Extended Phase 1 Habitat Survey

Dunton Hills Garden Village, Essex

On Behalf of:

CEG Land Promotions Ltd

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Executive Summary

CEG Land Promotions Ltd. have commissioned SES to carry out an extended phase 1 habitat survey covering land at Dunton Hills Farm, Essex (see Appendix 1). This site is within Brentwood Borough Council's draft local plan allocated predominately for residential development and is known as Dunton Hills Garden Village.

The site is approximately 237 ha in size and is dominated by arable farmland and amenity grassland used by Dunton Hills Golf Course. Due to this management much of the site is considered to be of low biodiversity value. Habitats of higher biodiversity value are restricted to field boundary habitats such as hedgerows and woodland blocks. These woodland blocks consist of two areas of deciduous woodland, with one small woodland block abutting the north-east boundary and a fragment of ancient woodland called Eastlands Spring which straddles the A127. The southern section of Eastlands Spring is located at the northern boundary of the site with the northern section on the distal side of the A127; this woodland is also designated as a Local Wildlife Site (LoWS). The proposed development will enable Eastlands Spring to be managed using recommendations from the Brentwood Borough Council Wildlife Review (ECCOS, 2012), in addition to complimentary habitats buffering the woodland, which will also add to its biodiversity value. Other habitats of interest are the flowing stream believed to be a tributary of the 'Mardyke' which dissects Eastlands Spring flowing north to south and the site's ponds.

The proposed development offers a unique opportunity to provide residential development in combination with delivering no net loss to biodiversity. Indeed, there is ample scope for ecological enhancement given the dominance of habitats of low ecological value. A master planning process which retains and enhances the site's key green infrastructure, while creating high value interconnecting complementary habitats can deliver these aspirations. Wildlife should also be welcomed within the built environment targeting priority species of principal importance to UK biodiversity (Natural Environment and Rural Communities Act 2006).

As previously mentioned residential development could be delivered to not only achieve no net loss but could deliver real biodiversity gains. Key to this strategy is the delivery of a landscape-scale coherent ecological network by strengthening and interconnecting the site's green infrastructure to allow wildlife to move through the landscape. It is recommended that ecological connectivity is maintained through functional links with Essex Wildlife Trust 'Living Landscapes' Thorndon Woods (23), Bulphen Fen (27) as well Langdon Hills (30) to the south. In addition, green corridors can be established east to west linking to any West Basildon urban extension while also connecting to railway corridor to the south. These green corridors should include Eastlands Spring LoWS ancient woodland, as recommended with the GI Study (2015). These green corridors can provide a mosaic of multi-functional open spaces for the benefit of people and wildlife.

This opportunity will provide an invaluable building block to help realise the vision of an integrated landscape scale ecological network which is both coherent and resilient. Sir John Lawton within his making space for nature review (2010) described in four words what is needed to establish coherent and resilient ecological networks that can deliver vital ecosystem services- these networks need to be: Better, Bigger, More and Joined. These four words describe the governments priorities stated

within the '*Biodiversity 2020 strategy: A strategy for England's wildlife and ecosystem services'* (2011) in order to deliver ecosystem services for the benefit of people and nature.

Dunton Hills Garden Village can deliver this vision of eco-system services creating a vibrant, healthy environment that the local community can feel pride in their shared heritage, whilst enjoying the health benefits of outdoor recreation set amongst thriving wildlife. Following mitigation proposals the redevelopment of the site can be achieved with no significant adverse effects upon any statutory or non-statutory sites.

In summary, Dunton Hills Garden Village can be delivered to not only achieve no net loss in biodiversity but can deliver real biodiversity gains. This draft allocation is considered to be compliant with ecological planning polices within the National Planning Policy Framework (DfCLG, 2012), draft local plan (BBC, 2016) and Brentwood Borough Council's Replacement Local Plan (adopted 2005).

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Appendices:

1.0 Introduction

1.1 Southern Ecological Solutions Ltd (SES) was commissioned by CEG Land Promotions Ltd. to carry out an Extended Phase 1 Habitat Survey on land at Dunton Hills Farm, Essex (TQ64608876).

1.2 The objectives of this extended phase 1 survey were to:

- Map the main ecological features within the site and compile a plant species list for each habitat type;
- make an initial assessment of the presence or likely absence of species of conservation concern;
- identify any legal and planning policy constraints relevant to nature conservation which may affect the development;
- determine any potential further ecological issues;
- determine the need for further surveys and mitigation;
- make recommendations for minimising impacts on biodiversity and providing net gains in biodiversity, where possible, in accordance with Chapter 11: *Conserving and Enhancing the Natural Environment*, of the National Planning Policy Framework (NPPF) (DfCLG,2012), the DRAFT LOCAL PLAN [2013- 2033] (BBC, 2016) (DLP) and Brentwood Borough Council's Replacement Local Plan (adopted 2005) (BBCRLP).

1.3 The survey was carried out by Ella Barnett GradCIEEM BSc (Hons) a suitably qualified ecologist, on the 26th February 2016 and was conducted according to the methodology as described in *Handbook for Phase 1 habitat survey* (JNCC, 2010), with all habitats within the application boundary mapped (see Appendix 3) and dominant species noted (see Appendix 5).

2.0 Methods

Desk Study

2.1 SES was commissioned to complete an in-depth data search for records of protected and notable fauna species via the local biodiversity record centre (Essex Field Club). The data search encompassed the site and up to 2km from its boundary. In addition, an internet search for UK statutory designated/non-designated site within 2km (non-statutory), 5km and 8km for European designated sites was also appropriated via MAGIC (magic.defra.gov.uk). A review of the Borough's local wildlife sites (EECOS, 2012) was also referenced. Records for dormouse were also sort from NBN Gateway (data.**nbn**.org.uk).

Extended Phase 1 Habitat Survey

2.2 The field survey comprised an extended phase 1 habitat survey (JNCC, 2010) of the proposed development site. This is a standard technique for obtaining baseline ecological information for areas of land, including proposed development sites.

2.3 The dominant and readily identifiable higher plant species identified in each of the various habitat parcels were recorded and their abundance was assessed on the DAFOR scale (see Appendix 5):

- D Dominant
- A Abundant

- F Frequent
- O Occasional
- R Rare

2.4 These scores represent the abundance within the defined area only and do not reflect national or regional abundances. Plant species nomenclature follows Stace (1997).

2.5 Incidental records of fauna were also made during the survey; and the habitats identified were evaluated for their potential to support legally protected species and other species of conservation concern.

Constraints

2.6 It is believed that the extended phase 1 habitat survey was constrained due to the time of year it was undertaken. It is possible that important flora was not identified during the survey and so it is recommended that a further botanical walkover is undertaken to further evaluate the site for its botanical importance. Notwithstanding, this does not significantly constrain the aims of this report due to the time of year the survey was undertaken.

3.0 Results

Desk Study

3.1 The desk study shows that there is potential habitat for European protected species within the proposed development site including for bats, great crested newts *Triturus cristatus* and dormice which are all protected under section 9 of the Wildlife and Countryside Act (WCA) (1981, as amended) and The Conservation of Habitats and Species Regulations (CHSR) (2010). Records from the data search indicate that there are records of bats approximately 0.7km south-east of site and great crested newts 1.2km south-east of site. There are no records of dormouse *Muscardinus avellanarius* within the same 10km grid-square of the site (nbn.org.uk).

3.2 There is also potential habitat for other protected species such as badgers *Meles meles* (The Protection of Badgers Act (1992)) and common reptiles (Schedule 5 Section 9.1a of the WCA (1981)) within the site. Records from the data search indicate that there are records of badger adjacent to the site and common reptile species 0.8km-2.3km from site.

3.3 Birds protected under Schedule 1 of the Wildlife and Countryside Act include Common Kingfisher *Alcedo atthis*, Peregrine Falcon *Falco peregrinus*, Eurasian Hobby *Falco subbuteo*, Brambling *Fringilla*, Mediterranean Gull *Larus melanocephalus*, Firecrest *Regulua ignicapilla*, Redwing *Turdus iliacus*, Fieldfare *Turdus pilaris*, Eurasian Hoopoe *Upupa epops* and Cetti's Warbler *Cettia cetti*.

3.4 Mammals protected under the NERC Act were also recorded within 1km of the site including harvest mouse (0.2km west) and European hedgehog (0.9km south). Brown hare were recorded 2km to the north-east of site.

3.5 There are 92 nationally notable insect species and 6 nationally notable spider species as well as 5 nationally scarce insect species and 17 nationally scarce spider species. 223 insect species, 18 spider

species and 1 mollusc species are listed on the Essex Red List. There are also 83 insect species and 2 spider species on the IUCN Red List and 72 species of insect and 1 species of spider protected under the NERC Act (2006).

3.6 The full data search results can be found within Appendix 7.

Extended Phase 1 Survey

3.7 The extended phase 1 habitat map of the site is shown within Appendix 3 and the plant species recorded in each habitat type are tabled in Appendix 5.

3.8 The site is located in the south of the borough of Brentwood in the south-west of Essex. The majority of the surrounding habitats consist of arable farmland. The site itself is approximately 237 ha in size and comprises of arable farmland and Dunton Hills Golf Course. The site is bounded by the A127 to the north, the A128 to the west, the railway track between Basildon and London to the south and arable farmland to the east.

