

7 Ecology & Biodiversity

7.1 Introduction

- 7.1.1 This chapter assesses the likely significant effects of the proposed development (described in Chapter 3) in terms of Ecology and Nature Conservation.
- 7.1.2 The chapter describes the assessment methodology; the baseline conditions at the assessment site and surroundings; the likely significant environmental (ecological) effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. Cumulative ecological effects in combination with other relevant local projects are also assessed where relevant. This chapter has been prepared by CSA Environmental.

7.2 Planning policy and guidance

Legislation

- 7.2.1 There are several pieces of legislation relating to wildlife and biodiversity. Those that are of particular relevance to ecology in the context of development are the Conservation of Habitats and Species Regulations 2010 (as amended), which enacts the Habitats and Birds Directives into UK law, the Wildlife and Countryside Act 1981 (as amended) and regarding specific protection of badgers, the Protection of Badgers Act 1992. Legislation relating to specific protected sites, habitats and species is set out under the relevant subheadings under Baseline Conditions below and within corresponding appendices. The Natural Environment and Rural Communities (NERC) Act 2006 requires planning authorities to consider impacts on “species of principle importance for the conservation of biodiversity” when determining planning applications, as described under Biodiversity and Priority Species below. These pieces of legislation and the species and habitats they afford protection to have been addressed in this chapter.
- 7.2.2 Natural England Standing Advice regarding protected species aims to support local authorities and forms a material consideration in determining applications in the same way as any individual response received from Natural England following consultation (except where applications require EIA or may affect a Natura 2000 site).

National Planning Policy

- 7.2.3 The National Planning Policy Framework (NPPF) 2018 sets out the government planning policies for England and how they should be applied. With regards to ecology and biodiversity, Chapter 15: Conserving and Enhancing the Natural Environment, paragraph 170, states that the planning system and planning policies should “contribute to and enhance the natural and local environment by:
- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
 - recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and

woodland; and

- minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.”

7.2.4 Paragraph 175 sets out the principles that local planning authorities should apply when determining planning applications:

- “If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons⁵⁸ and a suitable compensation strategy exists; and
- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity. “

7.2.5 The core theme of the NPPF is a “presumption in favour of sustainable development”. This does not however apply where Appropriate Assessment under the Birds or Habitats Directives is being considered, planned or determined (paragraph 177). Appropriate Assessment is required where a plan or project may affect a European Special Protection Area (designated SPA and proposed pSPA) or Special Area of Conservation (designated SAC and candidate cSAC), either alone or in combination with other plans or projects. Together SPA and SAC sites form a network of protected sites known as Natura 2000. Designated and proposed Ramsar sites are also attributed the same protection as Natura 2000 sites under the NPPF.

Government Circular 06/2005 Biodiversity and Geological Conservation

7.2.6 Government Circular 06/2005 which is referred to in the NPPF, provides further guidance in respect of statutory obligations for biodiversity and geological conservation and their impact within the planning system.

Local Planning Policy

CORE STRATEGY 2006 - 2031

7.2.7 The Core Strategy 2006 - 2031¹ was adopted on 25 September 2013. The Core Strategy forms part of the Development Plan for the borough and is used to assess any planning applications that are submitted to the Council. Policies of relevance to ecology, biodiversity and/or nature

¹ Dacorum Borough Council. Core Strategy 2006-2031 (adopted 2013): Dacorum's Local Planning Framework

conservation are listed below.

- Policy CS26: Green Infrastructure: which states the 'Green Infrastructure Network' will be protected, extended and enhanced, with habitat management zones, projects and more detailed policies will be set out in a Supplementary Planning Document and related Action Plan(s). The policy intends to support National and local Biodiversity Action Plans with Designated sites protected and opportunities taken to link them with the wider network. The policy also states that Development and management action will contribute towards:
 - the conservation and restoration of habitats and species;
 - the strengthening of biodiversity corridors;
 - the creation of better public access and links through green space; and
 - a greater range of uses in urban green spaces.

- Policy CS29: Sustainable Design And Construction, which states that new development will comply with the highest standards of sustainable design and construction possible, and where the following principles (of relevance to ecology) should normally be satisfied:
 - Incorporate at least one new tree per dwelling or per 100sqm (for non-residential developments) on-site;
 - Minimise impacts on biodiversity and incorporate positive measures to support wildlife;

DACORUM BOROUGH LOCAL PLAN 1991-2011 SAVED POLICIES

7.2.8 The Core Strategy (adopted 2013) does not replace all of the policies contained within the Local Plan 1991-2011. Many of the policies within the Local Plan have been 'saved'² and continue to inform planning policy. Saved policies of relevance to ecology, biodiversity and/or nature conservation are listed below.

