	**Green**		5	1	5	3	Probable breeding - 2 territories
Little owl *Athene noctua*	**Introduced**		1	0	0	0	Hunting over the site
Pheasant *Phasianus colchicus*	**Introduced**		1	0	0	1	Possible breeding - 1 territory

I Introduced
N/A Not assessed
Red rows are BOCC red-list, Amber rows are BoCC amber-list, Green rows are BoCC green-list, NA rows are non-native species.
BoCC: Birds of Conservation Concern as defined and listed in Eaton *et al.,* (2021)

Table A9.2: Summary of breeding bird survey visit dates and weather conditions.

Visit	Date	Survey Conditions
1	17/06/2020	Good: 18°C (average), no precipitation, 1 wind, cloud 3/8, good visibility.
2	02/07/2020	Good: 18°C (average), no precipitation, 2 wind, cloud 5/8, good visibility.
3	13/04/2021	Good: 3°C (average), no precipitation, 1 wind, cloud 2/8, good visibility.
4	17/05/2021	Good: 11°C (average), no precipitation, 2 wind, cloud 8/8, good visibility.

Appendix 8b – Breeding Bird Survey Territory Map



Appendix 9: Great Crested Newt Survey Results

Appendix 9a – Locations of Ponds within 500m of the Site

Appendix 9b – HSI Survey Results

Table A9.1: Detailed HSI survey results.

Pond no.	1		4	
	Result	**Score**	**Result**	**Score**
1-Location	Zone A	1	A	1
2-Pond area	6720m^2	0.8	140m^2	0.3
3- Permanence	Never Dries	0.9	Dries Annually	0.1
4-Water quality	Good	1	Good	1
5- Shade	80%	0.6	100%	0.2
6- Waterfowl	Minor	0.67	Absent	1
7- Fish	Major	0	Absent	1
8- Pond count	4	0.72	5	0.75
9- Terrestrial habitat	Good	1	Good	1
10- Macrophytes	20%	0.5	10%	0.4
HSI Score	0.50		0.53	
Pond suitability	**Below Average**		**Below Average**	
Distance from the site	onsite		310m south	

Appendix 9c – eDNA Survey Results (June 2020)

Pond 1

Client: Josey Travell,
Southern Ecological Solutions

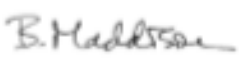
ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: 2020-1725	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 1 Rayleigh Road	Description: pond water samples in preservative	
Date of Receipt: 02/07/2020	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control[†]	2 of 2	Real Time PCR	16/07/2020
Degradation Control[‡]	Within Limits	Real Time PCR	16/07/2020
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	16/07/2020
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[¥]	4 of 4	Real Time PCR	As above for GCN

Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	16/07/2020	Date of issue:	16/07/2020

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

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

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

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

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

Pond 4

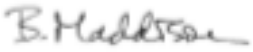
Client: Darren Denmede,
Southern Ecological Solutions

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: 2020-1336	Condition on Receipt: High Sediment	Volume: Passed
Client Identifier: Pond 4 Raleigh Road	Description: pond water samples in preservative	
Date of Receipt: 02/07/2020	Material Tested: eDNA from pond water samples	

Determinant	Result	Method	Date of Analysis
Inhibition Control[†]	0 of 2	Real Time PCR	16/07/2020
Degradation Control[‡]	Evidence of degradation or residual inhibition	Real Time PCR	16/07/2020
Great Crested Newt*	Indeterminate	Real Time PCR	16/07/2020
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)*	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	16/07/2020	Date of issue:	16/07/2020

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

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

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

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

**Additional positive controls (10^{-3}, 10^{-5}, 10^{-6} ng/µL) are also routinely run, results not shown here.*

Appendix 9d – eDNA Survey Results (April 2021)

Pond 4

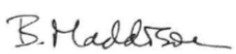
Client: Laura Bennett,
SES Eco

ADAS
Spring Lodge
172 Chester Road
Helsby
WA6 0AR

Tel: 01159 516747
Email: Helen.Rees@adas.co.uk

www.adas.uk

Sample ID: ADAS-1282	Condition on Receipt: Low Sediment	Volume: Passed
Client Identifier: Pond 4 Hadleigh	Description: pond water samples in preservative	
Date of Receipt: 29/04/2021	Material Tested: eDNA from pond water samples	

Determinant	**Result**	**Method**	**Date of Analysis**
Inhibition Control[†]	0 of 2	Real Time PCR	11/05/2021
Degradation Control[§]	Within Limits	Real Time PCR	11/05/2021
Great Crested Newt*	0 of 12 (GCN negative)	Real Time PCR	11/05/2021
Negative PCR Control (Nuclease Free Water)	0 of 4	Real Time PCR	As above for GCN
Positive PCR Control (GCN DNA 10^{-4} ng/µL)[#]	4 of 4	Real Time PCR	As above for GCN
Report Prepared by:	Dr Helen Rees	Report Issued by:	Dr Ben Maddison
Signed:		Signed:	
Position:	Director: Biotechnology	Position:	MD: Biotechnology
Date of preparation:	11/05/2021	Date of issue:	11/05/2021

