DUNTONHILLS

BRENTWOOD

Representations to Brentwood Borough Council
Draft Local Plan, January 2016

Biodiversity

March 2016

Review of Brentwood Borough Council Draft Local Plan- Biodiversity

Dunton Hills Farm, Brentwood, Essex

On Behalf of:

CEG Land Promotions Ltd

March 2016

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1.0 Introduction

1.1 Southern Ecological Solutions Ltd (SES) was instructed by CEG Land Promotions Ltd. to review Brentwood Borough Council's evidence base and assess whether the DRAFT LOCAL PLAN [2013- 2033] (DLP) (2016), meets the tests of 'soundness' with respect to biodiversity.

1.1 Paragraph 182 of the National Planning Policy Framework (NPPF) 2012 (DLCG, 2012) states: A local planning authority should submit a plan for examination which it considers is "sound" – namely that it is:

- Positively prepared – the plan should be prepared based on a strategy which seeks to meet objectively assessed development and infrastructure requirements, including unmet requirements from neighbouring authorities where it is reasonable to do so and consistent with achieving sustainable development;

- Justified – the plan should be the most appropriate strategy, when considered against the reasonable alternatives, based on proportionate evidence;

- Effective – the plan should be deliverable over its period and based on effective joint working on cross-boundary strategic priorities; and

- Consistent with national policy– the plan should enable the delivery of sustainable development in accordance with the policies in the Framework.

1.2 The following report assesses the "soundness" of the plan through an evaluation of the ecological evidence base as presented within the Sustainability Appraisal (AECOM, 2016) in relation to draft allocation Dunton Hills Garden Village (DHGV) of the DLP.

1.2 In particular this report will focus on the SA sustainability objectives: Biodiversity and its objectives which are listed below:

- The boroughs natural assets need to be protected from impacts of development.
- The borough's network of green infrastructure should be protected, enhanced and strategically expanded to deliver benefits for people and wildlife.
- Areas that are home to declining species or habitats should be a particular target for protection and ecological restoration

1.3 In addition the sites compliance with/ or ability to comply with DLP polices will be demonstrated.

2.0 Methods

Extended Phase 1 Habitat Survey

2.1 SES have undertaken wintering bird surveys and an extended phase 1 habitat survey (including a desktop data search) to provide an ecological baseline, from which to assess the constraints and opportunities at DHGV. 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. This survey report can be found within Appendix 1.

Draft Local Plan Review

2.2 SES has reviewed the following supporting documents that have informed the Sustainability Appraisal (SA) of the Brentwood local Plan (AECOM, 2016):

- Strategic Growth Option Consultation Statement (Jan 2016)
- Objectively Assessed Housing Need (Dec, 2014)
- Sustainability Appraisal (Feb, 2016)
- SA Non-Technical Summary (Feb, 2016)
- Strategic Growth Options Interim SA (Jan, 2015)
- Local Wildlife Site Review (ECCOS, 2012)
- Green Infrastructure Study (Sept, 2015)
- Dunton Garden Suburb SA and HRA Assessment (Nov, 2014)

3.0 Results and Assessment

Landscape Scale Ecological Networks

3.1 DHGV is south of Essex Wildlife Trusts (EWT) Living Landscape compartment 23 (Thorndon Woods) and north of 27 (Bulphan Fen), Thorndon Park SSSI can be found north of the A127. As acknowledged within the SA this SSSI is in an unfavourable condition which is currently being addressed through remedial action. The site has been identified as a 'potential greenway' within the green infrastructure study (2015) and a 'Key opportunity' site to provide landscape scale connectivity.

3.2 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) this builds on the governments Natural Environment White Paper (2011).

3.3 This is enshrined within the NPPF (DfCLG, 2012) to emphasise the need to protect important sites, plan for green infrastructure and plan for ecological networks at 'landscape scales'. National policy reflects the commitment to 'halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020'.

3.4 Paragraph 117 of the NPPF states that planning policies should 'promote preservation, restoration and recreation of priority habitat, ecological networks and the protection and recovery of priority species populations' and plan for biodiversity across local authority boundaries.