- Policy 99 Preservation Of Trees, Hedgerows And Woodlands, in which high priority is given to the retention of these habitats within developments
- Policy 100 Tree And Woodland Planting, in which such operations are encouraged with appropriate native broad-leaved species.
- Policy 101 Tree And Woodland Management, in which appropriate management is encouraged of trees standing as individual specimens, groups or woodlands or orchards and of hedgerows.
- Policy 102 Sites Of Importance To Nature Conservation, in which such sites will be protected from development in accordance with their designation, value and scarcity. It states that proposals for development which may have an adverse effect, directly or indirectly, on a Site of Special Scientific Interest will not be permitted unless there is an overriding need for the development which clearly outweighs the nature conservation value of the site itself and its role within the national network of such sites, and there are no suitable alternative sites for the development. Specific mention is made of Roughdown Common, Shrub Hill Common Local Nature Reserve and Howe Grove Local Nature Reserve. In addition the following green corridors will be protected and the nature conservation interest of open areas along their length enhanced:
 - Canal Corridor (Bulbourne Valley, Grand Union Canal, Boxmoor and

² Dacorum Borough Council. Dacorum Borough Local Plan 1991-2011 (adopted 2004) Saved Policies

- Durrants Hill cress beds)
- Gade River Corridor (River Gade, Water Gardens, Gadebridge Park, Warners End and Home Woods)
 - Gade Valley West Corridor (Gravel Hill Spring, Lockers Park, Cemetery, Warners End Playing Field)
- Policy 103 Management Of Sites Of Nature Conservation Importance, which states that where planning permission is granted for developments on or adjoining sites of importance to nature conservation, the Council will require applicants to undertake the following:
 - submit environmental statements where it is considered a proposed development would have a significant adverse effect on nature conservation interests (i.e. sites covered by Policy 102);
 - retain and enhance important nature conservation features and habitats within and/or, where appropriate, adjoining the site;
 - ensure the protection of such features and habitats from damage both during and after development;
 - make provision for the future management of such features and habitats.
 - Where loss of features or habitats is unavoidable, the Council will require compensatory measures to replace or reinstate the nature conservation value that has been lost.
 - Where appropriate the Council will achieve these objectives by the imposition of planning conditions and/or the negotiation of planning obligations and/or management agreements (Section 61 Wildlife and Countryside Act).

7.3 Assessment Methods

Introduction

7.3.1 The method for this assessment is based on the guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM)³. These guidelines provide a robust framework for ecological assessment, which has been approved by all relevant national agencies.

7.3.2 The main aims of this assessment are to:

- Consider the activities and biophysical changes likely to be associated with the proposed development and its zone of influence.
- Identify the baseline conditions within the zone of influence, with particular reference to those important ecological features that are likely to be affected.
- Describe and assess the potential effects on the structure and function of the systems on which these features depend, in the absence of mitigation.
- Describe any mitigation needed to avoid or minimise adverse effects and explain how such actions have been incorporated into the scheme.
- Describe any compensation needed where an effect cannot be reduced to an insignificant level.

³ CIEEM (2016). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal (2nd edition). Chartered Institute of Ecology and Environmental Management, Winchester.

- Set out the net anticipated effects of the proposed development, complete with mitigation.

Ecological Zone of Influence (Spatial Scope)

7.3.3 The EZol is defined as the areas/resources that may be affected by the biophysical changes caused by activities associated with the proposed development. Due to the scale and nature of the proposals, the EZol includes all land within the Study Area. When assessing the potential effects of the development proposals on statutory and non-statutory designated sites the following arbitrary EZols have been adopted:

- Internationally designated statutory sites: all land within 10km of the Site boundary.
- Nationally and locally designated statutory sites: all land within 3km of the Site boundary.
- Non-statutory designated sites: all land within 1km of the Site boundary.

7.3.4 In respect of fauna, flora and habitats, the EZol includes all land within the Site, with a wider 2km desk study area providing contextual records of notable and protected species. In addition, for great crested newts, the EZol was extended to include all waterbodies within 500m of the Site boundary and for badgers all publically accessible land within 100m.

Geographic Frame of Reference

7.3.5 The Geographic Frame of Reference method is adopted for this assessment to assign importance to ecological features based on that set out in CIEEM guidelines, where ecological resources are assessed as having importance at the following levels:

- **International**
- **National**
- **Regional** (if applicable)
- **County** (or Metropolitan, vice-county and other local authority-wide area)
- **Local**

7.3.6 It should be noted that ecological features which fall short of the threshold for local importance are those considered unable, or very unlikely, to experience significant adverse effects as a result of the proposals. However, these features often have some limited ecological importance such that they remain relevant when considering overall net gains or losses in biodiversity.

Designated Sites

7.3.7 Some sites are assigned a level of nature conservation importance through designation, and the guidelines recommend that the reasons for this designation need to be taken into account in the assessment. Such designations include:

- Internationally important sites: SACs, SPAs and Ramsar sites, including 'candidate' or 'potential' Sites (i.e. cSACs, pSACs, c.SPAs and pSPAs);
- Nationally important sites such as SSSIs and NNRs; and
- Regional/County important sites.

7.3.8 Where a particular site has multiple designations, effects of the proposals are considered in

respect of each of the features of each designation, carefully distinguishing between them in accordance with the respective legislation and policy.

7.3.9 The Multi-Agency Geographic Information for the Countryside (MAGIC) (2013) (Appendix 7.1) online database was interrogated in March 2016 to identify the following ecological features (based on the EZol defined above):

- Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar sites.
- Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Local Nature reserves (LNR).
- Other relevant data e.g. Ancient Woodland Inventory.

7.3.10 The Hertfordshire Environmental Records Centre (HERC) was contacted for details of any non-statutory designations within 2km (based on the EZol as defined above).

Habitats & Flora

7.3.11 The importance of areas of habitat, floral species and communities are measured against published selection criteria where available. Habitat types of European (International) conservation importance are listed on Annex I of the Habitats Directive. Habitats that are considered priorities for conservation in England are listed as habitats of principal importance under section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. Additional locally important habitats are listed in the Biodiversity Action Plan for Hertfordshire⁴.