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

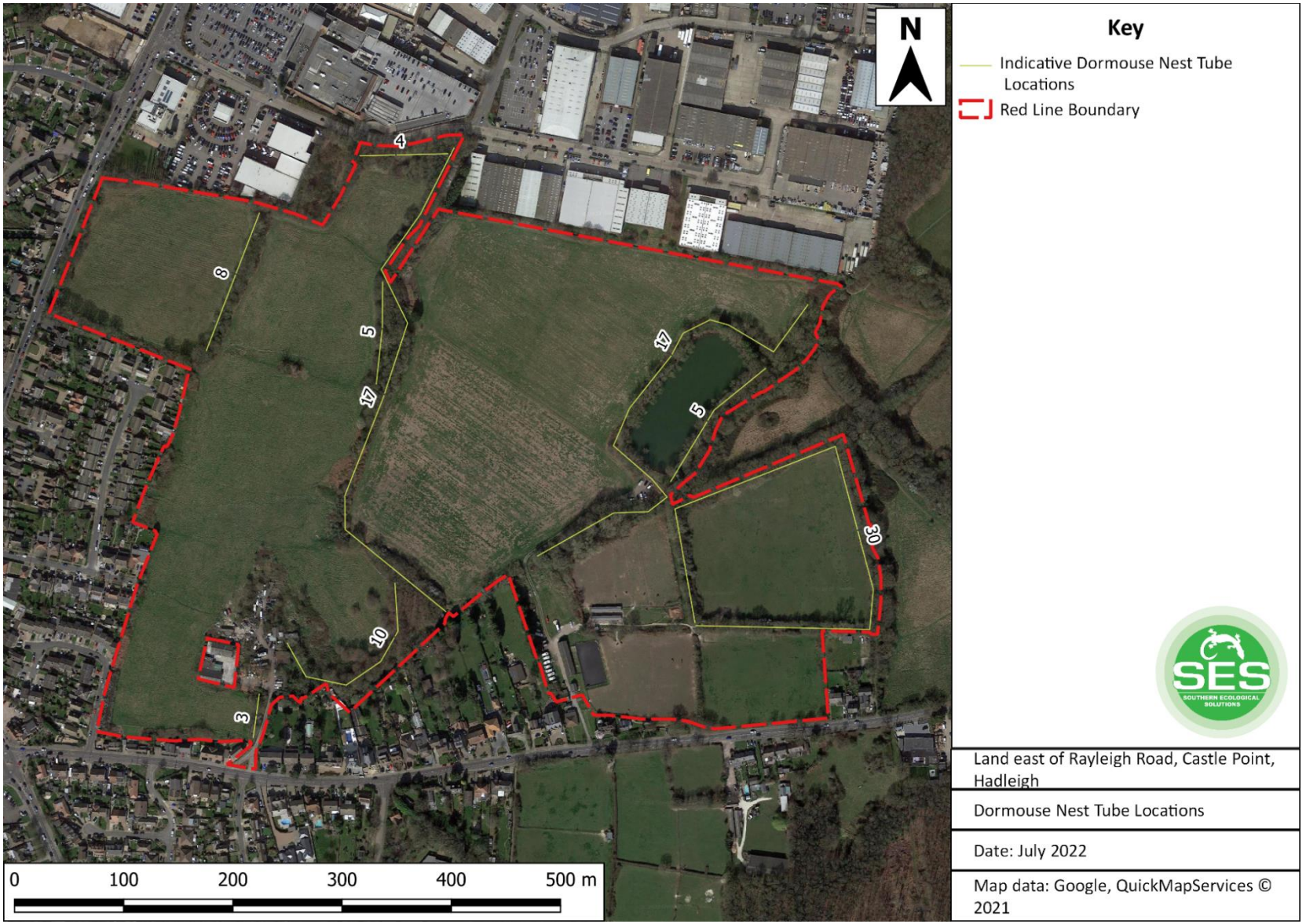
** If all PCR controls and extraction blanks give the expected results a sample is considered: negative for great crested newt if all of the replicates are negative; positive for great crested newt if one or more of the replicates are positive.*

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

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

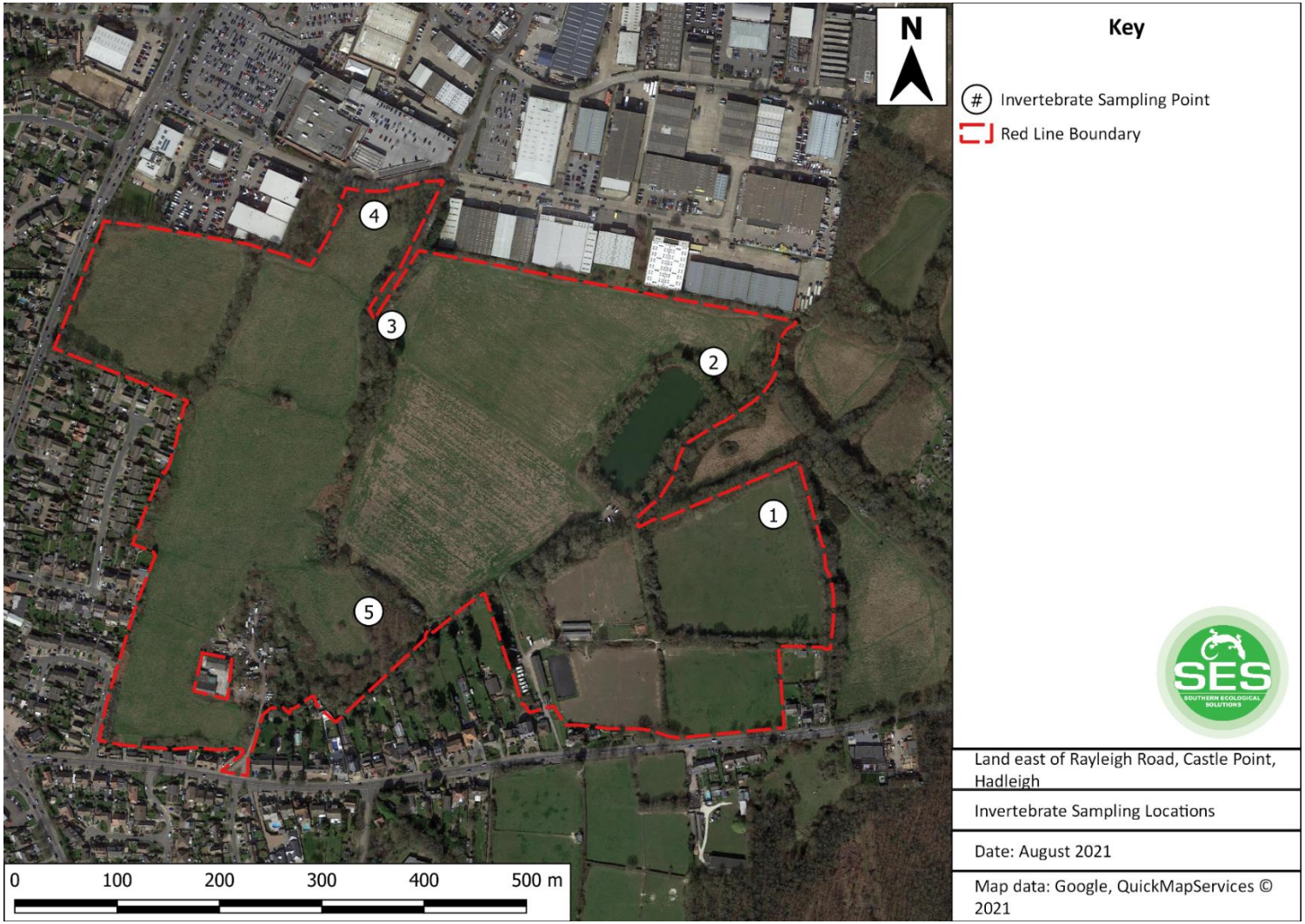
[#]Additional positive controls (10^{-1}, 10^{-2}, 10^{-3} ng/µL) are also routinely run, results not shown here.

Appendix 10. Dormouse Nest Tube Location Plan



Appendix 11: Invertebrate Survey Results

Appendix 11a – Locations of Invertebrate Sampling Stations



Appendix 11b – Combined survey information from 2020 and 2021

Table A12.1: Detailed species survey data.