3.9 There are nineteen different habitat types found within the site and on the boundaries:

- Dense Scrub
- Scattered Scrub
- Scattered Trees
- Semi-natural Broadleaved Woodland
- Tall Ruderal
- Amenity Grassland
- Intact Species-poor Hedgerow
- Defunct Species-poor Hedgerow
- Arable Farmland
- Improved Grassland
- Species-poor Semi-improved Grassland
- Standing Water
- Running Water
- Dry Ditch
- Ornamental Shrub
- Ephemeral Vegetation
- Spoil Heap
- Buildings
- Hard-standing

Dense Scrub

3.10 The dense scrub is mainly situated along the boundaries of arable fields, along the southern boundary of the ancient woodland, around some of the farm buildings at Dunton Hills Farm and in patches on the golf course. The majority of this habitat is made up of bramble *Rubus fruticosa* with other areas being made up of hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa* which are likely to be remnants of old hedgerows.

Scattered Scrub

3.11 This habitat occurs in patches of species-poor semi-improved grassland throughout the golf course and along boundaries of the arable fields. It consists mainly of hawthorn and blackthorn.

Scattered Trees

3.12 These trees are part of the boundaries of the arable fields, are scattered around the golf course and are associated with ponds within the golf course. The majority of the trees are pedunculate oak *Quercus robur* or ash *Fraxinus excelsior*.

Semi-natural Broadleaved Woodland

3.13 This habitat surrounds the stream which runs through the north of the site, it then tails off along Nightingale Lane (see Appendix 2, Photograph 3). This habitat is also located in the north-east of the site in the corner of an arable field (see Appendix 2, Photograph 2). The northern part of the woodland surrounding the stream is considered to be ancient woodland and is listed within the ancient woodland inventory (magic.defra.gov.uk) (see Appendix 4).

Tall Ruderal

3.14 Areas of tall ruderal are present to the north of the lake in the golf course and to the north of the farm buildings at Dunton Hills Farm. This habitat is dominated by common nettles *Urtica dioica* and creeping thistle *Cirisium arvense*.

Amenity Grassland

3.15 This habitat dominates the south of the site, where the golf course lies and areas of garden surrounding Dunton Hills Farm. There is a very strict mowing regime across the golf course which keeps the sward height very low although some areas will make up parts of the rough and so are left to grow longer (see Appendix 2, Photograph 6). This habitat is dominated by fine grasses such as perennial rye grass *Lolium perenne*.

Intact Species-poor Hedgerow

3.16 The majority of the hedgerows surrounding the arable farmlands are made up of this habitat type (see Appendix 2, Photograph 1). They mainly contain hawthorn and blackthorn and were between 2- 3m in height with occasional management. Many of the hedgerows on site are associated with ditches.

Defunct Species-poor Hedgerow

3.17 Hedgerows around some of the southern arable fields and which are present in the golf course are defunct as they have large gaps in them. These hedgerows also consist predominately of hawthorn and blackthorn. Many of the hedgerows on site are associated with ditches.

Arable Farmland

3.18 Over half of the site consists of this habitat-type. The fields to the north of the woodland are currently planted with a winter crop whereas the other fields are currently unsown and so contain a mixture of arable weeds including scented mayweed *Matricaria recutita*, thistle *Cirisium sp.*, dandelion *Taraxaxum agg.* and groundsel *Senecio vulgaris* (see Appendix 2, Photograph 1).

Improved Grassland

3.19 This habitat makes up the boundaries of the arable fields and consists mainly of coarse grass types such as false oat-grass *Arrhenatherum elatius* and cock's-foot *Dactylis glomerata*. The management of these strips is not intense as the sward height is long (see Appendix 2, Photograph 1).

Species-poor Semi-improved Grassland

3.20 This habitat occurs in the rough areas of the golf course; these areas are unlikely to be cut regularly as scrubby species are present (see scattered scrub) and so it has allowed only a few species such as cock's-foot and couch grass *Elytriga repens* to dominate.

Standing Water

3.21 There are numerous ponds located throughout the golf course and a few located in the boundaries of the arable fields. Those in the golf course look to be managed and have an ornamental appearance whereas those in the arable fields appear less frequently managed. Waterfowl such as Canada geese *Branta canadensis*, mute swans *Cygnus olor*, coots *Fulica atra*, moorhen *Gallinula chloropus* and mallards *Anas platyrhynchos* frequent the golf course ponds, especially the large lake whereas the arable field ponds look to be less frequently used by waterfowl.

Running Water

3.22 A stream which is part of the Mar Dyke, runs through the site from north to south (see Appendix 2, Photograph 4). In the north it is surrounded by ancient woodland although this thins to scattered trees and dense scrub past Nightingale Lane. It is quite a narrow stream with a maximum width of 1m and at the time of the survey the water was relatively shallow in places. Towards the north of the site the bed of the stream was gravelly with occasional obstacles from fly-tipping. The banks of the stream are vertical in places with little vegetation which could indicate higher water levels at different times of year.

3.23 Other running water on site includes shallow ditches on the golf course, associated with hedgerows and one which leads from the pond along Nightingale Lane, south and west towards the entrance of the site from the A128.

Dry Ditch

3.24 Some of the hedgerows on the golf course were located next to dry ditches. These ditches had steep sides which were covered in grasses. A dry ditch also ran parallel to the southern boundary (in the eastern half) of the site (see Appendix 2, Photograph 5).

Ornamental Shrub

3.25 The car park of Dunton Golf Course had strips of vegetation separating different parts of it; these strips of vegetation were ornamental species such as pampas grass *Cortaderia selloana*, magnolia *Magnolia sp.* and lavender *Lavandula sp*. There are also some tightly managed areas of box *Buxus sempervirens* and laurel *Prunus laurocerasus* located within the 'pitch 'n' putt' area of the golf course.

Ephemeral Vegetation

3.26 Areas of soil to the south and east of the buildings at Dunton Hills Farm and around the wind turbine have recently been re-landscaped. These areas are likely to have previously been arable field and have been left to naturally regenerate and so the vegetation, including grasses and arable weeds (see arable farmland and improved grass), is currently in the early growth stage but is unlikely to be farmed in the future.

Spoil Heap

3.27 A couple of spoil heaps are located in the golf course consisting of mud. Another is located near the buildings of the Dunton Hills Farm which consists of cut wood.

Buildings

3.28 There are a number of farm buildings associated with Dunton Hills Farm located towards the centre of the site. There are also a few small huts around the golf course, likely to be used by maintenance staff, alongside the club house and driving range of the golf course.

Hard-standing

3.29 The majority of the hard-standing is associated with the buildings on site. There is also an area to the south of the wind turbine and various tracks which link the A128 to Dunton Hills Farm and the Golf Course.

4.0 Findings and Recommendations

Statutory Designated Sites

4.1 Thames Estuary and Marshes (Special Protection Area (SPA)) is 8.1km to the south-east of site. The area consists of intertidal areas of mudflat on the northern side of the estuary. The site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: Avocet *Recurvirostra avosetta* and Hen Harrier *Circus cyaneus*. The site qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: Ringed Plover *Charadrius hiaticula*. The area also qualifies under Article 4.2 of the Directive (79/409/EEC) as it regularly supports at least 20,000 waterfowl; in winter the site regularly supports 33,433 individual waterfowl including: Redshank *Tringa totanus*, Black-tailed Godwit *Limosa limosa islandica*, Dunlin *Calidris alpina alpina*, Lapwing *Vanellus vanellus*, Grey Plover *Pluvialis squatarola*, Shoveler *Anas*

clypeata, Pintail *Anas acuta*, Gadwall *Anas strepera*, Shelduck *Tadorna tadorna*, White-fronted Goose *Anser albifrons albifrons*, Little Grebe *Tachybaptus ruficollis*, Ringed Plover *Charadrius hiaticula*, Avocet *Recurvirostra avosetta*, Whimbrel *Numenius phaeopus*.

4.2 Within 5km of the site boundary are two Sites of Special Scientific Interest (SSSI); Thorndon Park and Basildon Meadows (see Table 1). These sites are protected for their woodland and unimproved meadow habitats, respectively.

Table 1: The distance and direction of statutory sites from the site's boundary

Site Name	Designation	Distance and Direction from Site	Reason for Designation
Thorndon Park	SSSI	850m north-west	Semi-natural broad-leaved woodland and ancient parkland supporting a range of habitat types developed over Claygate and Bagshot Beds and gravels.
Basildon Meadows	SSSI	4.7km south-east	Unimproved herb-rich meadows lying on neutral soils. They are among the few areas of old pasture known to remain in the country.

4.3 **No significant adverse** effects are predicted upon any European or nationally designated sites following the implementation of mitigation such as the provision of green open space used for recreation. As part of the Environmental Impact Assessment triggered by the proposed development a screening request will be sent to Natural England to scope out impacts and guide mitigation to ensure that a robust mitigation package is implemented during early master-planning stages. This process is will demonstrate compliance with wildlife legislation and planning policy in respect to statutory designated sites

Non Statutory Designated Sites

4.4 There is one designated LoWS within the site boundary. This is an area of woodland to the north of the site; known as Eastlands Spring (which also continues north of the A127) it is classified as ancient woodland (EECOS, 2012) and also appears as such on MAGIC map (see Appendix 4 for location). Eastlands Spring is also categorised as a Lowland Mixed Deciduous Woodland which is a priority habitat of principle importance under Section 41 of the NERC Act (2006) and also an Essex Biodiversity Action Plan (BAP) habitat.