3.5 The NPPF states that local authorities should plan positively for 'green infrastructure' and is recognised as part of planning for ecological networks. New development should incorporate green space consisting of

a network of well-managed, high-quality green/open spaces linked to the wider landscape. These spaces should be of a range of types (e.g. community forests, wetland areas and parks) and be multifunctional, for instance as areas that can be used for walking and cycling, recreation and play, supporting of wildlife, or forming an element of an urban cooling and flood management (TCPA,2012).

Dunton Hills Garden Village

3.6 A preliminary extended phase 1 habitat survey (see Appendix 1 SES, 2016) has been undertaken to provide an ecological baseline to assess the sites biodiversity constraints and opportunities. The site is dominated by habitats considered to be of relatively low ecological value (amenity grassland / arable farmland). However habitats that are considered to be of significant biodiversity value are present including ancient woodland (Eastlands Spring) which is also designated as a LoWS. Other priority habitats of principle importance to biodiversity include hedgerows, deciduous woodland and potentially ponds and streams.

3.7 The site was performance ranked '5' in respect to biodiversity within the SA (AECOM, 2016) which concludes that the site is a preferred option to be supported. It continues to state that 'Biodiversity objectives are a notable exception, although the appraisal is fairly marginal, i.e. it is not clear that there are major constraints to growth south of the A127'. The SA concludes that 'overall no significant effects are predicted' for biodiversity.

3.8 The extended phase 1 habitat survey including desktop study has shaped the draft masterplan and provides the clarity that is missing from the SA. It is considered that the site offers significant opportunities to deliver coherent ecological networks of priority habitats, retaining, and enhancing high value habitats to deliver no net less to biodiversity with an achievable aspiration of a net gain in biodiversity. Opportunities that DHGV present are discussed below.

Opportunities for Ecosystem Services and Landscape Scale Ecological Networks

3.9 The draft masterplan for site has identified the ability to deliver significant biodiversity enhancements through the provision of coherent ecological networks of multifunctional priority habitats that connect Essex Wildlife Trust 'Living Landscapes' 23 & 27 (although it is acknowledged the A127 will limit connectivity to a certain extent) as well Langdon Hills (30) LoWS. In addition coherent green corridors can be established east to west via linking to any Basildon west urban extension and the green corridor which abuts the railway track. The draft masterplan allows habitats to be created promoting the recovery of priority species and creation of habitats which would be managed in perpetuity. New green corridors include Eastland Spring LoWS ancient woodland, as recommended with the GI Study (2015). Green corridors will provide a mosaic of multi-functional open spaces for the benefit of people and wildlife.

Statutory and non-Statutory Designated Sites

3.10 The southern section of Eastlands Spring LoWS can be found to the north of the DHGV allocation. Opportunities are presented by the allocation to protect and enhance Eastlands Spring through buffering and management (in accordance with ECCOS, 2012 recommendation) of this fragment of woodland. This buffer of habitats will consist of a mosaic of interconnected priority habitats (as described above). Suitable open space for recreation can also be employed to mitigate recreational pressures. It is predicted that a positive impact upon this woodland can be achieved following mitigation.

3.11 Following mitigation it is considered by SES that the development of the site will infer no significant impacts upon statutory designated sites including Thorndon Park and Basildon Meadows SSSI and the site is wholly deliverable in this respect. This package of mitigation will be presented within a statutory designated sites assessment which will include an assessment of recreational impacts. This conclusion is also shared within the SA (AECOM, 2016) which concludes there will be 'no significant affects' upon biodiversity. Delivering the allocation with no significant effects is in accordance with the NPPF.

3.12 It is acknowledged within the SA that West Horndon strategic site potentially poses greater risk to the SSSI network (Appendix 3 AECOM, 2016) than DHGV.

Priority Species and Habitats

3.13 The NPPF requires planning authorities to promote polices that achieve the protection and recovery of priority species and habitats.

3.14 The site provides habitat for a number of priority species and as such further ecological surveys will be undertaken to inform the ecological baseline (see Appendix 1). The draft masterplan will evolve as ecological data is collected following best practise guidance. However, following the extended phase 1 survey and the shaping of the draft masterplan there are significant opportunities to ensure not net loss of priority species/ habitats but also secure real biodiversity gains targeting priority species/ habitats.