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Mollusca	Discidae	*Discus rotundatus*					X
Mollusca	Helicidae	*Cornu aspersum*					X
Mollusca	Helicidae	*Monacha cantiana*					X
Mollusca	Zonitidae	*Oxychilus alliarius*				X	X
Molluscs	Helicidae	*Cepaea hortensis*					X
Isopoda	Armadillidae	*Armadillidium vulgare*					X
Isopoda	Oniscidae	*Oniscus asellus*					X
Isopoda	Philosciidae	*Philoscia muscorum*					X
Isopoda	Platyarthridae	*Platyarthrus hoffmannseggii*			X		
Isopoda	Porcellionidae	*Porcellio scaber*					X
Arachnida – Araneae	Araneidae	*Araneus diadematus*	X	X			X
Arachnida – Araneae	Araneidae	*Araniella cucurbitina*					X
Arachnida – Araneae	Clubionidae	*Cheiracanthium erraticum*		X			
Arachnida – Araneae	Clubionidae	*Clubiona comta*				X	
Arachnida – Araneae	Gnaphosidae	*Zelotes latreillei*				X	
Arachnida – Araneae	Linyphiidae	*Diplostyla concolor*		X			
Arachnida – Araneae	Linyphiidae	*Dismodicus bifrons*		X			
Arachnida – Araneae	Linyphiidae	*Erigone atra*			X		
Arachnida – Araneae	Linyphiidae	*Erigone dentipalpis*		X			
Arachnida – Araneae	Linyphiidae	*Lepthyphantes tenuis*		X			
Arachnida – Araneae	Linyphiidae	*Lepthyphantes zimmermanni*		X			
Arachnida – Araneae	Linyphiidae	*Linyphia hortensis*		X			
Arachnida – Araneae	Linyphiidae	*Neriene peltata*		X			
Arachnida – Araneae	Linyphiidae	*Tenuiphantes mengei*					X
Arachnida – Araneae	Linyphiidae	*Tenuiphantes tenuis*		X			
Arachnida – Araneae	Lycosidae	*Alopecosa pulverulenta*					X
Arachnida – Araneae	Lycosidae	*Trochosa terricola*		X			
Arachnida – Araneae	Nemastomatidae	*Nemastoma bimaculatum*			X		
Arachnida – Araneae	Phalangiidae	*Mitopus morio*		X			
Arachnida – Araneae	Phalangiidae	*Opilio saxatilis*					X
Arachnida – Araneae	Phalangiidae	*Phalangium opilio*					X
Arachnida – Araneae	Phalangiidae	*Platybunus triangularis*		X			
Arachnida – Araneae	Philodromidae	*Philodromus aureolus*					X
Arachnida – Araneae	Philodromidae	*Tibellus oblongus*		X			
Arachnida – Araneae	Pisauridae	*Pisaura mirabilis*			X		
Arachnida – Araneae	Salticidae	*Euophrys frontalis*					X
Arachnida – Araneae	Salticidae	*Heliophanus cupreus*			X		
Arachnida – Araneae	Salticidae	*Heliophanus flavipes*	X				
Arachnida – Araneae	Tetragnathidae	*Metellina mengei*			X		
Arachnida – Araneae	Theridiidae	*Enoplognatha ovata*	X			X	X
Arachnida – Araneae	Thomisidae	*Xysticus cristatus*					X
Arachnida – Araneae	Zoridae	*Zora spinimana*		X			
Coleoptera	Anthicidae	*Anthicus antherinus*				X	
Coleoptera	Apidae	*Anthophora plumipes*					X
Coleoptera	Apionidae	*Ceratapion gibbirostre*				X	
Coleoptera	Apionidae	*Ceratapion onopordi*				X	
Coleoptera	Apionidae	*Eutrichapion ervi*		X			

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Coleoptera	Apionidae	*Ischnopterapion loti*					X
Coleoptera	Apionidae	*Protapion apricans*					X
Coleoptera	Cantharidae	*Cantharis nigra*				X	
Coleoptera	Cantharidae	*Rhagonycha fulva*		X			X
Coleoptera	Carabidae	*Amara convexior*					X
Coleoptera	Carabidae	*Badister bullatus*		X			
Coleoptera	Carabidae	*Demetrias atricapillus*		X			
Coleoptera	Carabidae	*Harpalus affinis*		X			
Coleoptera	Carabidae	*Harpalus rufipes*					X
Coleoptera	Carabidae	*Microlestes maurus*					X
Coleoptera	Carabidae	*Nebria brevicollis*		X			
Coleoptera	Carabidae	*Notiophilus biguttatus*	X	X			X
Coleoptera	Carabidae	*Paradromius linearis*				X	
Coleoptera	Carabidae	*Philorhizus melanocephalus*				X	
Coleoptera	Carabidae	*Pterostichus madidus*		X			
Coleoptera	Carabidae	*Pterostichus melanarius*		X			
Coleoptera	Carabidae	*Pterostichus nigrita*			X		
Coleoptera	Cerambycidae	*Agapanthia villosoviridescens*		X			
Coleoptera	Cerambycidae	*Clytus arietis*				X	
Coleoptera	Chrysomelidae	*Altica lythri*				X	
Coleoptera	Chrysomelidae	*Bruchus loti*	X				X
Coleoptera	Chrysomelidae	*Bruchus rufipes*					X
Coleoptera	Chrysomelidae	*Cassida rubiginosa*					X
Coleoptera	Chrysomelidae	*Longitarsus dorsalis*				X	
Coleoptera	Chrysomelidae	*Longitarsus pratensis*				X	
Coleoptera	Chrysomelidae	*Phaedon tumidulus*					X
Coleoptera	Chrysomelidae	*Phyllotreta atra*		X			
Coleoptera	Chrysomelidae	*Sphaeroderma testaceum*					X
Coleoptera	Coccinellidae	*Adalia bipunctata*		X		X	X
Coleoptera	Coccinellidae	*Coccinella septempunctata*				X	
Coleoptera	Coccinellidae	*Coccinella undecimpunctata*				X	
Coleoptera	Coccinellidae	*Harmonia axyridis*					X
Coleoptera	Coccinellidae	*Rhyzobius litura*		X			
Coleoptera	Coccinellidae	*Subcoccinella vigintiquattuorpunctata*		X			
Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*					X
Coleoptera	Curculionidae	*Ceutorhynchus erysimi*		X			
Coleoptera	Curculionidae	*Hypera nigrirostris*					X
Coleoptera	Curculionidae	*Hypera postica*			X		
Coleoptera	Curculionidae	*Phyllobius virideaeris*				X	
Coleoptera	Curculionidae	*Sitona hispidulus*				X	
Coleoptera	Curculionidae	*Sitona humeralis*			X		
Coleoptera	Curculionidae	*Sitona lineatus*				X	
Coleoptera	Curculionidae	*Sitona puncticollis*			X		
Coleoptera	Curculionidae	*Sitona suturalis*	X				
Coleoptera	Curculionidae	*Trichosirocalus troglodytes*					X
Coleoptera	Elateridae	*Agriotes lineatus*		X			X
Coleoptera	Elateridae	*Agriotes sputator*					X
Coleoptera	Elateridae	*Athous haemorrhoidalis*				X	X
Coleoptera	Elateridae	*Kibunea minuta*		X			
Coleoptera	Latridiidae	*Corticarina minuta*			X		