7.3.12 Habitat and botanical survey work was carried out between March and September 2016, with full methodologies and results provided in Appendix 7.2 (Habitats, botany and hedgerows).

Fauna

7.3.13 The importance of areas for faunal species are measured against published selection criteria where available. Species of European (International) conservation importance are listed on Annexes II, IV and V of the Habitats Directive and Annex I of the Birds Directive. Species that are considered to be priorities for conservation in England are listed under section 41 of the NERC Act 2006. Additional locally important species are listed in the Biodiversity Action Plan for Hertfordshire.

7.3.14 The importance of faunal populations are determined using existing criteria where available and contextual information about distribution and abundance, including trends based on historical records.

7.3.15 Specific faunal species have legal protection under Annex IV of the EC Habitats Directive. In the UK other species are protected under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended). Where protected species are present and there is the potential for a breach of the legislation, these matters are considered, but addressed separately from ecological 'importance'.

7.3.16 HERC was contacted for details of records for protected and notable species within 2km (based on the EZol as defined above), which additional information obtained from online searches and review of existing survey documents. All relevant desk study data are presented in Appendix

⁴ Hertfordshire Environmental Forum (HEF) (2006). A 50 year vision: Biodiversity Action Plan

7.1.

- 7.3.17 Consideration has been given to ensuring that land use changes do not result in contravention of laws relating to legally controlled plant and animal species under Schedule 9 of the Wildlife and Countryside Act 1981, under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 and under the Weeds Act 1959 (as Amended by the Ragwort Control Act 2003). Where appropriate measures to control such species have been identified.
- 7.3.18 The following detailed field survey work was carried out between March 2016 and April 2017, with full methodologies and results provided in the relevant Appendices:
- Bats (Appendix 7.3)
 - Badger (Appendix 7.4)
 - Dormouse (Appendix 7.5)
 - Breeding birds (Appendix 7.6)
 - Reptiles (Appendix 7.7)
 - Great crested newt (Appendix 7.8)
 - Invertebrates (Appendix 7.9)
- 7.3.19 A desktop search was also undertaken to identify ponds within 500m as EZoI defined above which may have potential to support breeding great crested newts, using Ordnance Survey mapping, the MAGIC database and aerial photography.

Biodiversity

- 7.3.1 In addition to individually 'important' ecological features, and in line with CIEEM EclA guidance, '*Consideration of impacts at all scales is important, and essential if objectives for no net loss of biodiversity and maintenance of healthy ecosystems are to be achieved*'. As such, a broad metric of the 'Habitat Biodiversity Value' has been established using the approach set out in Appendix 7.10 within the Biodiversity Impact Assessment Calculator (Warwickshire County Council Ecological Services). Scores will be used to establish overall net loss/gain across all habitats and separately on linear features.

Assessment of Significant Effects

- 7.3.2 Potential effects on ecological features have been assessed in the context of how the predicted baseline conditions within the EZoI might change between the surveys and the start of construction.

TEMPORAL SCOPE

- 7.3.3 Effects have been assessed at the following stages:
- During construction: including any vegetation clearance, ground works and construction of infrastructure, dwelling, community facilities and landscaping of open space;
 - In-operation: during occupation of new dwellings and use of community/other facilities;
- 7.3.4 It is anticipated a phased work programme will commence in 2019 with initial works within the

first phase areas, phased occupation of dwelling and use of community/other facilities with the Site fully operational by 2027.

CHARACTERISING EFFECTS

7.3.5 The following terminology is adopted to express the nature of any significant effects and to determine their level of significance:

- Beneficial (positive) or Adverse (negative) at the relevant Geographic Frame of Reference (i.e. International, National, Regional, County or Local) and;
 - extent or magnitude;
 - duration or timing;
 - frequency; and/or
 - reversibility.

ASSESSMENT OF CUMULATIVE EFFECTS

7.3.6 The following types of actions which can cause cumulative effects were considered:

- Additive/incremental - refers to multiple activities/projects (each with potentially insignificant effects) which when added together give rise to a significant effect due to proximity in time and space. The effect may be additive or synergistic.
- Associated/connected - refers to a development activity which 'enables' another development such as phased development as part of separate planning applications.

7.3.7 The following types of future development projects within the same zone of influence were considered:

- proposals for which consent has been applied which are awaiting determination in any regulatory process;
- projects which have been granted consent but have not yet been started or which have been started but are not yet completed;
- proposals which have been refused permission but which are subject to appeal and the appeal is undetermined; or
- proposed projects that will be implemented by a public body but for which no consent is needed from a competent authority.

DETERMINING SIGNIFICANCE

7.3.8 The significance of an ecological effect, whether beneficial or adverse, has been assessed in accordance with the CIEEM guidelines, which states that an effect is considered to be significant "...if it is sufficiently important to require assessment and reporting" and if it could result in a change in the conservation status or degree of integrity of any important ecological feature. Wherever possible therefore, a justification for determining whether effects are 'sufficiently important', at whichever geographic scale, to warrant assessment and reporting, and the change to conservation status or integrity of a feature.

Assumptions / Limitations

7.3.9 There were no limitations to the survey work in terms of access to the Study Area. All surveys were undertaken in a range of suitable weather conditions at optimum times of year following

recognised guidance.