4.5 The proposed development offers an opportunity to enhance this LoWS in accordance with the NPPF (DfCLG, 2012) the DLP (2016) and BBCRLP (adopted 2005). Details of which are discussed within section 4.12- 4.19 below.

4.6 A number of sites were also recorded within the search and are described in Table 2 and located within Appendix 4. Friern Manor Wood, Thick/Hollow Bottom Shaw, Straight Path Shaw, Round Shaw, Barn Wood/Stonyhill Wood, Dog Wood, Spearshill Wood, Parkhill Wood and Poles Wood are all areas of ancient woodland and LoWS within 2km of the site's boundaries (EECOS, 2012). Other LoWS include All Saints Churchyard and Keepers Cottage Meadow (allocated for its semi-improved grassland), Southfields Washlands (allocated for its open mosaic habitats) and Langdon Hills Recreation Ground (allocated for its lowland meadows). The Langdon Complex also lies within 2km of the site. This is a large are of mixed habitats including ancient woodland, lowland meadows, ponds and the presence of great crested newts and its reptile diversity. No significant adverse effects are

predicted upon these habitats following mitigation such as the provision of onsite green open space used for recreation.

Table 2: Details of non-statutory designated sites within 2km of the site's boundary

Site Name	Size (ha)	Distance and Direction from Site	UKBAP Priority Habitats	Selection Criteria	
				Habitats	Species
Eastlands Spring	8.6	On site and North	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites, Habitat Extension Mosaics	None
Friern Manor Wood	8.7	0.05km North	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites, Habitat Extension Mosaics	None
All Saints Churchyard and Keepers Cottage Meadow	3.8	0.3km North-West	Hedgerows	Other Neutral Grasslands	None
Thick/Hollow Bottom Shaw	1.9	0.6km West	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Barn Wood/Stonyhill Wood	3.0	0.7km North	Lowland Mixed Deciduous Woodland, Hedgerows	Ancient Woodland Sites, Wildlife Corridors	None
Langdon Complex	205.9	0.7km South-East	Lowland Meadows, Lowland Mixed Deciduous Woodland, Ponds	Ancient Woodland Sites, Lowland Mixed Deciduous Woodland on Non-ancient Sites, Woody Scrub, Lowland Meadows, Other Neutral Meadows, Ponds	Great Crested Newts, Hotspots for Reptile Diversity
Round Shaw	1.4	0.8km West	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Straight Path Shaw	3.5	0.8km West	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Southfields Washlands	3.3	1.0km East	Open Mosaic Habitats on Previously Developed Land	Lowland Calcareous Grassland, Post-industrial Sites	Vascular Plants
Dog Wood	2.1	1.0km North	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Gravelpit Wood	2.1	1.1km North-East	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Spearshill Wood	1.8	1.2km North	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Parkhill Wood	9.4	1.4km North	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites, Habitat Extension Mosaics	None
Poles Wood	1.0	2.0km North-East	Lowland Mixed Deciduous Woodland	Ancient Woodland Sites	None
Langdon Hills Recreation Ground	1.8	2.0km South-East	Lowland Meadows	Lowland Meadows	Vascular Plants

Habitats

Lowland Mixed Deciduous Woodland

4.7 This habitat covers approximately 6.5 ha of the site and consists of mainly oak with some ash and hornbeam with a generally sparse understorey. Lowland Mixed Deciduous Woodland is categorised as a priority habitat of principle importance under Section 41 of the NERC Act (2006).

4.8 The woodland on site is considered likely to be of potential value to a number of species including European protected species such as bats, dormice and great crested newts due to its age and degree of ecological connectivity through the landscape. It could also provide breeding, foraging and nesting habitat for a number of species of birds of conservation concern. Further recommended surveys for the aforementioned receptors will assess this value.

4.9 This woodland is considered to be fragmented or at least partially fragmented due to current land management practises. This presents a significant opportunity to deliver landscape ecological connectivity, linking and enhancing the valuable sites' habitats.

4.10 It is recommended that this woodland is retained and managed following a woodland management plan to enhance its biodiversity value. Connectivity to the Eastlands Spring LoWS should be enhanced through the 'rewilding' of the site's northern boundary through a tree belt and associated habitats. Connectivity south of the woodland should also be enhanced through the 'gapping-up' of hedgerows to make them species-rich and provision of tree belts which link with the railway line which provides excellent landscape connectivity offsite to the east and west.

4.11 These recommendations will be refined through further survey work but provide a strategy that is predicted to provide biodiversity gains in accordance with the NPPF (DfCLG, 2012), DLP (2016) and is compliant with the BBCRLP (2005).

Ancient Woodland

4.12 Eastlands Spring LoWS can be described as stream-side ancient woodland which is split in two by the A127, the offsite section north of the A127 is 5.5ha with the southern section found in the north of the application site being 3.1ha. As previously mentioned Eastlands Spring is classified as ancient woodland although ancient trees (with large girths etc.) are only occasional throughout the area. The understorey consists of bluebells and dog's mercury; ancient woodland indicators. There is abundant dead wood throughout the site as well as standing dead wood.

4.13 Paragraph 118 of the NPPF (DfCLG, 2012) states that "planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland... unless the need for, and benefits of, the development in that location clearly outweigh the loss". Natural England's Standing Advice for Ancient Woodland (2012) recommends that the following impacts are considered for developments adjacent ancient woodland:

- Effects on the Root Protection Area of individual trees.
- Reduction in the area of other semi-natural habitats adjoining ancient woodland.
- Increased likely exposure of ancient woodland to air and water born pollutants from the surrounding area.
- Changing the local hydrology.
- Increased public use near veteran trees such that safety works may be required, which may lead to damage to, or loss of the tree.
- Changing the landscape context for ancient woods and veteran trees.

4.14 Policy protection is also afforded within the DLP (2016) and the BBCRLP(2005).

4.15 During construction this woodland should be protected to British Standards (BS) 5837 2012 *Trees in relation to design, demolition and construction*. In addition pollution prevention guidelines should be employed through a Construction Environmental Management Plan to mitigate indirect impacts. Further potential indirect impacts caused via light pollution should be mitigated through no direct lighting upon the woodland and wildlife sensitive lighting used in proximity during both the construction and operational phases of the development. As the woodland contains a public byway access cannot be prohibited through these areas, however, members of the public can be

encouraged to stick to paths through signage and guided routes. The provision of alternative greenspace will also mitigate recreational pressures upon the woodland.

4.16 This fragment of ancient woodland should be maintained through the adoption of a woodland management plan, this plan will include the recommendations from the Brentwood Borough Local Wildlife site review (EECOS, 2012).

4.17 Habitats adjacent to the woodland are of low ecological value largely consisting of arable farmland (a small buffer of improved grassland was recorded). Complementary habitats should buffer this woodland being a minimum width of 15m. This buffer should include a habitat mosaic of trees, species rich grassland and scrub. Through the retention, creation of buffer/ complementary habitats Eastlands Spring can become an integral part a coherent ecological network linking to EWT 'Living Landscapes' Thorndon Woods to the north, Bulphan Fen and Langdon Hills LoWS to the south. Site wide connectivity west and east can be achieved as well as providing potential links to any Basildon West urban extension.

4.18 These recommendations will be refined through further survey work but provide a strategy that is predicted to protect the woodland and potentially deliver biodiversity gains in accordance with the NPPF (DfCLG, 2012), DLP (BBC, 2016) and the BBCRLP (BBC, 2005).

Hedgerows

4.19 The Hedgerows on site are species-poor and are largely dominated of hawthorn, blackthorn and bramble with occasional semi-mature/mature trees such as pedunculate oak and ash. These hedgerows meet the definition for classification as a NERC Act (2006) priority habitat of principle importance, since they comprise of more than 80% native woody species. These hedgerows are also considered to be an Essex BAP habitat. They are not classified as species-rich and hence their conservation is not essential but highly desirable where possible with planting of species-rich hedgerows, 'gapping-up' existing hedgerows and creation of linear woody corridors to maintain landscape connectivity. It is predicted that an enhancement in terms of quality and quantity of wooded linear corridors can be achieved.

4.20 The hedgerows on site are not classified as important under the Hedgerow Regulations (1997) in respect to wildlife and landscape criteria, specifically criteria listed in Part II of schedule 1.

4.21 This recommended strategy is compliant with the NPPF (DfCLG, 2012), the DLP (BBC, 2016) BBCRLP (BBC, 2005).

Ponds

4.22 There is potential for the ponds on site to be classified as NERC Act (2006) habitats of principle importance if, for example, the ponds are found to support exceptional assemblages of key biotic groups such as amphibians and dragonflies, exceptionally rich sites for plants or invertebrates. They could also be classified if they are found to support species of high conservation importance such as those on the Red Data Book, UK BAP/Priority Species, those fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitat Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.

4.23 Further surveys of the ponds on site will determine whether they support any of the assemblages listed above. However it is recommended that ponds are retained where possible and linked to landscape via green corridors. Planting of aquatic species will also boost biodiversity, any SuDS created within the site should also, where possible, serve a dual purpose with biodiversity gains being achieved through the shape and planting within these features.