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Coleoptera	Malachiidae	*Malachius bipustulatus*		X		X	X
Coleoptera	Mordellidae	*Mordellistena neuwaldeggiana*		X			
Coleoptera	Oedemeridae	*Oedemera lurida*	X	X			
Coleoptera	Oedemeridae	*Oedemera nobilis*	X	X	X	X	X
Coleoptera	Silphidae	*Nicrophorus vespillo*					X
Coleoptera	Silphidae	*Silpha atrata*		X			
Coleoptera	Staphylinidae	*Drusilla canaliculata*		X			
Coleoptera	Staphylinidae	*Gyrohypnus fracticornis*		X			
Coleoptera	Staphylinidae	*Ischnosoma splendidum*					X
Coleoptera	Staphylinidae	*Metopsia clypeata*					X
Coleoptera	Staphylinidae	*Mocyta fungi*		X			
Coleoptera	Staphylinidae	*Quedius semiobscurus*		X			
Coleoptera	Staphylinidae	*Sepedophilus nigripennis*				X	
Coleoptera	Staphylinidae	*Stenus aceris*			X		
Coleoptera	Staphylinidae	*Stenus ossium*		X			
Coleoptera	Staphylinidae	*Tachyporus atriceps*		X			
Coleoptera	Staphylinidae	*Tachyporus dispar*			X		
Coleoptera	Staphylinidae	*Tachyporus hypnorum*				X	
Coleoptera	Staphylinidae	*Tachyporus pusillus*			X		
Coleoptera	Staphylinidae	*Tachyporus solutus*			X		
Coleoptera	Tenebrionidae	*Lagria hirta*	X			X	
Dermaptera	Forficulidae	*Forficula auricularia*					X
Diptera	Asilidae	*Dioctria atricapilla*	X	X			X
Diptera	Asilidae	*Dioctria baumhaueri*					X
Diptera	Asilidae	*Dioctria rufipes*		X			X
Diptera	Asilidae	*Leptogaster cylindrica*	X			X	
Diptera	Bibionidae	*Bibio marci*	X	X			
Diptera	Bibionidae	*Dilophus febrilis*	X				
Diptera	Bombylidae	*Bombylius major*		X			
Diptera	Calliphoridae	*Calliphora vicina*					X
Diptera	Calliphoridae	*Lucilia caesar*					X
Diptera	Chloropidae	*Elachiptera cornuta*				X	
Diptera	Conopidae	*Conops quadrifasciatus*				X	
Diptera	Conopidae	*Myopa buccata*					X
Diptera	Conopidae	*Sicus ferrugineus*	X	X			
Diptera	Dolichopodidae	*Dolichopus festivus*		X			
Diptera	Dolichopodidae	*Dolichopus griseipennis*		X			
Diptera	Dolichopodidae	*Hercostomus cupreus*		X			
Diptera	Empididae	*Empis aestiva*		X			
Diptera	Empididae	*Empis livida*	X	X			
Diptera	Empididae	*Empis nigripes*		X			
Diptera	Hybotidae	*Platypalpus annulipes*					X
Diptera	Lauxaniidae	*Tricholauxania praeusta*		X			
Diptera	Lonchopteridae	*Lonchoptera lutea*			X		
Diptera	Muscidae	*Coenosia tigrina*					X
Diptera	Muscidae	*Helina evecta*					X
Diptera	Rhagionidae	*Chrysopilus cristatus*		X			
Diptera	Rhagionidae	*Rhagio scolopaceus*		X			
Diptera	Rhinophoridae	*Paykullia maculata*				X	
Diptera	Sarcophagidae	*Brachicoma devia*					X
Diptera	Scathophagidae	*Scathophaga stercoraria*			X		

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Diptera	Sepsidae	*Sepsis fulgens*					X
Diptera	Stratiomyidae	*Beris chalybata*		X			
Diptera	Stratiomyidae	*Chloromyia formosa*	X	X			
Diptera	Stratiomyidae	*Chorisops tibialis*		X			
Diptera	Stratiomyidae	*Sargus bipunctatus*		X			
Diptera	Syrphdiae	*Helophilus pendulus*			X		
Diptera	Syrphidae	*Cheilosia albitarsis*				X	X
Diptera	Syrphidae	*Cheilosia bergenstammi*				X	
Diptera	Syrphidae	*Cheilosia variabilis*		X			
Diptera	Syrphidae	*Epistrophe eligans*		X			
Diptera	Syrphidae	*Episyrphus balteatus*		X		X	X
Diptera	Syrphidae	*Eristalinus sepulchralis*		X			
Diptera	Syrphidae	*Eristalis arbustorum*	X		X		X
Diptera	Syrphidae	*Eristalis intricarius*					X
Diptera	Syrphidae	*Eristalis nemorum*			X		X
Diptera	Syrphidae	*Eristalis pertinax*		X			
Diptera	Syrphidae	*Eristalis tenax*		X		X	X
Diptera	Syrphidae	*Eupeodes luniger*				X	
Diptera	Syrphidae	*Melanostoma mellinum*				X	
Diptera	Syrphidae	*Merodon equestris*	X				
Diptera	Syrphidae	*Neoascia tenur*				X	X
Diptera	Syrphidae	*Platycheirus albimanus*		X			
Diptera	Syrphidae	*Platycheirus clypeatus*	X	X			
Diptera	Syrphidae	*Platycheirus manicatus*			X		
Diptera	Syrphidae	*Sphaerophoria scripta*		X			
Diptera	Syrphidae	*Syritta pipiens*	X	X	X	X	X
Diptera	Syrphidae	*Syrphus ribesii*		X			
Diptera	Syrphidae	*Volucella pellucens*		X			
Diptera	Syrphidae	*Volucella zonaria*					X
Diptera	Tabanidae	*Haematopota pluvialis*		X			
Diptera	Tephritidae	*Tephritis cometa*		X			
Diptera	Tephritidae	*Tephritis formosa*		X			
Diptera	Tephritidae	*Urophora cardui*	X	X			
Diptera	Tipulidae	*Limonia nubeculosa*		X			X
Diptera	Tipulidae	*Nephrotoma flavescens*					X
Diptera	Tipulidae	*Tipula fascipennis*		X			
Diptera	Tipulidae	*Tipula oleracea*		X			
Hemiptera - Heteroptera	Acanthosomatidae	*Elasmucha grisea*	X			X	X
Hemiptera - Heteroptera	Coreidae	*Coriomeris denticulatus*	X				
Hemiptera - Heteroptera	Lygaediae	*Cymus melanocephalus*				X	
Hemiptera - Heteroptera	Lygaediae	*Heterogaster urticae*			X		X
Hemiptera - Heteroptera	Miridae	*Apolygus lucorum*					X
Hemiptera - Heteroptera	Miridae	*Calocoris norvegicus*		X			X
Hemiptera - Heteroptera	Miridae	*Capsus ater*			X		X
Hemiptera - Heteroptera	Miridae	*Closterotomus norwegicus*	X	X	X	X	X
Hemiptera - Heteroptera	Miridae	*Deraeocoris ruber*				X	
Hemiptera - Heteroptera	Miridae	*Leptopterna dolabrata*		X			
Hemiptera - Heteroptera	Miridae	*Liocoris tripustulatus*				X	
Hemiptera - Heteroptera	Miridae	*Lygocoris pabulinus*				X	X
Hemiptera - Heteroptera	Miridae	*Lygus rugulipennis*				X	X
Hemiptera - Heteroptera	Miridae	*Notostira elongata*					X