Demonstrating Compliance with the Draft Local Plan Polices

3.15 DHGV is considered to be consistent with the NPPF. The DLP polices build on NPPF policy guidance to provide biodiversity policy with is consistent with the NPPF while delivering local focus. The following tables highlight the DHGV allocation compliance with and/or its ability to deliver positive outcomes against draft local polices in relation to biodiversity.

Table 1. Draft Policy 6.3 General Development.

Policy 6.3: General Development	Compliance with policy criteria	Demonstration of compliance
Take full account of opportunities to incorporate biodiversity in developments		Preliminary baseline ecological survey has shaped draft masterplan.
		full suite of ecological surveys recommended to maximise biodiversity gains (priority species and habitats targeted).
		Landscape scale approach to ecology interconnecting green infrastructure - including functional links between EWT 'Living Landscapes' Thorndon woods, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon urban extension.
		Protection and enhancement of Eastland Springs LoWS and ancient woodland

		Targeting development within habitats of lower ecological value i.e. arable farmland amenity grassland.
		Targeting retention and enhancement of priority habitats to achieve not net loss
		Built environment to welcome wildlife through ecological permeability, sensitive landscaping and installation of habitat features (e.g. bird and bat roost boxes) targeting priority species.

Table 2. Draft Policy 9.1 Historic and Natural Environment Landscape and Character

Policy 9.1 Historic and Natural Environment Landscape Character	Compliance with policy criteria	Demonstration of compliance
Conserving and enhancing biodiversity and habitats, including through creation of new habitat		Preliminary baseline ecological survey to shape draft masterplan
		full suite of ecological surveys will be undertaken to maximise biodiversity gains in relation to species and habitats
		Landscape scale approach to ecology interconnecting green infrastructure - including functional links between EWT 'living landscapes' Thorndon wood, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon urban extension.
		Protection and enhancement of Eastland Springs LoWS and ancient woodland
		Targeting development within habitats of lower ecological value i.e. arable farmland amenity grassland.
		Targeting retention and enhancement of priority habitats to achieve not net loss.
		Built environment to welcome wildlife through ecological permeability, sensitive landscaping and installation of habitat features (e.g. bird and bat roost boxes) targeting priority species.
		Screening of impacts (to include cumulative impacts) with NE upon statutory designated sites including but limited to Thorndon Park SSSI and Basildon Meadows SSSI. Mitigation to include (but not limited to) suitable multifunctional GI to mitigate

		recreational pressure and GI to functional link habitats (landscape scale). Draft masterplan provides scope for suitable openspace provision.

Table 3. Draft Policy 9.2 Wildlife and Nature Conservation

Policy 9.2 Wildlife and Nature Conservation	Compliance with policy criteria	Demonstration of compliance
proposals affecting SSSI and National Nature reserves and irreplaceable habitats should be controlled through avoidance, on site management and on site mitigation		Preliminary baseline ecological survey has shaped draft masterplan
All stages of development must be considered when assessing the impact and cumulative impact on wildlife sites both within and in proximity to the Borough of Brentwood		Landscape scale approach to ecology interconnecting green infrastructure - including functional links between EWT 'living landscapes' Thorndon wood, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon extension demonstrated by the draft masterplan
Proposals likely to significantly effect on LoWS . Developer will be required to demonstrate that impacts will be avoided.		Protection and enhancement of Eastland Springs LoWS and ancient woodland through management, buffering with complimentary habitats and provision of sensitively designed GI.
		Targeting development within habitats of lower ecological value i.e. arable farmland amenity grassland.
Where there is confirmed presence or reasonable likelihood, of a legally protected species or priority species. Applicant must demonstrate impacts have been avoided where they cannot be avoided adequately mitigated		Targeting retention, enhancement and creation of priority habitats to achieve not net loss with achievable aspirations for net gain.
Hedgerows subject to assessment against criteria of the hedgerow Regulations 1997		Screening of impacts with NE upon statutory designated sites including but limited to Thorndon Park SSSI and Basildon Meadows SSSI to include cumulative impacts. Mitigation to include (but not limited to) suitable multifunctional GI to mitigate recreational pressure and GI to functional link habitats (landscape scale). Draft masterplan provides scope for suitable open space provision.