4.24 This recommended strategy is compliant with the NPPF (DfCLG, 2012), DLP (BBC, 2016) BBCRLP (BBC, 2005).

Streams

4.25 The stream on site is thought to be a tributary of the Mardyke which in turn is a tributary of the river Thames. There is potential for the stream on site to be classified as a NERC Act (2006) priority habitat of principle importance if it contains species of importance, i.e.:

- Annex II Habitats Directive Species;
- BAP/NERC Act Priority Species;
- Invertebrate species which are strongly indicative of river shingle.

4.26 It is believed that this is the only category in which the stream on site could qualify. Further surveys of the stream will determine if the stream qualifies. In any case this stream will become part of a green corridor which connects the site north to south.

Creation of Coherent Ecological Networks on a Landscape Scale

4.27 A key strategy for site is to deliver a landscape-scale coherent ecological network by strengthening and interconnecting the site's green infrastructure to allow wildlife to move through the landscape. It is recommended that functional links connect Essex Wildlife Trust 'Living Landscapes' Thorndon Woods (23) & Bulphen Fen (27) and Langdon Hills (30) LoWS to the south. . In addition green corridors can be established east to west linking to any West Basildon urban extension while also connecting to railway corridor to the south. These green corridors should include Eastlands Spring LoWS ancient woodland and stream, as recommended with the GI Study (2015).

4.28 This opportunity will provide an invaluable building block to help realise the vision of an integrated landscape scale ecological network which is both coherent and resilient. Sir John Lawton within his making space for nature review (2010) described in four words what is needed to establish coherent and resilient ecological networks that can deliver vital ecosystem services- these networks need to be: Better, Bigger, More and Joined. These four words describe the governments priorities stated within the 'Biodiversity 2020 strategy: A strategy for England's wildlife and ecosystem services' (2011) in order to deliver ecosystem services for the benefit of people and nature.

4.29 The site can deliver this vision of eco-system services creating a vibrant, healthy environment that the local community can feel pride in their shared heritage, whilst enjoying the health benefits of outdoor recreation set amongst thriving wildlife. Following mitigation proposals the redevelopment of the site can be achieved with no significant adverse effects upon any statutory or non-statutory sites.

Species of Conservation Concern

Amphibians

4.30 Great crested newts (GCN) are legally protected under section 9 of the Wildlife and Countryside Act 1981 (as amended) (WCA) and regulation 41 of The Conservation of Habitats and Species Regulations (2010) thus making GCN a material consideration of the planning process.

4.31 There are fifteen ponds on site with a further fifteen within 500m of the site (without major barriers in between – in this case the A127). There are also suitable foraging and sheltering habitats on site for GCN such as areas of long grass, dead wood, hedgerows and woodland.

4.32 Data from the EFC shows records of GCN approximately 1km to the south-east of the site.

4.33 Due to the suitable terrestrial and aquatic habitat on site and connectivity to potential breeding ponds off-site, it is considered that GCN could be utilising the site as terrestrial habitat as well as for breeding and egg-laying. As such it is recommended that a full presence / likely absence survey is undertaken during mid-March to mid-June consisting of four visits with at least two between mid- April- mid May following published guidance (English Nature, 2001). If presence is detected then a further two visits should be undertaken with at least one of these occurring between mid- April to mid- May to provide a population class size assessment which is a requirement should a Natural England mitigation licence be required.

4.34 It is considered to there is ample scope to mitigate any impacts associated with the development and achieve a site level favourable conservation status for this species. This is in accordance with the NPPF (DfCLG, 2012), the DLP (BBC, 2016), the BBCRLP (BBC, 2005) and relevant wildlife legislation.

Badgers

4.35 Badgers are legally protected under The Protection of Badgers Act (1992) and as such, are of material consideration when applying the principles of the NPPF (DfCLG, 2012).

4.36 During the site visit very few signs/evidence of badgers were found on site. No potential badger setts were found on site, however there are areas of dense scrub on site where badger setts and other evidence of badgers could be present but were unable to be observed during the survey. Evidence on site included badger footprints and a latrine towards the south of the site as well as mammal runs in the east of the site. Severall locations of badgers have been recorded in the EFC data search including on the main roads surrounding the site; A127, A128 and Lower Dunton Road.

4.37 Some of the habitats on site (woodland, grassland, arable farmland) are optimal for foraging badgers and there is also some potential sett-building habitat on site.

4.38 There is an abundance of suitable badger habitat in the surrounding landscape including woodland, grassland and arable farmland. The proposed development is unlikely to isolate areas of suitable badger foraging habitat or decrease the foraging value of the site significantly; the loss of foraging will be mitigated by the addition of green openspace and planting of species of known benefit.

4.39 It is an offence to disturb a badger whilst utilising a sett, destroy or damage a sett. As mentioned above there is some sett building habitat on site, some of which was obstructed by dense scrub during the initial survey. It is therefore recommended that a badger survey is undertaken on site to determine whether any badger setts are present within these areas.

4.40 Badger surveys can be undertaken anytime, but ideally outside of the summer months when vegetation is dense. They are best undertaken when vegetation is low in February and April; which also coincides with a peak in territorial activity. A second peak in activity occurs in October but vegetation can potentially hinder the location of setts in dense vegetation.

4.41 It is considered to there is ample scope to mitigate any impacts associated with the development and achieve a site level favourable conservation status for this species. This is in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

Bats

4.42 All bat species are legally protected under section 9 of the WCA (1981) (as amended) and regulation 41 of The Conservation of Habitats and Species Regulations (2010) thus making bats a material consideration of the planning process.

4.43 Some of the trees and buildings on site provide potential roosting areas for bats. The woodland, ponds, lake, ditches, hedgerows and dense scrub also provide suitable foraging and/or commuting habitats for bats although the arable farmland and grassland are likely to provide sub optimal foraging resources.

4.44 Records from the Essex Field Club showed likely roosting records for brown long-eared bats *Plecotus auritus*, common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *Pipistrellus pygmaeus* within 2km of the site.

4.45 Other bat species recorded include noctules *Nyctalus noctula*, Leisler's *Nyctalus leislerii*, Natterer's *Myotis nattereri* and Daubenton's *Myotis daubentonii*. Some of the species recorded are specialist woodland foraging and roosting species of bat, such as the brown long-eared bat and noctule, respectively. Daubenton's bats specialise in foraging over bodies of water and so could utilise the ponds and lake on site. All of the bats recorded could possibly utilise the habitats found on site.

Activity Surveys

4.46 Further survey is recommended to assess the site for its value for local bat populations. Following Bat Conservation Trust Guidance (BCT) (Collins, 2016) the site is 'large' and is assessed to provide 'medium' quality habitat i.e. dominated by sub optimal habitats such as amenity grassland / arable farmland interspersed with higher value habitats such as Eastlands Spring woodland and ponds. it is recommended that activity surveys take place comprised of one transect visit each month (Apr-Oct) with at least one of the surveys comprising of a dusk and pre-dawn survey (or a dusk-to-dawn survey) within one 24-hour period. In addition automated surveys are recommended using static detectors at two locations per transection five consecutive nights April – October.

Roost Surveys

4.47 It is also recommended that any trees which will be directly affected or are within the zone of influence of the proposed development that display roosting potential are subject to an aerial inspection and/or emergence/re-entry surveys to identify any potential to support roosting bats. Buildings to be demolished or which could be indirectly affected by the proposed development (for example by an increase in external light) should be subject to an internal and external inspection to look for evidence of bats or the potential to support roosting bats.

4.48 The recommended surveys will be used to guide appropriate mitigation but it is likely that sensitive bat lighting will be required, basic principles have been set out below. To minimise disturbance to roosting, foraging and commuting bats during construction works it is recommended that site lighting is kept to a minimum. Lights should be placed to avoid directly illuminating the existing woodland and security lighting should be operated on short timers. Lighting during the operational phase should also be kept to a minimum, the following mitigation strategies have been taken from Bat Conservation Trust Landscape and Urban Design for Bats and Biodiversity (Gunnell *et al*., 2012) and other referenced sources:

- Minimise light spill by eliminating any bare bulbs and upward pointing light fixtures. The spread of light should be kept near to or below the horizontal plane, by using as steep a downward angle as possible and/or shield hood. Flat, cut-off lanterns are best;
- Use light sources that emit minimal ultra-violet light (Van Langevelde *et al.*, 2011) and avoid the white and blue wavelengths of the light spectrum, so as to avoid attracting insects and thus potentially reducing numbers in adjacent areas, which bats may use for foraging;
- Limiting the height of lighting columns to eight metres and increase the spacing of lighting columns (Fure, 2006) can reduce the spill of light into unwanted areas such as the aforementioned habitats;
- Avoid using reflective surfaces under lights or light reflecting off windows (e.g. onto bat flight lines);
- Only the minimum amount of light needed for safety and access should be used and or turned off when the site is not in use;
- Artificial lighting proposals should not directly illuminate tree lines, woodland and areas of scrub, which may be of value to foraging or commuting bats and birds;
- Lighting that is required for security reasons should use a lamp of no greater than 2000 lumes (150 Watts) and be PIR sensor activated, to ensure that the lights are not on only when required (Jones 2000);

4.49 There is abundant scope within the proposed development to enhance the site for bats including within the built environment. The planting of flying-insect attracting flowers and shrubs through the landscaping scheme, in particular night-scented species, could provide additional foraging opportunities for bats (see Appendix 6). Bat roosting features could also be incorporated into the proposed properties on site or placed on retained trees. The retention and creation of dark and green corridors throughout the site will be important so as to not significantly affect the dispersal of bats in the local landscape. If these enhancements are undertaken on site it is likely there will be a positive effect on local bat populations. These surveys and potential enhancements are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

Birds

4.50 All breeding birds are protected under the WCA 1981 (as amended). Therefore, if any nesting bird habitat is to be lost or disturbed (i.e. dense scrub or trees) it should be cleared outside of the nesting season (which is generally March to August) or after an ecologist has confirmed active nests are not present.