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Hemiptera - Heteroptera	Miridae	*Pithanus maerkelii*	X	X			
Hemiptera - Heteroptera	Miridae	*Stenodema calcarata*				X	
Hemiptera - Heteroptera	Nabidae	*Nabis flavomarginatus*	X				
Hemiptera - Heteroptera	Pentatomidae	*Dolycoris baccarum*				X	X
Hemiptera - Heteroptera	Pentatomidae	*Eurydema oleracea*	X				
Hemiptera - Heteroptera	Pentatomidae	*Palomena prasina*		X			X
Hemiptera - Heteroptera	Pentatomidae	*Pentatoma rufipes*				X	X
Hemiptera - Heteroptera	Pentatomidae	*Podops inuncta*	X				
Hemiptera - Heteroptera	Pentatomidae	*Troilus luridus*		X			
Hemiptera: Auchenorrhyncha	Aphrophoridae	*Aphrophora alni*		X			
Hemiptera: Auchenorrhyncha	Aphrophoridae	*Neophilaenus lineatus*		X			
Hemiptera: Auchenorrhyncha	Aphrophoridae	*Philaenus spumarius*		X			
Hemiptera: Auchenorrhyncha	Cicadellidae	*Cicadella viridis*		X			
Hemiptera: Auchenorrhyncha	Cicadellidae	*Eupteryx urticae*	X				
Hemiptera: Auchenorrhyncha	Cicadellidae	*Euscelis incisus*			X		
Hemiptera: Auchenorrhyncha	Cicadellidae	*Zyginidia scutellaris*		X			
Hemiptera: Auchenorrhyncha	Delphacidae	*Javesella pellucida*		X			
Hemiptera: Auchenorrhyncha	Delphacidae	*Stenocranus minutus*				X	
Hemiptera: Heteroptera	Acanthosomatidae	*Acanthosoma haemorrhoidale*					X
Hemiptera: Heteroptera	Anthocoridae	*Anthocoris confusus*				X	
Hemiptera: Heteroptera	Coreidae	*Coreus marginatus*		X			
Hemiptera: Heteroptera	Lygaeidae	*Nysius huttoni*				X	
Hemiptera: Heteroptera	Miridae	*Deraeocoris lutescens*		X			
Hemiptera: Heteroptera	Miridae	*Stenodema laevigata*				X	
Hemiptera: Heteroptera	Nabidae	*Himacerus mirmicoides*					X
Hemiptera: Heteroptera	Nabidae	*Nabis ferus*		X		X	
Hemiptera: Heteroptera	Pentatomidae	*Aelia acuminata*	X				
Hemiptera: Heteroptera	Rhopalidae	*Corizus hyoscyami*				X	
Hemiptera: Heteroptera	Rhopalidae	*Rhopalus subrufus*		X			
Hemiptera: Heteroptera	Tingidae	*Tingis cardui*		X			X
Hymenoptera	Andrenidae	*Andrena dorsata*				X	
Hymenoptera	Andrenidae	*Andrena flavipes*					X
Hymenoptera	Andrenidae	*Andrena fulva*					X
Hymenoptera	Andrenidae	*Andrena praecox*					X
Hymenoptera	Apidae	*Bombus hortorum*			X	X	
Hymenoptera	Apidae	*Bombus hypnorum*		X			X
Hymenoptera	Apidae	*Bombus lapidarius*	X				
Hymenoptera	Apidae	*Bombus pascuorum*	X	X	X	X	
Hymenoptera	Apidae	*Bombus sylvarum*	X				
Hymenoptera	Apidae	*Bombus terrestris*	X				
Hymenoptera	Apidae	*Colletes similis*				X	
Hymenoptera	Apidae	*Halictus rubicundus*				X	
Hymenoptera	Apidae	*Halictus tumulorum*				X	X
Hymenoptera	Apidae	*Nomada goodeniana*	X				
Hymenoptera	Chrysididae	*Chrysis ignita*				X	

Higher taxon	Family	Species	Sampling stations				
			1	2	3	4	5
Hymenoptera	Colletidae	*Hylaeus communis*		X			
Hymenoptera	Crabronidae	*Cerceris rybyensis*	X				
Hymenoptera	Crabronidae	*Ectemnius continuus*					X
Hymenoptera	Formicidae	*Formica fusca*				X	
Hymenoptera	Formicidae	*Lasius niger*	X		X		X
Hymenoptera	Formicidae	*Myrmica scabrinodis*		X			
Hymenoptera	Halictidae	*Lasioglossum leucopus*	X			X	
Hymenoptera	Halictinae	*Lasioglossum calceatum*	X				
Hymenoptera	Megachilidae	*Megachile versicolor*		X			X
Hymenoptera	Vespidae	*Gymnomerus laevipes*		X			
Hymenoptera	Vespidae	*Vespula vulgaris*	X			X	
Lepidoptera	Arctiidae	*Tyria jacobaeae*	X	X			X
Lepidoptera	Hesperidae	*Thymelicus sylvestris*	X				X
Lepidoptera	Hesperiidae	*Ochlodes faunus*					X
Lepidoptera	Hesperiidae	*Thymelicus lineola*	X				X
Lepidoptera	Lepidoptera	*Aphantopus hyperantus*	X	X		X	X
Lepidoptera	Lycaednidae	*Polyommatus icarus*		X			
Lepidoptera	Lycaenidae	*Lycaena phlaeas*		X		X	X
Lepidoptera	Nymphalidae	*Aglais io*				X	
Lepidoptera	Nymphalidae	*Inachis io*	X				X
Lepidoptera	Nymphalidae	*Vanessa atalanta*		X			
Lepidoptera	Pieridae	*Colias croceus*	X				
Lepidoptera	Pieridae	*Pieris brassicae*			X		
Lepidoptera	Satyridae	*Coenonympha pamphilus*	X				X
Lepidoptera	Satyridae	*Maniola jurtina*	X	X			
Lepidoptera	Satyridae	*Melanargia galathea*					X
Lepidoptera	Satyridae	*Pararge aegeria*			X		
Lepidoptera	Satyridae	*Pyronia tithonus*		X			
Lepidoptera	Nymphalidae	*Polygonia c-album*	X				
Mecoptera	Panorpidae	*Panorpa communis*		X			
Neuroptera	Chrysopidae	*Hemerobius humulinus*		X			
Orthoptera	Acrididae	*Chorthippus brunneus*				X	X
Orthoptera	Acrididae	*Chorthippus parallelus*		X			
Orthoptera	Conocephalidae	*Conocephalus fuscus*		X			
Orthoptera	Meconematodae	*Meconema thalassinum*			X		
Orthoptera	Phaneropteridae	*Leptophyes punctatissima*					X
Orthoptera	Tetrigidae	*Tetrix undulata*		X			
Orthoptera	Tettigoniidae	*Metrioptera roeselii*		X			X