- 7.3.10 Any assumptions/limitations relating to specific surveys types have been provided in the relevant appendices, and referenced as required in the baseline conditions and/or assessment of effects.
- 7.3.11 It should be noted that owing to the seasonal/annual variation in detectability of some fauna/flora, as well as the ability for some species to colonise, the absence of evidence of any particular species from within the Site should not be taken as conclusive proof of absence. However, it is considered that the results of the surveys undertaken in 2016 and early 2017 are sufficient to determine baseline conditions.

7.4 Baseline conditions

Site Context and Description

- 7.4.1 The Site is located on the western settlement edge of Hemel Hempstead upon the northern slope of the Bulbourne Valley, immediately to the north of Chaulden Lane and east of Pouchen End Lane.
- 7.4.2 Residential land forms much of the adjacent land use to the east with agricultural land to the north, south and west. A railway line (West Coast Main Line) lies approximately 0.1km south of the Site within the Bulbourne valley. Further information on the site and its context is provided in Chapter 2.
- 7.4.3 The Site comprises a number of arable fields and horse-grazed semi-improved grassland fields bounded by hedgerows with some mature trees. A dry attenuation basin is present in the east of the Site adjacent to a small woodland copse. A ditch (largely dry) is present between the two arable fields in the north-east of the Site.
- 7.4.4 The Site slopes significantly from north to south down into the Bulbourne Valley. The underlying geology includes both chalk, with soils also influenced by agricultural uses.

Designations

- 7.4.5 There are no statutory nature conservation designations present on or immediately adjacent to the Site. Several statutory and non-statutory nature conservation designations occur within the data search radii as summarised in Table 7.1 below (for map see Appendix 7.1):

Table 7.1: Statutory and Non-Statutory Designations within Data Search Radii

Site Name & Designation	Distance & Direction from Survey Area	Brief Description of Designated Site	Level of importance
Internationally Important Designations within 10km			
Chilterns Beechwoods SAC	c. 3.3km north-west	Extensive tract of <i>Asperulo-Fagetum</i> beech forests in the centre of the habitat's UK range. Also comprises semi-natural dry grasslands and scrubland facies on calcareous substrates.	International (European)

		Supports stag beetle <i>Lucanus cervus</i> .	
Nationally Important Designations within 3km			
Little Heath Pit SSSI	c.1.1km north-west	Designated for geological importance only	n/a
Roughdown Common SSSI	c. 1.7km south-east	Small area of unimproved calcareous grassland on a north-facing chalk escarpment which supports a rich assemblage of plant species.	National
Locally Important Designations within 3km			
Shrubhill Common LNR	c. 0.02km east	Herb-rich chalk grassland and woodland.	Local*
Howe Grove Wood LNR	c. 2.7km north-east	Dense woodland.	Local
Non-statutory Designations within 1km			
Shrubhill Common North LWS	c. 0.02km north-east	Several old pastures, an area of old secondary woodland and a length of ancient green lane. The grasslands support areas of unimproved chalk grassland.	County
Unnamed Ancient Semi-natural Woodland (ASW)	c. 0.3km west	0.56ha of ancient semi-natural woodland.	Local
Boxmoor Common LWS	c. 0.4km south	Ancient grazing pastures, on alluvial soils alongside the River Bulbourne, which support dry to marshy, mostly semi-improved, neutral grassland.	County
Westbrook Hay Golf Course Bourne End Golf Course LWS	c. 0.6km south-west	Unimproved neutral and calcareous grassland (there is a slight acid influence in some areas), ancient woodland and old hedgerows.	County
Lower Little Heath Farm Grassland (East) LWS	c. 0.6km north-west	Neutral grassland.	County
Moor End Farm LWS	c. 0.6km south-east	Building and environs important for protected species.	County
Bovingdon Reach, Three Crofts, Barnfield LWS	c. 0.8km south	Secondary grassland developed on set-aside arable.	County
Unnamed ASW	c. 0.8km south-west	1.06ha of ancient semi-natural woodland.	Local
Unnamed Ancient	c. 0.8km south	4.31ha of ancient replanted woodland	Local

Replanted Woodland (ARW)			
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Green Infrastructure

7.4.6 HERC have provided details of both existing and potential green infrastructure features at the Site and in adjacent areas via 'Hertfordshire Ecological Network Mapping'. The following features of relevance have been identified (with feature references given where necessary):

- On-site:
 - Copse adjacent to Long Chaulden (no reference given but listed as S41 habitat)
 - Hedgerows H15, H17 and parts of H18 & H21, along with the plantation belts adjacent to these areas (D19987 & M08008)- with target habitat restoration/creation: 'broad-leaved woodland/chalk grassland'
 - Grassland within existing drainage basin (D19984) with target habitat restoration: 'chalk grassland/neutral grassland'
 - A number of other features with 'No known habitats present (high priority for habitat creation)' with target habitat creation/restoration: 'chalk/neutral grassland'
 - (M08000)
- Off-site:
 - Cluster of woodland, hedgerows and grasslands to the northwest
 - Shrubhill common and associated habitats to the west
 - Cluster of grassland and some hedgerows to the southwest
 - Bulbourne Valley with riparian habitats to the south

Habitats and Flora

7.4.7 The findings of the extended Phase 1 Habitat survey are mapped in Figure 7.1 Habitats Plan (CSa/2617/101) and described below.