Proposals that result in a net gain in priority habitat will in principle be supported..where priority habitats are likely to be adversely impacted by the proposal, the developer must demonstrate that adverse impacts will be avoided, and impacts that cannot be avoided are mitigated onsite. Where residual impacts cannot be avoided offsite compensation will be required so that there is no net loss in quantity and quality of priority habitats in the Borough of Brentwood.		full suite of ecological surveys will be undertaken following extended phase 1 habitat survey to enable mitigation and enhancement in relation to species and habitats
Council will require mitigation and compensation measures to be provided for features (list of habitats provided a-f pg126)		Extended phase 1 habitat survey has assessed hedgerows.
		Built environment to welcome wildlife through ecological permeability, sensitive landscaping and installation of habitat features (e.g. bird boxes) targeting priority species.

Table 4. Draft Policy 9.3 Landscape Protection and Woodland Management

Policy 9.3 Landscape Protection and Woodland Management	Compliance with policy criteria	Demonstration of compliance
Where appropriate development proposals will be required to be accompanied by: A) An ecological survey as required appropriate to the nature and scale of the proposal, identifying links to similar eco systems within the proximity of the development site in line with policy10.10 green infrastructure.		Preliminary baseline ecological survey has shaped draft masterplan.
Areas of landscape, biodiversity and geo diversity interest and local distinctiveness within the Borough will be protected from harm and their retention and enhancement encouraged. Where feasible, proposals should promote the use of trees, hedges, wildlife gardens allotments, ponds, green roofs/walls, roosting boxes and wider habitat creation.		Landscape scale approach to ecology interconnecting green infrastructure - including functional links between 'living landscapes' Thorndon wood, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon urban extension

Permission will not be granted for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside of ancient woodland, unless the need for and the benefits of, the development in the location clearly outweigh the loss.		full suite of ecological and arboricultural surveys will be undertaken following extended phase 1 habitat survey to enable mitigation and enhancement in targeting priority species and habitats
		Built environment to welcome wildlife through ecological permeability, sensitive landscaping and installation of habitat features (e.g. bird and bat roosting boxes) targeting priority species.
Council supports the Essex Wildlife Trusts 'Living Landscapes' vision…. Opportunities for the preservation, restoration and recreation of priority habitats, ecological networks and populations of priority species will be supported in order to protect and enhance strategic wildlife corridors and habitats in Essex. Developments proposals that would deliver these opportunities will in principle be supported, subject to other polices with the plan. Development resulting in a significantly adverse impact on the ecological function of these living landscapes will be refused		Targeting retention, enhancement and creation of priority habitats to achieve not net loss with achievable aspirations for net gain.
		Screening of impacts with NE upon statutory designated sites including but limited to Thorndon Park SSSI and Basildon Meadows SSSI to include cumulative impacts. Mitigation to include (but not limited to) suitable multifunctional GI to mitigate recreational pressure and GI to functional link habitats (landscape scale). Draft masterplan provides scope for suitable open space provision.
		Protection and enhancement of Eastland Springs LoWS and ancient woodland through management, buffering with complimentary habitats and provision of sensitively designed GI.
		Deciduous woodland, where possible, to be retained and enhanced onsite including reinforcing habitat connectivity through sensitive GI design.

Table 5. Draft Policy 10.6 High Quality Design Principles

Policy 10.6: High Quality Design Principles	Compliance with policy criteria	Demonstration of compliance
New development proposals should: Limit the impact of light pollution from artificial light on local amenity, Intrinsically dark landscapes and nature conservation; Demonstrate a holistic approach to biodiversity, the micro climate, and air pollution and provide attractive places that improve people's health and sense of vitality		Preliminary ecological survey has shaped draft masterplan. Landscape scale approach to ecology interconnecting green infrastructure - including functional links between EWT 'living landscapes' Thorndon wood, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon urban extension. GI to include multifunctional purpose for benefit of people and biodiversity. Full suite of ecological surveys will be undertaken following extended phase 1 habitat survey to enable mitigation and enhancement targeting priority species and habitats. These surveys will inform location of 'dark' corridors and/or location, extent of wildlife sensitive lighting. Built environment to welcome wildlife through ecological permeability, sensitive landscaping and installation of habitat features (e.g. bird and bat roosting boxes) targeting priority species.