Appendix 12: Reptile Survey Results

Appendix 12a – Reptile Refugia Location Plan

Appendix 12b – Reptile Survey Results

Table A13.1: Detailed reptile survey results.

Visit No.	Date	Temperature (°C)	Cloud (%)	Wind (Beaufort)	Precipitation	Species	Location
1	22/07/2020	16	60	1	0	2 x female common lizard 5 x female slow worm	Grassland habitats – Field Compartments 1, 2 & 3.
2	29/07/2020	18	0	1	0	1 x male common lizard 3 x slow worm (1 female, 2 male)	Grassland habitats – Field Compartment 1
3	03/08/2020	18	0	0	0	2 x slow worm (1 male, 1 juvenile)	Grassland habitats – Field Compartments 1 & 2.
4	05/08/2020	18	0	1	0	2 x slow worm (1 male, 1 juvenile)	Grassland habitats - Field Compartment 1
5	17/08/2020	17	10	1	0	5 x slow worm (3 female, 2 male)	Grassland habitats - Field Compartments 1 & 2.
6	29/08/2020	15	80	0	0	2 x female common lizard	Grassland habitats - Field Compartment 1
7	23/09/2020	17	100	1	0	2 x female common lizard	Grassland habitats - Field Compartment 2

Appendix 13: Habitat Creation and Management Summary

Specific detail to be provided within the LEMP, below is a guide to establish feature habitats.

Scrub grassland

- The seed mix (EM10 or similar) will be sown in late spring or autumn

- The grassland will be mown regularly throughout the first year of establishment to a height of 40-60mm to control annual weeds and help maintain balance between faster growing grasses and slower developing wildflowers.

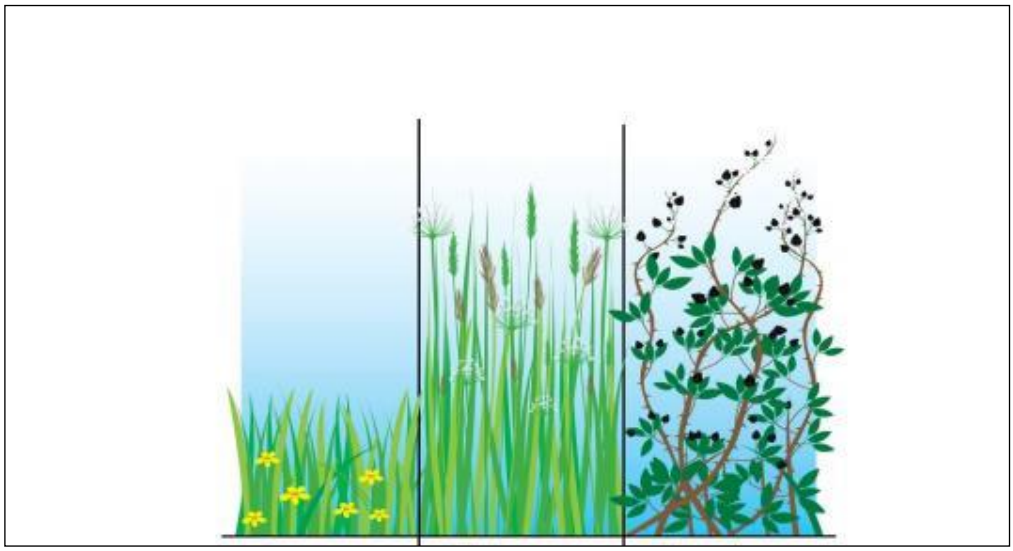
- Post-establishment, tussock grassland areas will be cut on a 3 year rotation, with no more than a third of the total habitat resource or two hectares (whichever is smaller) cut in any one year (Edgar, Foster & Baker 2010). This will ensure continuous provision of longer-sward grassland suitable for reptiles and attractive to invertebrate species. Cutting of tussock grassland areas will be undertaken during the winter period of reptile inactivity from November to February when individuals will be concentrated within scrub, roots and purpose-built hibernacula refuge habitats, to minimise risk of harm. Arisings will be collected and used to form compost piles located close to reptile hibernacula, to provide egg-laying site for grass snake in the spring.

- Natural features that develop such as ant hills will be retained and not destroyed as they create valuable micro habitats for animals and plants.

- This regime will create a biodiverse grass sward and in turn provide a valuable habitat for invertebrates, foraging bats, badgers and breeding and over wintering birds coupled with nesting habitat provided within the built development and biodiversity building which complement the provision of this habitat.

- Islands of species rich scrub will be planted with November – February. These islands will be mapped and a maximum extent of scrub encroachment will be established with managed with the aim of creating a gradient of scrub/ tall herbs to grassland of varied ages (see figure below). This will be achieved through 5 year rotational cuts (dictated by ground conditions). These cuts will be outside of nesting bird season March to August (inclusive)

Scrub grading to tall ruderal and grassland



Meadow grassland

- Wildflower grassland will be created using Emorsgate Seeds mixture EM3 (or similar suitable mix) with an increased proportion of yellow rattle versus the standard mix, as this mix is suitable where precise soil and site characteristics have not been established before sowing.

- Identified areas will be sown in September. Prior to sowing, any existing vegetation will be tightly cut, clippings will be removed, and the area scarified with a harrow to reveal bare soil. Spot spraying of all competitive weeds such as for thistle *Cirsium sp.* and ragwort *Jacobaea vulgaris* will also be undertaken before seed is sown.