RECORDS

7.4.8 HERC have provided 145 records of 39 notable plant species from within the search area. Those of potential relevance to the Site recorded between 1996-2016 include juniper *Juniperus communis*, bluebell *Hyacinthoides non-scripta*, frog orchid *Coeloglossum viride*, white helleborine *Cephalanthera damasonium*, dwarf spurge *Euphorbia exigua*, welsh poppy *Meconopsis cambrica*, common rock-rose *Helianthemum nummularium*, lady's mantle *Alchemilla filicaulis* subsp. *vestita*, heath false-brome *Brachypodium pinnatum*, sassari crisp-moss *Tortella inflexa*, lesser screw-moss *Syntrichia virescens*, strap-leaved earth-moss *Ephemerum recurvifolium* and yellow-tuber thread-moss *Bryum tenuisetum*.

7.4.9 None of these species were recorded at the Site at the time of survey save for bluebell. However, this species is protected from sale only under Schedule 8 of the Wildlife and Countryside Act, 1981 (as amended).

ARABLE

- 7.4.10 A significant proportion of the Site comprises arable land. At the time of survey field in 2016 F13 contained a cereal crop with F14 had been recently ploughed, comprising bare earth, seeded with broad beans *Vicia faba* in late March 2016. Frequent common arable weeds, including black-grass *Alopecurus myosuroides*, scented mayweed *Matricaria recutita*, scentless mayweed *Tripleurospermum inodorum*, wild radish *Raphanus raphanistrum* and scarlet pimpernel *Anagallis arvensis* were recorded within arable fields. A wide strip in the east and south of F13 appeared to have recently been treated with herbicide and is colonising with short, patchy vegetation (see 'Ephemeral / Short Perennial' below).
- 7.4.11 Fields F6 and F7 comprise arable land which has been left fallow for a number of years. These fields were previously recorded by ACD Ecology in 2012 as an agricultural grassland ley, being sown with perennial rye-grass *Lolium perenne*. At the time of the 2016 survey these fields were dominated by perennial rye-grass, with some infrequent coarse grasses and forbs.
- 7.4.12 The narrow species-poor field margins of F13 and F14 do not meet the criteria for the section 41 habitat of principal importance "arable field margins" as they are not managed specifically to provide benefits to wildlife. The intensive management of these areas at the Site coupled with the narrow field margins, mean this habitat is considered to be of limited ecological importance. It should be noted however that the field margins of F6 and F7 comprise 'good semi-improved' as described above.

SEMI-IMPROVED GRASSLAND

- 7.4.13 The site is dominated by semi-improved grassland, and is grazed by horses (to the south) and sheep (to the north). The grassland appears to have been subject to some 'improvement' through manure spreading and/or other fertilising. Trophic conditions are thought to range from neutral to slightly acidic in the north of the Site, becoming calcareous towards the centre and east of the Site, reverting back to more neutral to slightly acidic conditions towards the south. However, due to the improvement of soils, the species recorded reflect that of neutral grassland.
- 7.4.14 None of the grassland present at the Site is likely to meet the criteria for any Section 41 habitat of principal importance such as "lowland meadow", "lowland dry acid grassland" or "lowland calcareous grassland" given the absence of certain communities/diversity of grasslands. Nor are they likely to meet the Selection Criteria for Local Wildlife Sites in Hertfordshire such as "neutral grassland", "acid grassland" or "calcareous grassland" given the limited number of key indicator species and/or absence of certain communities.
- 7.4.15 The grassland habitats present at the Site have been categorised either as 'Neutral semi-improved' (where species diversity is sufficient to determine trophic condition) or 'poor semi-improved' (where species diversity is significantly lower), as described below.

POOR SEMI-IMPROVED GRASSLAND

- 7.4.16 Fields F1, F4, F5, F8, F9, F10 and F11 and the narrow (c.1m) margins of arable fields F13 and F14 comprise poor semi-improved grassland. These grasslands are dominated by coarse grasses with fewer herbs. F1 and F5 are managed as hay meadows, and the greatest diversity of grassland species within these fields found to the margins. F4 is intensively horse-grazed and parts of the field have been trampled to such an extent that some areas are just bare ground. F8 and F9 are unmanaged and utilised for storage of machinery, rubble, etc. A chicken coop is present in the east of F9. F10 is currently horse-grazed. F11 is ungrazed. A c. 2.5m

wide poor semi-improved grassland margin in the north of F14 is utilised as a public footpath and as such has been subject to significant disturbance by walkers.

- 7.4.17 Fields F1 and F5 are currently managed as hay meadows and include a small number of herbs typically associated with neutral grasslands in Hertfordshire including common bird's-foot trefoil *Lotus corniculatus*, agrimony *Agrimonia eupatoria*, common knapweed *Centaurea nigra*, red clover *Trifolium pratense*, and oxeye daisy *Leucanthemum vulgare*, which occur infrequently in the sward. In addition, F1 and F5 include some of the fine grasses typically associated with this habitat type including crested dog's-tail *Cynosurus cristatus* and common bent *Agrostis capillaris*, although coarse grasses, such as Yorkshire-fog *Holcus lanatus*, cock's-foot *Dactylis glomerata* and false oat-grass *Arrhenatherum elatius* occur more frequently within the sward. The species composition is such that the origin of the grassland cannot be ascertained and is considered 'poor'.
- 7.4.18 The poor semi-improved grasslands present at the Site are considered to fall short of the threshold for local importance.