Table 6. Draft Policy 10.10 Green Infrastructure.

Policy 10.10: Green Infrastructure	Compliance with policy criteria	Demonstration of compliance
New development will be required to maximise opportunities for the creation, restoration, enhancement, expansion and connection of Green Infrastructure and connection of the development site to the local Ecological Network. All major development proposals should seek to include elements of Green Infrastructure and Ecological Networks, such as but not limited to SuDS, allotments, street trees, green roofs, recreational areas, areas of new and existing natural habitat, green corridors through the site and waterbodies, and existing networks including Thames Chase Forest.		Preliminary baseline ecological survey has shaped draft masterplan Landscape scale approach to ecology interconnecting green infrastructure - including functional links between 'living landscapes' Thorndon wood, Bulphan Fen, Langdon Hills LoWs and any proposed West Basildon urban extension. SuDS to incorporate wildlife friendly design such as planting where possible.

Table 7. Draft Policy 10.12 Flood light and Illumination

Policy 10.12: Flood light and Illumination	Compliance with policy criteria	Demonstration of compliance
Proposals must demonstrate adequate protection from glare and light spill, particularly in sensitive locations, such as residential areas, sites of nature conservation interest, and have no adverse effect on amenity, highway safety, landscape or historic character.		Wildlife sensitive lighting and/or no lighting will be used in areas of sensitive habitat to minimise light pollution following recommendations in phase 2 surveys. The draft masterplan has been shaped to provide such areas in known areas of interest.

Table 8. Draft Policy 10.14 Sustainable Drainage.

Policy 10.14: Sustainable Drainage	Compliance with policy criteria	Demonstration of compliance
Applications should meet the following standards: d. Amenity and biodiversity- SuDS should be sensitively designed and located to promote improved biodiversity, an enhanced landscape and good quality spaces that benefit public amenities in the area.		Where possible SuDS will be enhanced for biodiversity through planting, habitat connectivity and design (shape and form)

4.0 Conclusion

4.1 The allocation at Dunton Hills Garden Village provides opportunities to not only achieve no net loss to biodiversity but aspires to deliver real biodiversity gains targeting priority species and habitats. Key to this strategy has been early ecological and arboricultural survey to shape the draft masterplan enabling landscape-scale coherent ecological networks to the planned through the strengthening and interconnecting of site's high value green infrastructure. This approach to design will functionally link Brentwood and Basildon's key green infrastructure including those habitats identified within the EWT 'living Landscapes' Thorndon Hills to the north, Bulphan Fen and Langdon Hills to the south. Green corridors will also be provided to link to any proposed Basildon West urban extension development.

4.2 Following recommendations within the extended phase 1 survey (SES, 2016) and the subsequent shaping of the draft masterplan, targeted ecological surveys will provide detail to allow mitigation and biodiversity enhancements to be delivered by Dunton Hills Garden Village.

4.3 Following mitigation no predicted adverse effects are predicted upon non statutory and statutory designated sites.

4.4 Dunton Hills Garden Village can deliver against the SA biodiversity objectives with significant opportunities for biodiversity gain. Dunton Hills Garden Village can also demonstrate compliance or the ability to comply with the draft local plan polices. These policies are considered in respect to the Regulation 18 (Town and Country Planning Regulations, 2012) proposal to allocate Dunton Hills Garden Village to be 'sound' and consistent with the NPPF in relation to biodiversity.

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Appendix 1: Extended Phase 1 Habitat Survey

Appended separately

Extended Phase 1 Habitat Survey

Dunton Hills Farm, Essex

On Behalf of:

CEG Land Promotions Ltd

March 2016

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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 (BBC, 2016) 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 principle 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 functional links connect 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).