- Yellow rattle Rhinanthus minor will be seeded along with the meadow mix as this is a parasite on and reduces grass; thus its inclusion in the planting mix should help to aid the establishment of wildflowers which may otherwise be outcompeted by fast growing grasses (English Nature/Wildlife Trusts, 1999). Yellow rattle will be sourced from a reputable supplier (see Supplier List on www.floralocale.org).

- In year 1 the grassland will be maintained to a height of 200mm between May and July. This will be above the height of the yellow rattle, allowing time for this species to set seed with the intention of achieving blanket coverage of the meadow within 5 years. In July, the grassland will be cut short to <20mm (short cuttings will dry out quickly so will not smother seedlings).

- In year 2, weeds which have grown back from the seed bank will be topped via a main cut to 150mm during mid-summer, with a final cut to <20mm undertaken in mid-October. The latter will replicate aftermath grazing as in traditional hay meadow management (English Nature/Wildlife Trusts, 1999). Arisings will be removed and used to form compost heaps adjacent to reptile hibernacula.

- In years 1 and 2 the wildflower meadow will be protected from disturbance by restricting access with temporary barrier fencing and signage.

- Year 3 will follow the same pattern as year 2. If the winter has been warm and dry, an additional spring cut to <20mm may be necessary to remove early growth that could swamp wildflowers later in the year; the need for this measure will be determined by the on-site ECoW.

- Throughout the first 3 years of establishment, the ECoW will undertake a yearly 'snagging' visit during late spring to highlight any challenges to successful establishment such as weed problems. Additional spot spraying/ pulling is likely to be required on an ongoing basis. Spot spraying is most effective and will be undertaken in April to early May. A detailed review will be carried out in year 4 and plans adjusted accordingly with the repetition of year 3 actions. If good coverage of yellow rattle has not been achieved across the wildflower meadow area, additional seeds will be sown in autumn of year 4 following the short October cut.

- Throughout and beyond establishment, timing of the main summer cut will be varied year on year to maximise the structural and species diversity of the sward, alternating between early cuts (in July) to later cuts (in August to September). A rotational cutting regime will be followed whereby no more than one third of the total wildflower meadow habitat resource is cut at any one time.

- It is predicted that wildflowers will spread into surrounding grassland as the habitat matures.

Wet grassland

Areas of wet grassland will be sown with EM8 / 4 (or similar). Management as per meadow grassland.

Broadleaved Woodland

- Native woody species will be planted explicitly not in straight lines with centres every 2-3m. Species will be native mimicking that of the lowland deciduous woodland onsite with the intention of creating a multi story woodland. A thorny shelter belt will be planted to provide protection from excess recreational pressure.

- Planting should occur between November – March, preferably in November after the first frost. A dibber should be used to plant bare root trees with suitable rabbit and deer browsing guards. Spot spraying of competitive vegetation should occur in the spring. Large scale failures should be replaced but failures on a smaller scale should be tolerated as this could provide more diverse, varied woodland.

- Woodland should be thinned on a 7 year rotation with dead wood.

Orchard

Orchard management

- An orchard will be planted with species of local provenance. Due to modern day farming methods and how we source fruit; orchards within the UK have been uneconomic and thus have suffered major declines since the 1950's. Orchards managed in a low intensity manner produce a rich biodiverse habitat.

Orchard Trees

- For orchard biodiversity to flourish a variety of trees of varying age are required. Fruit trees are generally, although not necessarily, short-lived trees compared to other hardwood species. This means that they

begin to produce veteran tree features such as hollow trunks, rot holes, split bark, tears, lightning strikes and sap runs relatively quickly. Because of the wide tree spacing in orchards compared to woodland, the dead and decaying wood is usually in open, sunny locations. These conditions create good habitat for insects and other invertebrate species which depend on decaying wood habitats.

Management Requirements

- As in parkland or wood pasture sites, careful management of the trees is necessary to maintain older individual ones. Dead and decaying branches should not be removed unless they interfere with necessary operations or are unsafe. Large cut branches, fallen dead wood or remains of old trees should be left on site. Planned replanting over time and adequate aftercare of new fruit trees is also required to ensure the long term future of the orchard.

- The abundance of climbers such as bramble and ivy should be controlled to allow plants and animals that need higher light levels or warmth to survive.

- Any tree health problems need to be assessed on a case by case basis. The application of chemicals to control pests and diseases should be minimised, and their use should be the exception rather than the rule.

Orchard Floor Management

- The grasses at the base of the orchard floor should be cut in late summer and again in the September/ October. Grass arising should be removed to rather than left in situ to prevent soil nutrients building up and therefore favouring competitive species at the expense of a varied sward. Further cuts may be needed should scrub come a problem. A network of mown paths should be maintained to allow people to enjoy and forage from the orchard.

- Many species of bumblebee, solitary bee and other insects may be present in an orchard. Wild bees play an important role during the blossom period when they help to pollinate the orchard trees. They are particularly helpful as they are active in colder conditions and forage for longer than honey bees. Many bee species use pollen and nectar from flowers in the orchard grassland and tall herb areas as well as fruit blossom on the trees. Members of the daisy family (such as ox-eye daisy *Leucanthemum vulgare*), hogweed *Heracleum sphondylium* and other umbellifers and legumes (clovers, vetches and trefoils) are particularly important food sources.