NEUTRAL SEMI-IMPROVED GRASSLAND

- 7.4.19 Semi-improved grasslands of F3 and F12, and the wide (c. 15m) margins of F6 and F7, have a greater diversity of herbs, some of which occur frequently in the sward. It should be noted that F3 is extensively horse-grazed and F12 comprises a dry attenuation basin, with some areas showing poor condition and/or more localised soil improvement. A more 'species-rich' south-facing bank comprising wild carrot *Daucus carota*, agrimony, yarrow *Achillea millefolium*, common bird's-foot trefoil, common vetch *Vicia sativa*, oxeye daisy and common knapweed is present within F12. The margins of F6 and F7 comprise occasional large ant hills. These grasslands are unlikely to meet the criteria for any Hertfordshire BAP habitat such as "neutral grassland". Nonetheless, given the relatively species-rich nature of F3, F12 and the margins of F6 and F7, these areas are considered to be of ecological importance at the **Local** level.

HEDGEROWS

- 7.4.20 There are 27 hedgerows at the Site labelled H1-H25 on the Habitats Plan. The majority of the hedgerows are dense, continuous and species-rich, and therefore considered to be in favourable condition. The majority appear to be managed through flail cutting. Ground flora includes some species of interest, including bluebell *Hyacinthoides non-scripta*, lords-and-ladies *Arum maculatum*, dog's-mercury *Mercurialis perennis* and yellow archangel *Lamium galeobdolon*, specifically recorded in association with some hedgerows H1, H5, H6, H8-H10, H11, H13, H15-H19, H21-H24. The results of the hedgerow survey are presented at Appendix
- 7.4.21 Hedgerows H2, H6-H8, H10, H12-H18 and H20-H24 meet the criteria for 'important' hedgerows under The Hedgerows Regulations 1997. However, all hedgerows "consisting predominantly (i.e. 80% or more cover) of at least one woody UK native species" are covered by the UK BAP Priority Habitat 'Hedgerows' and hedgerows are included within Hertfordshire BAP. As such, all the hedgerows within the site would likely qualify as Priority Habitats and Hertfordshire BAP habitats.
- 7.4.22 With the exception of H24, none of the hedgerows present at the Site meet any of the Selection Criteria for Local Wildlife Sites in Hertfordshire⁵. It is understood that H24 is an ancient green

⁵ Hertfordshire Local Wildlife Sites Partnership (2016) "Selection Criteria for Local Wildlife Sites in Hertfordshire" (10th version).

lane, and connects somewhat with Shrubhill Common. It should be noted that Mistletoe *Viscum album*, which is a declining species was recorded within hedgerow H7.

- 7.4.23 The Hedgerow Survey Handbook⁶ defines a species-rich hedgerow as that which contains at least 5 woody species which are native somewhere in the UK, and as such all hedgerows at the Site, save for H21 and H25 are species-rich. Many of the hedgerows at the Site comprise in excess of 7 woody species. The hedgerows at the Site provide good connectivity for wildlife within the Site and to suitable habitats in the wider landscape. In particular, again, hedgerow H24 (in combination with the parallel hedgerow c. 2m east, on the other side of the public footpath) provides a species-rich, dense, continuous and dark corridor associated with Shrubhill Common LNR / Shrubhill Common North LWS located to the south. In addition, H6, H8, H14 and H23 at the site-boundaries in-combination with off-site parallel hedgerows on the other side of the road, form dark green lanes with connectivity to habitat in the wider landscape. A number of the hedgerows at the Site are considered likely to be ancient in origin, in particular H24 and potentially H14, H6 and H8.
- 7.4.24 Given the age, favourable condition and high species-richness of the hedgerows at the Site coupled with the connectivity of these hedgerows within the Site and to the surrounding habitat, the hedgerow network is considered to be of ecological importance at the **Local** Level, with particular interest associated with four hedgerows: H6, H8, H14 and H24.

SEMI-NATURAL BROADLEAVED WOODLAND

- 7.4.25 A small area of broadleaved woodland, approximately 0.29 ha in size is present in the east of the Site. The canopy is dominated by mature pedunculate oak *Quercus robur*. The understorey is relatively sparse and comprises common and widespread species, including hawthorn and elder. The ground flora comprises mats of ivy *Hedera helix* but also a number of ancient woodland indicator species, including bluebell, lords-and-ladies, wood melick *Melica uniflora* and wood speedwell *Veronica montana*. Old hedge banks flank the woodland on the eastern and western edges comprising pedunculate oak, ash *Fraxinus excelsior* and coppiced hornbeam *Carpinus betulus*. "Lowland mixed deciduous woodland" is a priority habitat under the Section 41 list of the NERC Act 2006 and is included within Hertfordshire Biodiversity Action Plan. However, the woodland does not meet any of the Selection Criteria for Local Wildlife Sites in Hertfordshire. As such, given its likely age, structure and species-diversity this broadleaved woodland is considered to be of ecological importance at the **Local** Level.

BROADLEAVED PLANTATION WOODLAND

- 7.4.26 A belt of young (thought to be c.10-15 years old) broadleaved plantation woodland surrounds F13 to the north, west and south. In addition, a second belt is present along the western margin of F6 and F7, with a third belt partially dividing these two fields. Much of this habitat is dominated by very densely planted or self-seeded ash *Fraxinus excelsior*, albeit with a wide range of other common woody species, including some non-natives, occurring infrequently. However, the third belt that partially divides F6 and F7 is more sparsely planted and dominated by birch *Betula pendula*. The ground flora of the broadleaved plantations comprises abundant common nettle *Urtica dioica*, broad-leaved dock *Rumex obtusifolius* and wood avens. Where trees are less densely planted, the ground flora includes species found in the adjacent grassland margins.
- 7.4.27 The plantation woodland provides connectivity for wildlife within the Site and to suitable habitats

⁶ Defra (2007). "Hedgerow Survey Handbook: A standard procedure for local surveys in the UK" (2nd Ed).

in the wider landscape. However, whilst plantation woodland is included within Hertfordshire BAP, the dominance of a single species (ash) within the young broadleaved plantation is not considered to be of such sufficient intrinsic interest as to warrant further assessment.