Contents:

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 *Crsitatus triturus* 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.

<u>Creation of Coherent Ecological Networks on a Landscape Scale</u>

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

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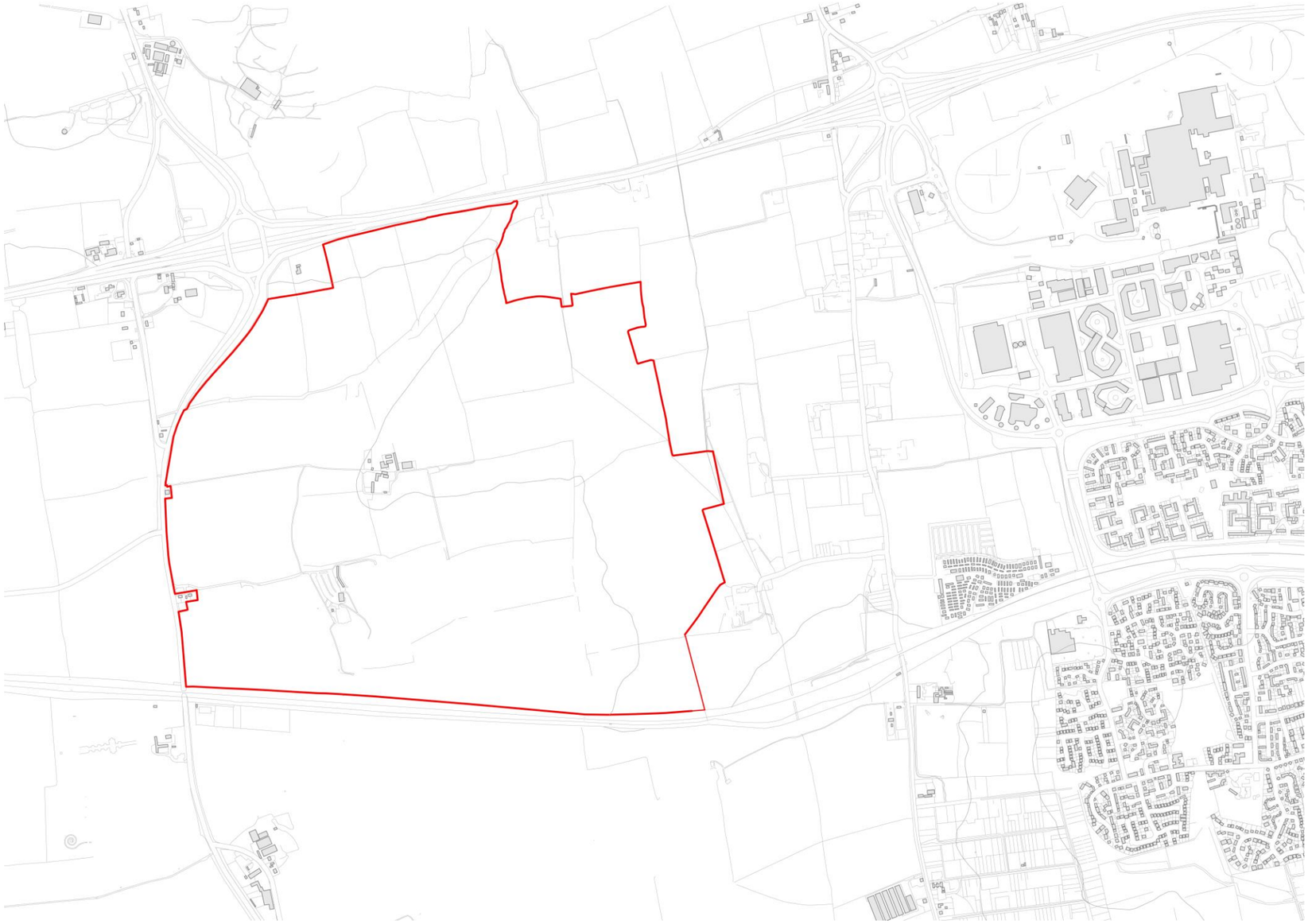
Appendix 1: Plan of the Site