4.51 A number of bird species were present on site during this survey, including blackbird *Turdus merula*, robin *Erithacus rubecula*, chaffinch *Fringilla coelebs*, great tit *Parus major*, grey heron *Ardea cinerea*, mute swan, Canada geese, redwing *Turdus iliacus*, fieldfare *Turdus pilaris*, moorhen, coot, mallard, green woodpecker *Picus viridis*, tree creeper *Certhia familiaris*, skylark *Alauda arevensis* and woodcock *Scolopax rusticola*.

4.52 Due to the habitats on site and the habitats available in the wider landscape the site has potential to be of value to bird species of conservation concern (BoCC), schedule 1 birds (of the WCA, 1981, as amended) and those listed as priority species under section 41 of the Natural Environment and Rural Communities Act (2006). It is therefore recommended that wintering and breeding bird surveys are undertaken on site.

4.53 A total of two wintering bird surveys and three breeding bird surveys are recommended to adequately assess the sites value following standard survey guidance (Gilbert *et al* 1998). These surveys will guide mitigation and compensation requirements but it is expected that through the retention and enhancement of key habitats as well as the creation of quality complementary habitats a positive effect on local bird populations could potentially be achieved. The built environment should also be landscaped with species of known wildlife benefit to bird along with the provision of integrated bird boxes. This is in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

Dormouse

4.54 Dormice are protected under United Kingdom law, primarily by the WCA (1981) and regulation 41 of The Conservation of Habitats and Species Regulations (2010).

4.55 Dormice are arboreal and ideally require a habitat of a diverse range of trees and shrubs, which provide food resources throughout the year. They are generally found to have low population densities across their range due to territory and food requirements (Bright *et al.*, 2006).

4.56 Suitable habitat for dormice is present within the site in the form of woodlands and hedgerows. This habitat is connected to other suitable hedgerows, tree belts and woodlands in the wider landscape although all of the sites hedgerows are species poor and some are defunct. In addition there are no records of dormice within the 10km grid-square of this site (EFC, NBN Gateway) notwithstanding sufficient habitat quality is present and there is potential for dormice to be present on site.

4.57 It is therefore recommended that a full dormice nest tube survey is undertaken. This survey should follow guidance set out within Natural England guidance: *The Dormouse Conservation Handbook 2nd edition* (Bright *et al.*, 2006), which was updated by Natural England's Interim Advice Note: *Dormouse surveys for mitigation licensing, best practice and common misconceptions* (Natural England, 2011).

4.58 This survey will guide the need for mitigation. Notwithstanding the creation and suitable management of quality connective habitat between the woodland blocks as well as the wider landscape will represent an enhancement for this species. In addition these habitats should be planted to become species rich and include species of known benefit to dormice (targeting those species currently missing). These recommendations are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

Invertebrates

4.59 Generally habitats across the sites are considered to be of low value i.e. arable farmland and amenity grassland. However the site does contain high value habitat such as ancient woodland and is located within the Thames Gateway area which is of national importance for invertebrates. Therefore it is recommended that four direct survey visits are undertaken from April to high summer to provide a spread of sampling and guide mitigation requirements.

4.60 Although mitigation will be guided by survey, retention and enhancement of key habitats plus the addition of a sympathetic landscaping scheme a positive impact upon invertebrate assemblages is predicted. These recommendations are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005).

Notable Mammals

4.61 Harvest mouse *Micromys minutus*, brown hare *Lepus europaeus* and European hedgehog *Erinaceus europaeus* are listed as priority species of principle importance under the NERC Act. As such they are capable of being a material consideration of the planning process. The data search shows records of harvest mouse in East Horndon, approximately 215m to the west of site. Brown hare were recorded 2km to the east and European hedgehog 950m to the south of site. The site provides suitable habitat for all these species and with records in such close proximity it is recommended that presence/likely absence and/or habitat assessment surveys are undertaken to guide any potential mitigation and enhancements and ensure compliance with planning policy.

4.62 It is considered that adequate mitigation can be provided through the master planning process to deliver a positive effect upon harvest mouse and European hedgehog and a neutral/ minor negative impact on brown hare. These recommendations are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) and BBCRLP (BBC, 2005).

Reptiles

4.63 There are four common reptile species found throughout Britain, common lizards *Zootoca vivpara,* slow-worms *Anguis fragilis,* grass snake *Natrix natrix,* and adder *Vipera berus*, are primarily legally protected under the WCA 1981 (as amended).

4.64 The majority of the site is considered to provide habitats unsuitable for the above reptile species. However, the grassy buffers around the arable fields and woodland edges, the areas of rough/semi-improved grassland in the golf course and ponds throughout the site provide suitable habitat for these four common reptile species. In addition, the site is also ecologically linked to a railway track, which provides continuous suitable habitat for reptiles.

4.65 Recorded data from EFC shows that grass snakes, slow-worms and common lizards have all been recorded within 1km of the site. Adders have been recorded approximately 2.3km form site.

4.66 It is therefore recommended that a seven visit presence/likely absence reptile survey is undertaken within the suitable habitat on site (long grassland, woodland edges etc.) These visits should be undertaken from March- September during 'suitable' days for reptile activity; a 'suitable' survey day is determined by the weather with temperature being the pre-eminent factor. Reptile refugia (0.5m x 0.5m) should be used to observe reptiles basking. Refugia should be laid at a density of 10 per hectare (minimum). This survey methodology is recognised as best practice by Froglife (1999) and the Herpetofauna Worker's Manual (Gent & Gibson, 2003).

4.67 Given that the majority of the site is assessed to be unsuitable for reptiles it is considered that if a population of reptiles were identified onsite then an *in situ* solution could be achieved with ample scope for enhancements. Such enhancement measures would include interconnected hedgerows, ponds, grassland and edge habitats which provide landscape ecological connectivity and a positive impact upon these species. These recommendations are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

Water Voles and Otters

4.68 Water Vole *Arvicola amphibius* are protected under the WCA (1981) and Otter *Lutra lutra* are legally protected under the WCA (1981) and regulation 41 of The Conservation of Habitats and Species Regulations (2010).

4.69 Although there are no records of water voles or otters in the data search, with negative records for otters further upstream (Dobson & Tansley, 2014) and the northern part of the stream has bare banks (and therefore does not provide suitable habitat for water voles), the southern half of the stream, wet ditches and ponds on site do provide suitable habitat and also connect to waterbodies with known water vole populations in the wider landscape.

4.70 It is recommended a survey is undertaken with late April being the optimum period for water voles (no seasonal constraints for otter) to guide any potential mitigation that may be required. Mitigation can be provided through the buffering of water courses and enhancement through the planting of emergent / semi emergent vegetation, the removal of over shading scrub in places would also encourage recovery of aquatic species and represent enhanced habitat. These recommendations are in accordance with the NPPF (DfCLG, 2012) DLP (BBC, 2016) BBCRLP (BBC, 2005) and relevant wildlife legislation.

5.0 Conclusions

5.1 The site is approximately 237 ha in size and is dominated by arable farmland and amenity grassland used by Dunton Hills Golf Course. Due to this management much of the site is considered to be of low biodiversity value. Habitats of higher biodiversity value are restricted to field boundary habitats such as hedgerows and woodland blocks. These woodland blocks consist of two areas of deciduous woodland, with one small woodland block abutting the north-east boundary and a fragment of ancient woodland called Eastlands Spring which straddles the A127. The southern section of Eastlands Spring is located at the northern boundary of the site with the northern section on the distal side of the A127; this woodland is also designated as a LoWS. The proposed development will enable Eastlands Spring to be managed using recommendations from the Brentwood Borough Council Wildlife Review (ECCOS, 2012), in addition to complimentary habitats buffering the woodland, which will also add to its biodiversity value. Other habitats of interest are the flowing stream believed to be a tributary of the 'Mardyke' which dissects Eastlands Spring flowing north to south and the site's ponds.

5.2 The habitats on site have the potential to be of value to protected species as well as being of general biodiversity value themselves. As such further works have been recommended for the following:

- Botanical survey;
- Great crested newts (presence/likely absence survey);
- Badgers (a survey of the site to search for field signs, setts and evidence of use of the site by badgers);
- Bats (activity surveys, tree and building inspection surveys and/or emergence surveys);
- Breeding and Wintering Bird Survey (during breeding and wintering seasons);
- Dormouse (nest tube survey);
- Invertebrates (to establish the site's value to rare or noted invertebrates);
- Notable mammals (habitat assessment for harvest mouse, brown hare and European hedgehog);
- Reptiles (presence/likely absence survey);
- Water vole and otters (survey of suitable water bodies).
- Statutory Designated Sites Impact and Mitigation Strategy

5.3 The following precautionary methods are also recommended:

- If any nesting bird habitat is to be lost (trees and scrub) it should be cleared outside the nesting season (March to end of August) or immediately after an ecologist has confirmed the absence of nesting birds;

5.4 The aforementioned surveys will be used to further shape the masterplan and offers a unique opportunity to provide residential development in combination with delivering no net loss to biodiversity. Indeed there is ample scope for ecological enhancement given the dominance of habitats of low ecological value which have been targeted for development. A master planning process which retains and enhances the site's key green infrastructure, while creating high value interconnecting complementary habitats will deliver these aspirations. Wildlife should also be welcomed within the built environment targeting priority species of principle importance to UK biodiversity (Natural Environment and Rural Communities Act 2006).