CONIFEROUS PLANTATION

- 7.4.28 A small young coniferous plantation, c. 0.55ha in size, is present in the south-west of the Site, and is dominated by fir *Abies* sp trees. Very occasional young broadleaved species including birch, butterfly-bush *Buddleja davidii*, bramble *Rubus fruticosus* agg. and grey willow *Salix cinerea* also occur. The ground flora includes those species found in the adjacent grassland with occasional wood avens.
- 7.4.29 Plantation woodland is included within Hertfordshire BAP. However, given the young nature of the plantation (thought to be c.10-15 years old) coupled with the poor species diversity, the broadleaved plantation woodland at the Site is not considered to be of sufficient intrinsic interest as to warrant further assessment.

DRY ATTENUATION BASIN

- 7.4.30 The attenuation basin was dry throughout much of the survey period and includes species suggesting periodic but limited inundation. The basin comprises semi-improved grassland and as such is described under 'Semi-improved Grassland' above.

DITCH

- 7.4.31 A single ditch is present to the west of H22. The ditch was dry during the survey period and given the species composition (i.e. absence of submerged, emergent, aquatic or wetland species) the ditch is considered highly unlikely to hold water for any significant period of time. The ditch comprises common and widespread species from the adjacent grassland margin along with frequent bramble scrub and common tall ruderal species. The ditch lacks connectivity with ditches in the wider landscape. In its current condition the ditch is not considered to be of sufficient intrinsic interest to warrant further assessment.

TREES

- 7.4.32 Numerous trees are present at the Site (c.154 trees or groups of trees), largely within hedgerows, broadleaved woodland, broadleaved plantations and coniferous plantation and as such are assessed under the corresponding headings above. In addition, a single mature pedunculated oak tree is present in the west of F13. All mature trees at the Site, given their size and age, are likely to contribute to the biodiversity of the local area. As such, taken together, mature trees at the Site are considered to be of ecological importance at the **Local** Level.

SCRUB

- 7.4.33 Occasional scattered and continuous scrub is present along the eastern margins of F6 and F7, predominantly in the form of bramble with occasional hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa*, willow *Salix* sp., pedunculated oak and birch. Continuous scrub, in the form of dense bramble, is present to the north of the semi-natural broadleaved woodland in the east of the Site. This habitat at the Site is not considered to be of sufficient intrinsic interest as to warrant further assessment.

EPHEMERAL / SHORT PERENNIAL

7.4.34 A wide strip in the east and south of F13 appeared to have recently been treated with herbicide and is colonising with short, patchy vegetation. This habitat at the Site is not considered to be of sufficient intrinsic interest as to warrant further assessment.

Fauna

BATS

Desk Study

7.4.35 HERC have provided 79 records of bats from within the search area dating from 1985 to 2013 and covering the following species: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared *Plecotus auritus*, noctule *Nyctalus noctula*, natterer's bat *Myotis nattereri* and barbastelle *Barbastella barbastellus*. The closest records occur within the same grid reference as the Site and include a roosting Brown long-eared bat, a roosting common pipistrelle and a roosting natterer's bat all dating to 1999 and an unknown roosting bat dating to 1995. Given the resolution of the data provided, precise locations for these records could not be determined.

Foraging / commuting

7.4.36 Full results of remote monitoring and bat activity transect surveys are provided in Appendix 7.3.

7.4.37 In summary, at least seven species of bat were confirmed to make use of the Site including common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle *Pipistrellus nathusii*, brown long-eared bat, noctule, *Myotis* sp. and barbastelle; as well as *Nyctalus* sp. and *Nyctalus* sp./*Eptesicus* sp. Bat activity was dominated by common bat species with common pipistrelle by far the most commonly recorded bat species at the Site, followed by occasional passes of soprano pipistrelle and brown long-eared bat. Barbastelle and Nathusius' pipistrelle were the least recorded species.

7.4.38 Spatially, activity was recorded across most of the site, but focussed along hedgerows for most⁷ species, with markedly less activity recorded in open areas (see table 7.2 below). This trend was also found to be true during the remote monitoring. MP4 (situated along fence line between F11 and F12) was the only Monitoring Point not situated along a hedgerow and this Monitoring Point recorded the fewest bat contacts by far. All seven species recorded at the Site were recorded at all four remote Monitoring Points. MP1 (situated within H13) recorded the highest levels of bat activity, closely followed by MP3 (situated within H22).

Table 7.2: Approximate number of bat contacts recorded in association with habitat type during the activity transect surveys. Please note GPS error does not allow clear separation of habitats, and therefore only general trends of habitat utilisation should be taken from the data below.

Bat species	Habitat Type						
	Arable	Semi-improved grassland	Coniferous plantation	Broadleaved plantation	Scrub, ephemeral/short perennial	Semi-natural broadleaved woodland	Hedgerows
Common pipistrelle	20	10	0	17	0	17	683
Soprano pipistrelle	0	0	0	0	0	1	26
Noctule	2	12	0	0	0	0	28

⁷ Noctule bats, as expected, were recorded more frequently in the open areas likely to due to their high commuting flight behaviour.