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

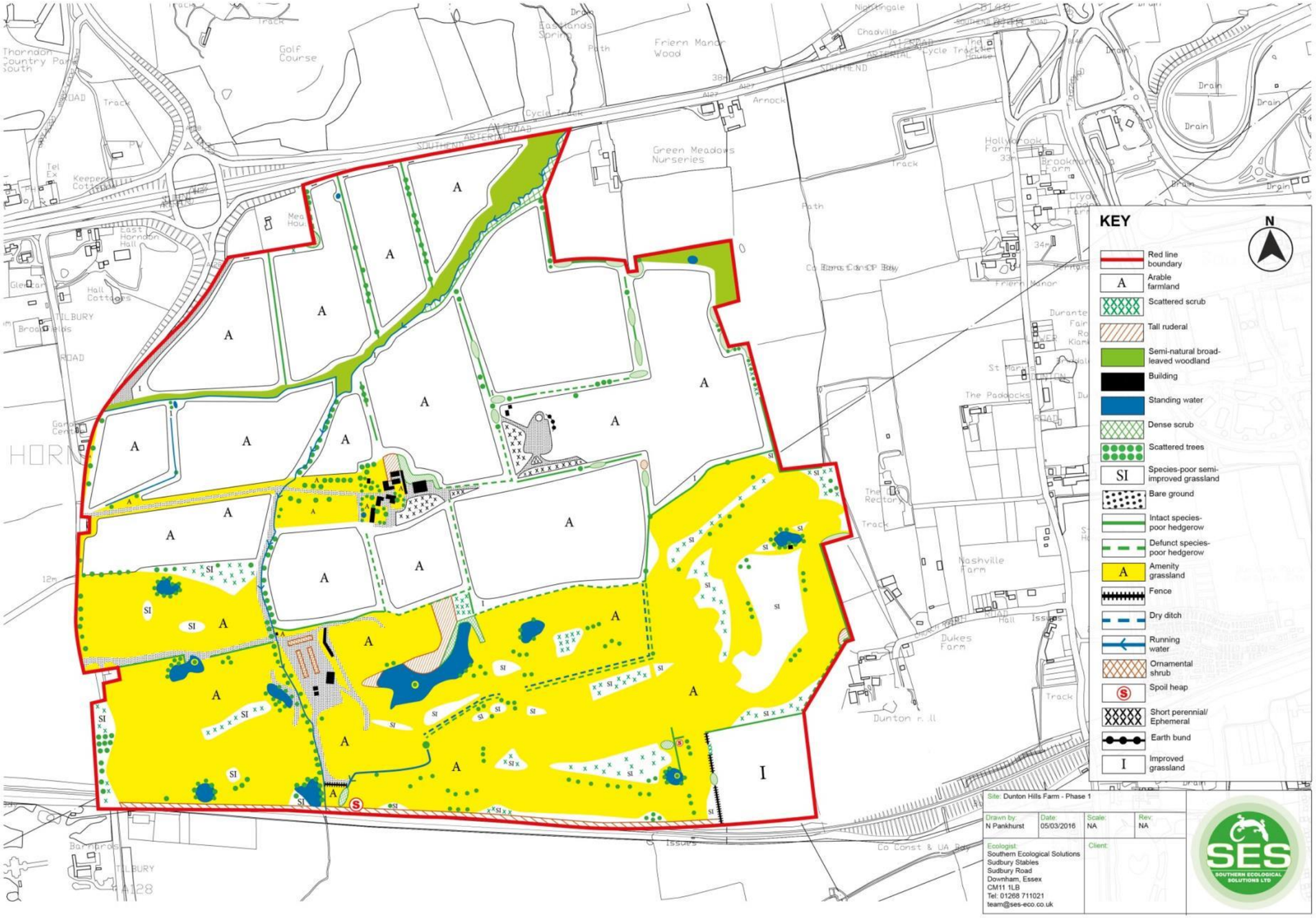
Photograph 3: View of the ancient woodland running through the middle of the site.

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.