5.5 Key to this strategy is the delivery of a landscape-scale coherent ecological network by strengthening and interconnecting the site's green infrastructure to allow wildlife to move through the landscape. It is recommended that green functional links are created to connect Essex Wildlife Trust 'Living Landscapes' Thorndon Woods (23), Bulphen Fen (27) and Langdon Hills (30) LoWS to the south. In addition green corridors can be established east to west linking to any West Basildon urban extension while also connecting to railway corridor to the south. These green corridors should include Eastlands Spring LoWS ancient woodland, as recommended with the GI Study (2015). These green corridors will provide a mosaic of multi-functional open spaces for the benefit of people and wildlife.

5.6 Dunton Hills Garden Village can deliver this vision of eco-system services creating a vibrant, healthy environment that the local community can feel pride in their shared heritage, whilst enjoying the health benefits of outdoor recreation set amongst thriving wildlife. Following mitigation proposals the redevelopment of the site can be achieved with no significant adverse effects upon any statutory or non-statutory sites.

5.7 In summary, Dunton Hills Garden Village can be delivered to not only achieve no net loss in biodiversity but can deliver real biodiversity gains. This draft allocation is considered to be compliant with ecological planning polices within the NPPF (DfCLG, 2012), DLP (BBC, 2016) and BBCRLP (BBC, 2005).

6.0 References

Brentwood Borough Council (adopted 2005). *Replacement Local Plan*. Brentwood Borough Council

Brentwood Borough Council (2016) *Draft Local Plan 92013-2033)LOCAL DEVELOPMENT PLAN FOR BRENTWOOD BOROUGH*. Brentwood Borough Council.

Bright P.W., Morris, P.A. and Mitchell-Jones, T. (2006). *The dormouse conservation handbook* (2nd ed.) Peterborough: English Nature.

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

Department for Communities and Local Government, (2012). National Planning Policy Framework. www.communities.gov.uk

Dobson, J., & Tansley, D., (2014). *Mammals of Essex*. Healeys Print Group, Suffolk

English Nature (2001). *Great crested newt mitigation guidelines*. English Nature, Peterborough.

Environment Agency (2009). *Water for life and livelihoods: River Basin Management Plan Anglian River Basin District*. Environment Agency, Bristol

Essex Ecology Services Ltd. (EECOS) (2012). *Brentwood Borough: Local Wildlife Site Review 2012.* Brentwood Borough Council. Available at http://www.brentwood.gov.uk/pdf/17072013120644u.pdf [Accessed 01.03.16]

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

Fure, A. (2006) *Bats and Lighting*. The London Naturalist, No. 85.

Gent, A.H., & Gibson S.D. (2003). *Herpetofauna workers' manual*. Joint Nature Conservation Committee, Peterborough.

Gunnell, K., Grant, G. and Williams, C. (2012). *Landscape and Urban Design for Bats and Biodiversity*, Bat Conservation Trust.

HMSO. 1981. The Wildlife and Countryside Act. Ch. 69. London

HMSO (1997). *The Hedgerow Regulations 1997 – Statutory Instrument 1997 No. 1160*

Joint Nature Conservation Committee (JNCC), (2010). Handbook for Phase 1 habitat survey. A technique for environmental audit. 2nd Edition. JNCC: Peterborough. 80pp

Jones, J (2000). *Impact of Lighting on Bats*. Bat Conservation Trust, London.

Natural England (2011). *Advice Note: Dormouse surveys for mitigation licensing, best practice and common misconceptions*. Natural England

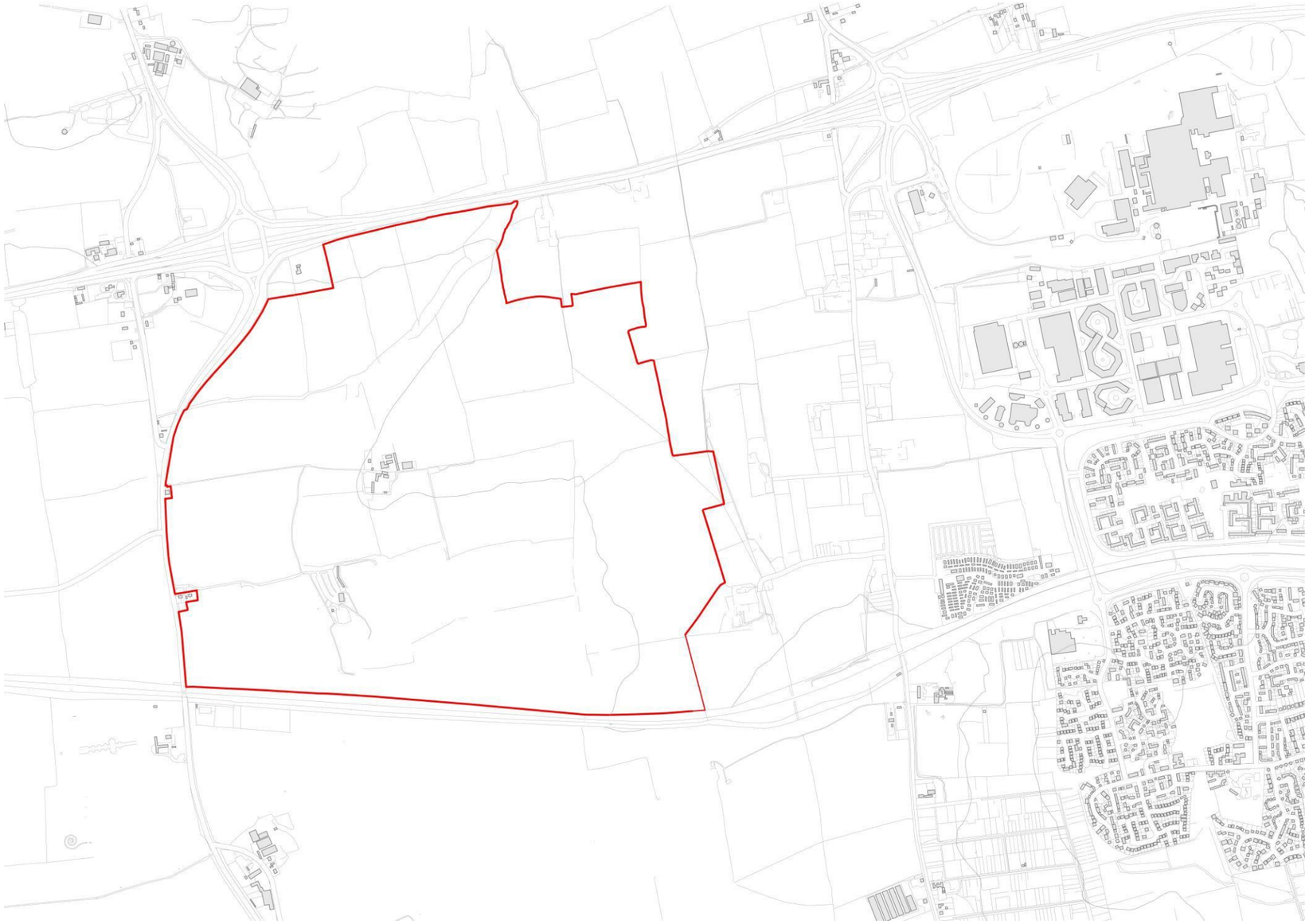
NBN Gateway. Available at https://data.nbn.org.uk/. [Accessed 01.03.16]

Stace, C. A. (1997). *New Flora of the British Isles, 2nd Edition.* Cambridge University Press. Cambridge.

Strachan, R., Moorhouse, T., and Gelling, M., (2016). *Water Vole Conservation Handbook Third Edition*. Oxford University, UK.

Van Langevelde, F., Ettema, J.A., Donners, M., WallisDeVries., M.F. and Groenendijk., D. (2011). *Effect of Spectral Composition of Artificial Light on the Attraction of Moths*. Biological Conservation **144**: 2274-2281.