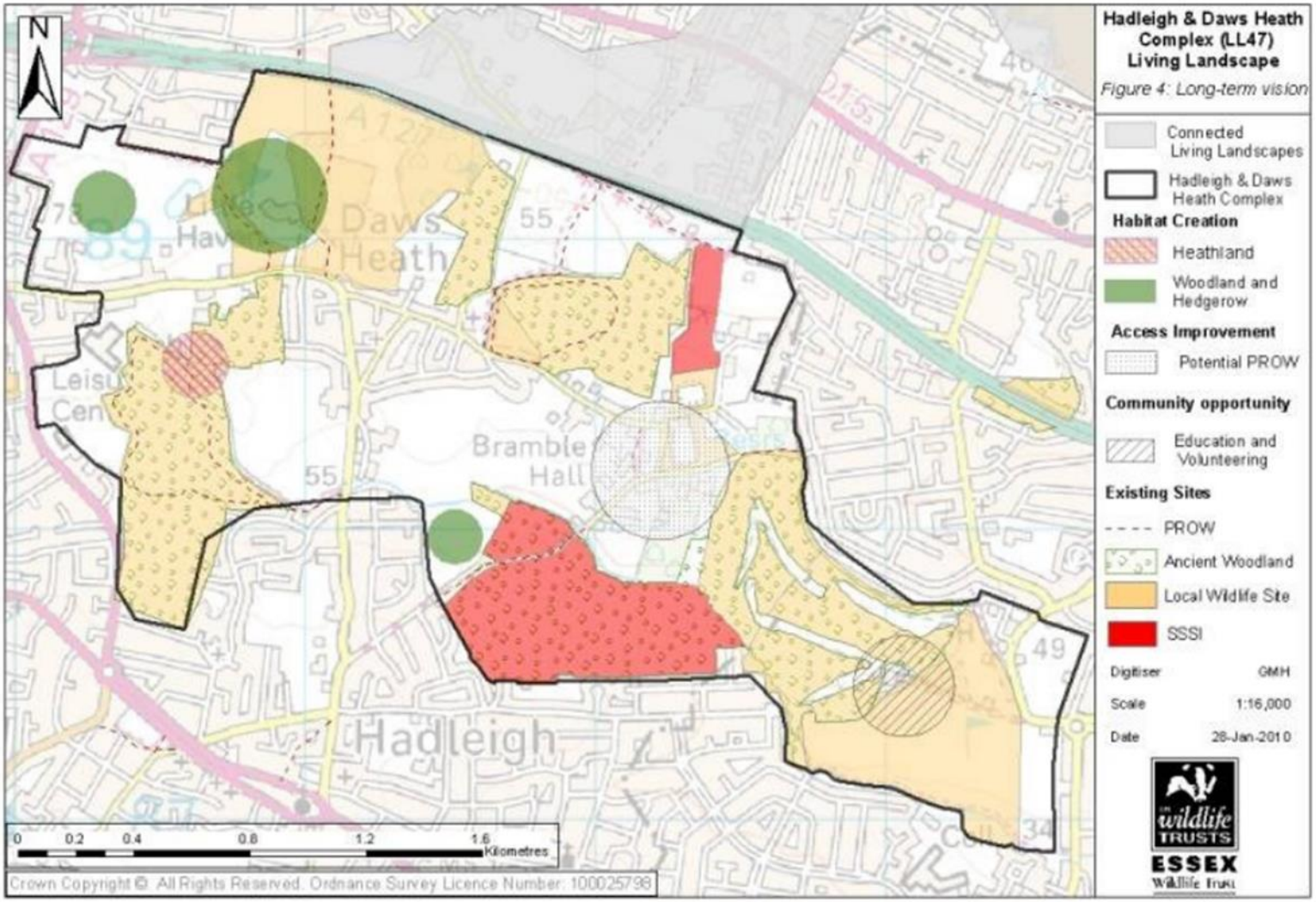
Hedgerows

- The site has been master planned to retain key hedgerows where possible. Existing hedgerows will be ‘gapped up’ where necessary to ensure that no gaps are presented larger than 10% of the hedgerow. Planting of whips with rabbit guards will be undertaken from November – February. Fruiting species will also be used to gap up hedgerows providing a valuable late season food source for many species. New hedgerows will be species rich (10 species including fruiting varieties see Appendix 5 for suggested planting list) with at least one standard tree per 50m. Retained and created hedgerows will be maintained in a low intensity manner meaning that cutting is carried out on 2-3 year rotation this will allow the development of hedge that is diverse in structure and prevent tall and woody ‘leggy’ hedges developing. This structure will allow a greater yield of fruit, nuts and seeds to be produced

which in turn will benefit many species including farmland birds. The transition between hedgerow and grassland habitats will have a buffer of 2m (minimum of 1m) to reduce 'edge' effect and also provide a greater habitat mosaic. This buffer will consist of grasses and tall ruderal vegetation.

- Rotational cutting should take place outside of bird nesting season, as a guide March – August. If this is not possible it may be appropriate on occasion to cut hedgerows within bird nesting season after an ecologist has declared the area in question to be free from nesting birds.

Appendix 14: Hadleigh and Daws Heath Complex Living Landscape Long-Term Vision



Appendix 15: Badger Survey Results

Table A16.1: Summary of badger monitoring surveys results – July/August 2020

Sett/Date	22.07.2020	27.07.2020	29.07.2020	03.08.2020	05.08.2020	12.08.2020	17.08.2020	Classification
Sett 1 (1-4)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 2 (1-10)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 3 (1-6)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 4 (1-2)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 5 (1-2)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 6 (1-3)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 7 (1)	N/A	A	A	NA	NA	A	A	A (outlier)
Sett 7 (2-4)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 8 (1-7, 9-14, 16-17, 19-26, 28-28, 40)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 8 (8, 18, 27, 39, 41)	N/A	NA	A (S)	NA	NA	NA	NA	A (main)
Sett 8 (8, 15, 39)	N/A	NA	NA	NA	NA	A (S)	NA	A (main)
Sett 8 (8, 9, 44)	N/A	NA	NA	NA	NA	NA	A (S)	A (main)
Sett 9 (1-3)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 10 (1, 3, 5)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 10 (2)	N/A	NA	A	NA	NA	NA	NA	A (subsidiary)
Sett 10 (4)	N/A	A	NA	A(S)	A	A(S)	NA	A (subsidiary)
Sett 11 (1-3)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 12 (1-2)	N/A	NA	NA	NA	NA	NA	NA	NA
Sett 13 (1)	Identified post monitoring period – Considered Active							

Key: A = Active; NA=No Activity; F=Footprint; S=Sticks Pushed Down; R=Rabbit; V = Fox; and B=Bedding

Blue = Active; White = Inactive

Table A16.2: Summary of badger scoping surveys results – April 2021

Sett number	Number of entrances	Sett type	Notes
1	4	Outlier	All entrances filled with leaf litter (disused)
2	10	Old disused subsidiary	All entrances filled with leaf litter (disused)
3	6	Old disused subsidiary	All entrances filled with leaf litter (disused)
4	2	Outlier	All entrances filled with leaf litter (disused)
5	2	Outlier	All entrances filled with leaf litter (disused)
6	3	Outlier	All entrances filled with leaf litter (disused)
7	4	Outlier	Entrances 2, 3 &4 filled with leaf litter (partially used); entrance 1 had fresh spoil and badger fur in entrance (well used)
8	43	Main	Flags gone on most of the holes so no numbers. 33 holes were free from debris and had fresh spoil (well used). Of these, 11 showed signs of recent use such as fresh bedding and badger hairs. The other 10 entrances were filled with leaf litter (partially used)
9	3	Outlier	All entrances filled with leaf litter (disused)
10	5	Subsidiary	Entrances 1,2,& 5 filled with leaf litter (partially used); entrances 2 & 4 had fresh spoil and badger fur was found in entrance 4 (well used)
11	3	Outlier	All entrances filled with leaf litter (disused)
12	2	Outlier	Both entrances filled with leaf litter (disused)
13	2	Outlier	Both entrances had fresh spoil (well used)

Appendix 15c – Badger Sett Location Plan