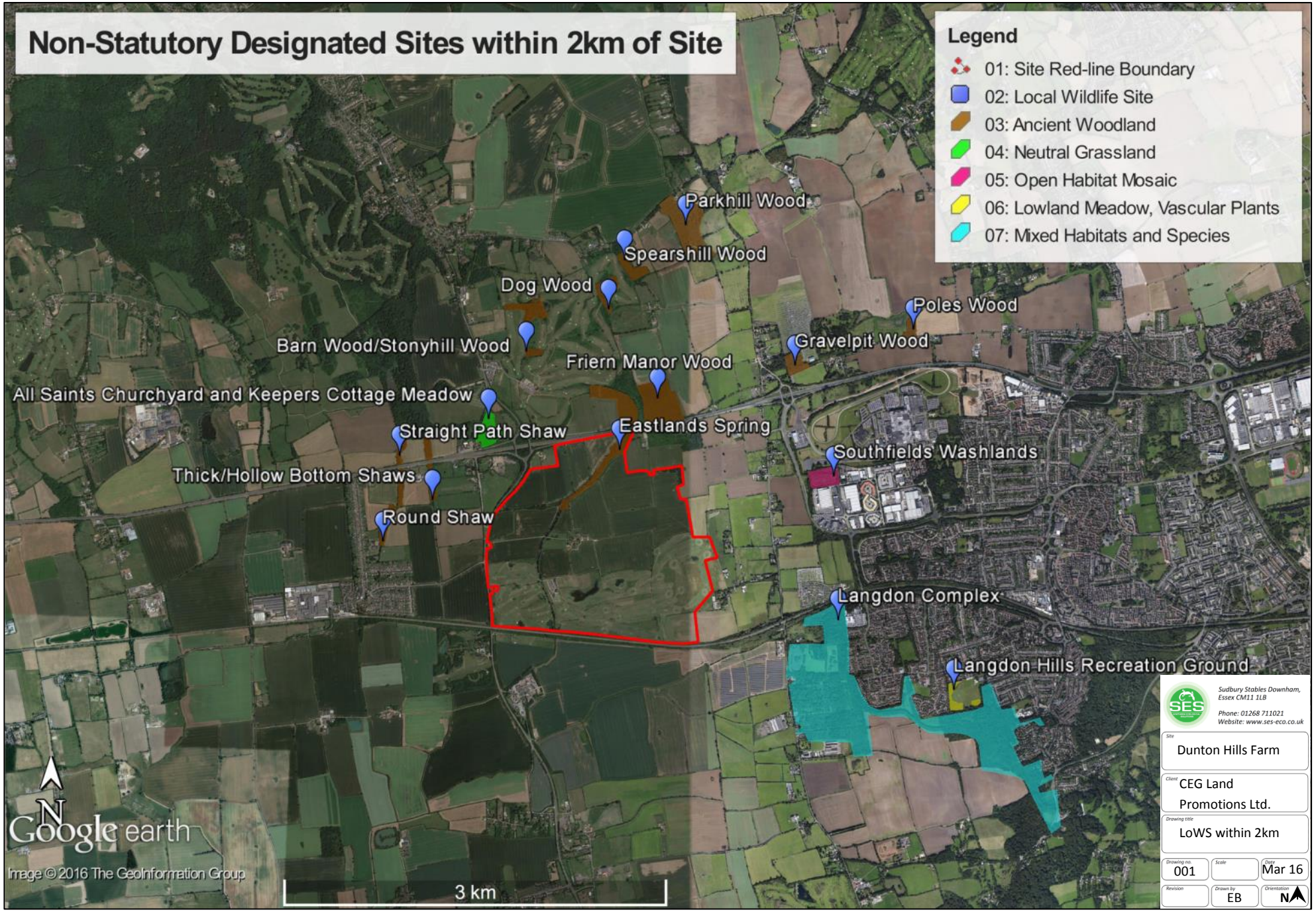
Photograph 5: View of the ditch which widens in the south east of the site. Badger footprints were visible at what appeared to be a crossing point from the golf course into the vegetated bank of the railway track to the south of the site.

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

DUNTON HILLS

BRENTWOOD