Appendix 1: Plan of the Site



Appendix 2: Photographs of the site

Photograph 1: Typical view of the arable fields, grassy buffer and hedgerow

Photograph 2: View of the woodland in the north-east of site

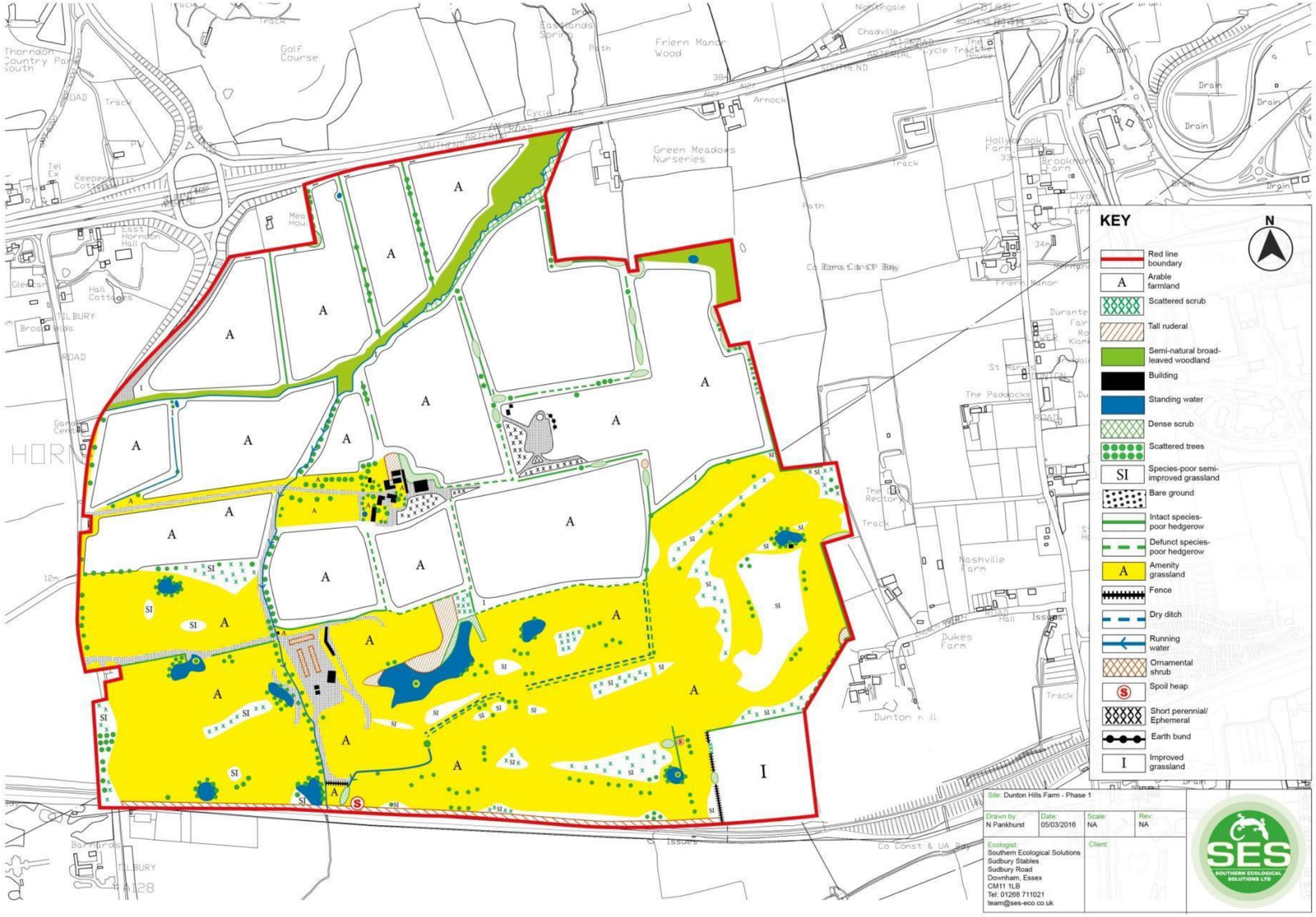
Photograph 3: View of the ancient woodland running through the middle of the site.

Photograph 4: View of the stream and ancient woodland on site. A127 and culvert under this road is visible in the background; gravelly substrate of the stream visible in the foreground.

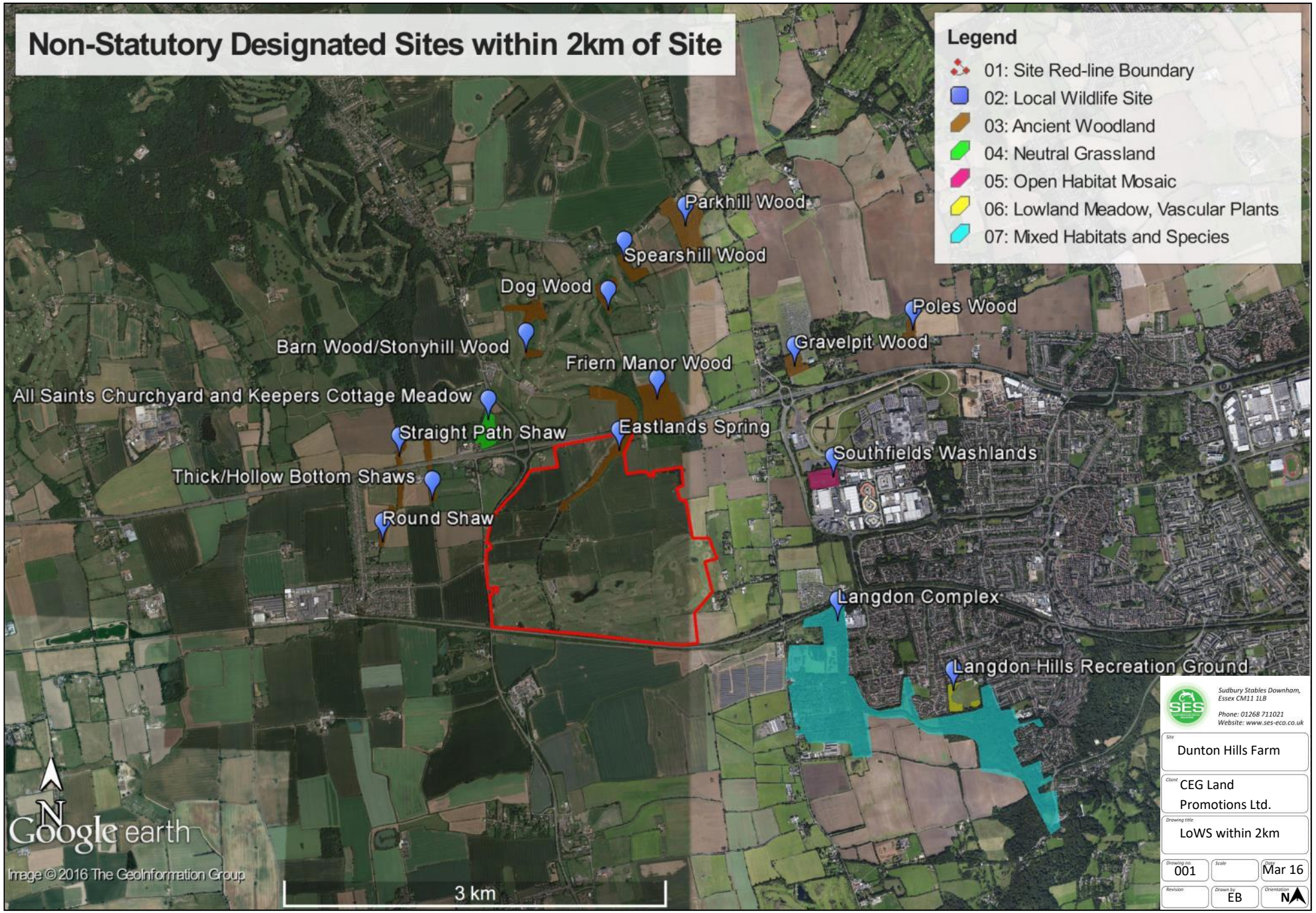
Photograph 5: View of the ditch which widens in the south east of the site. Badger footprints were visible at what appeared to be a crossing point from the golf course into the vegetated bank of the railway track to the south of the site.

Photograph 6: View of the golf course showing the typical amenity grassland which occasionally has a longer sward height.

Appendix 3: Phase 1 Habitat Map



Appendix 4: Location Map of Local Wildlife Sites within 2km of Site



Appendix 5: Species List

Common Name	*Latin Name*	Dense Scrub	Scattered Scrub	Scattered Trees	Semi-natural Broadleaved Woodland	Tall Ruderal	Amenity Grassland	Intact Species-poor Hedgerow	Defunct Species-poor Hedgerow	Arable Farmland	Improved Grassland	Species-poor Semi-improved Grassland	Standing Water	Running Water	Dry Ditch	Ornamental Shrub	Ephemeral Vegetation	Spoil Heap	Buildings	Hard-standing
Hawthorn	*Crataegus monogyna*	A	F		F			A	A											
Blackthorn	*Prunus spinosa*	A	F		F			A	A											
Bramble	*Rubus sp.*	A	F					A	A											
Dog-rose	*Rosa canina*		F					R	R											
Pedunculate Oak	*Quercus rober*		R	D	D															
Turkey Oak	*Quercus cerris*				O															
Ash	*Fraxinus excelsior*			A	O															
Hornbeam	*Carpinus betulus*		R		F															
Whitebeam	*Sorbus aria agg*			R																
Silver Birch	*Betula pendula*			R																
Sycamore	*Acer pseudoplantus*			R																
Lime	*Tilia sp.*			R																
Willow	*Salix sp.*			F	O															
Poplar	*Populus sp.*			R																
Elm	*Ulmus spp.*		F																	
Elder	*Sambucus nigra*	R			F															
Broom	*Cytisus scoparius*				R															
Dog's Mercury	*Mercurialis perennis*				F									O						
Bluebell	*Hyacinthoides non-scripta*				F															
Lords and Ladies	*Arum maculatum*				R			R	R											
Bristly Oxtongue	*Picris echioides*									O	F			R	O		O			
Cow Parsley	*Anthriscus sylvestris*					F				O	O						O			
Hogweed	*Heracleum sphondylium*					F		O	O	O	F	O		F	O		O			
Creeping Thistle	*Cirsium arvense*					A				R	O	O					R			
Dock	*Rumex sp.*					F				R	F						R			

Canadian Fleabane	*Conyza canadensis*									R	O						R			
Rape	*Brassica napus*									R	R						R			
Scented Mayweed	*Matricaria recutita*									R	R						R			
Dandelion	*Taraxacum agg.*									R	R						R			
Daisy	*Bellis perennis*										O									
Ribwort Plantain	*Plantago lanceolata*										R									
Common Nettle	*Urtica dioica*				F	F														
Red Dead-nettle	*Lamium purpureum*									R							R			
Ivy	*Hedera helix*				F			R	R					F						
Teasel	*Dipsacus sp.*				O						O									
Ground-ivy	*Glechhoma hederacea*				O															
Cleavers	*Galium aparine*				F					R							R			
Groundsel	*Senecio vulgaris*									R							R			
Speedwell	*Veronica sp.*									R							R			
Willowherb	*Epilobium sp.*	R						R	R					F	O					
Lesser Celendine	*Ranunculus ficaria*													R						
Pendulus Sedge	*Carex pendula*													R						
Common Reed	*Pragmites sp.*				R								F							
Bulrush	*Typha sp.*												F							
Soft Rush	*Juncus effusus*												F							
Perennial Rye-grass	*Lolium perenne*						A													
False Oat-grass	*Arrhenatherum elatius*				F						D				F					
Cocksfoot	*Dactylis glomerata*				F						A	A			F					
Couch Grass	*Elytrigia repens*						F				F	A								
Timothy	*Phleum pratense*				F							F								
Meadow Grass	*Poa sp.*				F		F					F								
Box	*Buxus sempervirens*															O				
Laurel	*Prunus laurocerasus*															R				
Lavendar	*Lavandula sp.*															O				
Magnolia	*Magnolia sp.*															O				
Pampas Grass	*Cortaderia selloana*															R				

Ornamental Privet	*Prunus sp.*															F				
Holly	*Ilex aquifolium*															R				
Periwinkle	*Vinca sp.*															R				

D=Dominant; A=Abundant; F=Frequent; O=Occasional; R=Rare

Appendix 6: Plant Species of Known Benefit to Bats

Plant species	Common name	Native (N)	Type	Benefit	Soil	Aspect	Extensive Green roofs	Living Walls	Rain gardens	Hedge/Trees	Beds/Borders
Acer campestre	Field maple	N	T/S	C	Any	Sun/Shade				Y	
Acer platanoides	Norway maple		T/S	S	Well drained/ alkaline	Sun/Shade				Y	
Acer saooharum	Sugar maple		T/S	S	Any	Sun/Shade				Y	
Achillea millefolium	Yarrow	N	HP	C,F	Well drained	Sun/Shade				Y	
Ajuga reptans	Bugle	N	HP	C,F	Any	Sun/Shade	Y		Y		
Anthyllis vulneraria	Kidney Vetch	N	HP	F	Well drained	Sun	Y				
Aubrieta deltoidea	Aubretia		H	F	Well drained	Sun/Shade		Y			
Betula pendula	Silver birch	N	T	C	Sandy/Acid	Sun				Y	
Cardamine pratensis	Cuckoo-flower	N	HP	F	Moist	Sun/Shade			Y		Y
Carpinus betulus	Hornbeam	N	T	C	Clay	Sun				Y	
Centaurea nigra	Common Knapweed	N	HP	C,F	Dry/ not acid	Sun	Y				Y
Centranthus ruber	Red valerian		HP	F	Well drained	Sun	Y				Y
Clematis vitalba	Old man's beard	N	C	F	Well drained/ alkaline	Sun				Y	
Corylus avellana	Hazel	N	S	C	Any dry	Sun/Shade		Y		Y	
Crataegus monogyna	Hawthorn	N	S	S,C	Any	Sun/Shade				Y	
Daucus carota	Wild carrot	N	Bi	S,C,F	Any	Sun	Y				Y
Dianthus spp.	Pinks	N	A-Bi	F	Well drained	Sun	Y	Y			Y
Digitalis purpurea	Foxglove	N	Bi	C	Well drained	Shade/ partial shade				Y	Y
Erica cinera	Bell heather	N	S	F	Sandy	Full sun					Y
Ersimum cherira	Wallflower		Bi-P	F	Well drained	Sun		Y			Y
Eupatorium	Hemp agrimony	N	H	F	Moist	Sun/Shade			Y		Y
Fagus sylvatica	Beech	N	T	C,R	Well drained alkaline	Sun/Shade				Y	
Foeniculum vulgare	Fennel		H	F	Well drained	Sun					Y
Fraxinus Excelsior	Common Ash	N	T	C,R	Any	Sun/Shade				Y	
Hebe spp.	Hebe species		S	F	Well drained	Sun/Shade				Y	Y
Hedera Helix	Ivy	N	C	F,C	Any	Sun/Shade		Y	Y	Y	Y
Hesperis matrionalis	Sweet rocket		H	F	Well drained/dry	Sun/Shade					Y

Hyacinthoides non-scripta	Bluebell	N	B	F	Loam	Shade/ partial shade		Y		Y	Y
Ilex aquailfolium	Holly	N	T	C	Any	Sun/Shade				Y	
jasmine officinale	Common jasmine		C	F	Well drained	Sun		Y			Y
Lavandula spp.	Lavender species		S	F	Well drained/ sandy	Sun		Y			Y
Linaria vulgaris	Toadflax	N	HP	C	Well drained/alkaline	Sun	Y				Y
Locinera periclymenum	Honeysuckle	N	C	F	Well drained	Sun		Y		Y	
Lotus corniculatus	Bird's foot trefoil	N	HP	F	Well drained/dry	Sun	Y				Y
Lunaria annua	Honesty		Bi	F	Any	Sun/ partial shade	Y				Y
Malus spp.	Apple		T	C	Any	Sun				Y	Y
Matthiola longipetala	Night-scented stock		A-Bi	F	Well drained/ moist				Y		Y
Myosotis spp.	Forget-mt-not species	N	A	F	Any	Sun	Y	Y			Y
Nicotiania alata	Ornamental tobacco		A	F	Well drained/ moist	Sun/ partial shade			Y		Y
Oneothera spp.	Evening primrose		Bi	F	Well drained	Sun	Y				Y
Origanum vulgare	Marjoram	N	HP	F	Well drained/dry	Sun				Y	
Populus alba	White poplar	N	T	C	Clay loam	Sun				Y	
Primula veris	Cowslip	N	HP	F	Well drained/ moist	Sun/ partial shade	Y				Y
Primula vulgaris	Primrose	N	HP	F	Moist	Partial shade	Y	Y		Y	Y
Prunus avium	Wild cherry	N	T	C	Any	Sun				Y	Y
Prunus domestica	Plum		T	C	Well drained/ moist	Sun				Y	Y
Prunus spinosa	Blackthorn	N	S	C	Any	Sun/ partial shade				Y	
Querois petraea	Sessile oak	N	T	C, R	Sandy loam	Sun/ shade				Y	
Quercus robur	Common oak	N	T	R	Clay loam	Sun/ shade				Y	
Rosa canina	Dog rose	N	S	C	Any	Sun			Y	Y	Y
Salix spp.	Willow species	N	S	S, C	Moist	Sun/ shade			Y	Y	
Sambucus nigra	Elder	N	T	C	Clay loam	Sun				Y	
Saponaira officinalis	Soapwort	N	HP	F	Any	Sun					Y
Saxifraga oppositifolia	Saxifage	N	HP	C	Well drained	Sun	Y	Y			Y
Scabiosa columbaria	Small scabious	N	HP	F	Well drained/ alkaline	Sun	Y				Y
Sedum spectabile	Ice plant		HP	F	Well drained/ dry	Sun	Y				Y
Silene dioecia	Red campion	N	HP	F	Any	Shade/ partial shade		Y	Y	Y	Y
Sorbus aucuparia	Rowan	N	T	C	Well drained	Sun				Y	

Stachys lanata	Lamb's ear		HP	F	Well drained/ dry	Sun					Y
Symphotrichum spp.	Michalemas daisies		HP	F	Any	Sun					Y
Tages patula	French marigold		A	F	Well drained	Sun					Y
Thymus serpyllum	Creeping thyme	N	HP/S	F	Well drained/ dry	Sun	Y	Y			Y
Tilia x europaea	Common lime		T	C	Any	Sun/ shade				Y	
Trifolium spp.	Clover species	N	H	F	Any	Sun	Y				Y
Valerina spp.	Valerian species	N	HP	F	Moist	Sun/ partial shade			Y		Y
Verbascum spp.	Mulliens	N	Bi/ HP	C	Well drained	Sun					Y
Verbena bonariensis	Verbena		HP	F	Well drained/ moist	Sun					Y
Viburnum lantana	Wayfaring tree	N	S	C	Any	Sun/ shade				Y	Y
Viburnum opulus	Guelder rose	N	S	C	Moist	Sun/Shade			Y	Y	
Viola tricolor	Pansy	B	A	F	Well drained/ moist		Y	Y			Y

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

Appendix 7: Desktop Data Search

Appended separately