Brown long-eared bat	1	0	0	1	0	0	6
Myotis sp.	0	5	0	1	0	0	7
Nyctalus sp.	0	0	0	0	0	0	2
Nyctalus / Eptesicus	0	0	0	0	0	0	1
Nathusius' pipistrelle (not recorded during transects)	0	0	0	0	0	0	0
Barbastelle	0	0	0	0	0	0	3
Total bat contacts	23	27	0	19	0	18	756
Percentage of bat contacts	2.7%	3.2%	0.0%	2.3%	0.0%	2.1%	89.7%
Contacts per hectare (or km if linear feature i.e. hedgerows)	1.5 contacts/ha	1.4 contacts/ha	0.0 contacts/ha	7.0 contacts/ha	0.0 contacts/ha	62.1 contacts/ha	140 contacts/ km

7.4.39 Local Wildlife Site Selection criteria states “*areas of semi-natural habitat with records for foraging bats of at least eight bat species*”. At least seven bat species were recorded at the Site. Therefore the bat diversity at the Site falls slightly short of this criteria. It should be noted that, given the grouping of some sonograms to genus level (e.g. Myotis sp. Nyctalus sp. Nyctalus/Eptesicus sp.), it is possible that more than seven species were recorded during the surveys. Overall, given the habitats present and the diversity of bat species recorded at the Site, in combination with the presence of barbastelle and Nathusius’s pipistrelle (albeit in extremely low numbers), which are considered rare in the UK⁸, the bat foraging/commuting interest at the Site is considered to be of importance at the **Local Level**.

Roosting

7.4.40 No bat roosts were confirmed to be present at the Site during transect or inspection surveys. None of the activity survey data indirectly indicated roost(s) on or adjacent to the Site.

7.4.41 Results of tree inspections are provided at Appendix 7.3. In summary tree roosting opportunities are present across the Site, with single tree of ‘High’ suitability, 23 of ‘Moderate’ suitability and 10 of ‘Low’ suitability.

BADGER Desk Study

7.4.42 HERC have provided 237 records of badger *Meles meles* from within the search area dating from 1985 to 2016. Four records returned occur from within the Site itself and these are thought to refer to setts BS4 and BS2 recorded on Site during the 2016 badger survey. 22 records returned occur within the same grid-squares as the site and include records for setts and individual badgers including those found deceased on the road.

⁸ Bat Conservation Trust, 2016. The National Bat Monitoring Programme. Annual Report 2015. Bat Conservation Trust, London. Available at http://www.bats.org.uk/pages/nbmp_annual_report.html

Use of the Site

- 7.4.43 Given the habitats present, the vast majority of the Site offers potential opportunities for foraging badgers, particularly those grassland areas where earthworm prey are anticipated to be abundant.
- 7.4.44 Seven badger setts are present at the Site comprising three outlier setts and four subsidiary setts. Full results of the badger survey are presented at Appendix 7.4.
- 7.4.45 Badgers are common and not considered to be of conservation concern. However badgers and their setts are protected under the Protection of Badgers Act 1992 and are therefore included in the assessment of effects in the context of this legislation.

DORMOUSE

Desk Study

- 7.4.46 HERC have provided a single record for dormouse *Muscardinus avellanarius* located approximately 1.7km south-east of the Site within Roughdown Common SSSI and woodland dating to 1995. This record is separated from the Site by the River Bulbourne, the A4251 and a railway line.

Use of the Site

- 7.4.47 The hedgerows, scrub, woodland and plantation offer potential opportunities for foraging/nesting dormice, given their structure and species-diversity. The Site also affords connectivity to suitable habitats in the wider landscape.
- 7.4.48 No evidence of dormice was recorded at the Site (see Appendix 7.5 for full survey data). It is therefore concluded that the Site is not of any significant importance for this species.

WATER VOLE AND OTTER

Desk Study

- 7.4.49 HERC have provided 11 records of water vole *Arvicola amphibius* from within the search area dating from 1987 to 2007. The closest records are associated with the River Bulbourne and the Grand Union Canal which are located approximately 0.2km south of the Site. Records associated with the River Gade, which is located approximately 2.1km east of the Site, have also been returned.
- 7.4.50 HERC have provided two records of otter *Lutra lutra* from within the search area dating to 1974 and 2006. Given the resolution of the data provided, it is not possible to determine the location of these records but they appear to be associated with the River Bulbourne and the River Gade.

Use of the Site

- 7.4.51 Given the absence of watercourses within/adjacent to the Site, the Site is considered entirely unsuitable for riparian species including water vole and otter. The single ditch present at the Site, given that it does not hold water for a significant period of time and is isolated in terms of connectivity to other ditches/watercourses in the local area, is considered unsuitable for riparian species. It is therefore concluded that the Site is not of any significant importance for these species.

BROWN HARE
Desk Study

- 7.4.52 HERC have provided three records for brown hare *Lepus europaeus* from within the search area, the most recent of which dates to 1997. The closest record is located within a tetrad c.0.2km north of the Site and dates to 1985.

Use of the Site

- 7.4.53 The majority of the Site, being dominated by grassland and arable land, provides potential opportunities for brown hare which were once known to occur in the local area (given the records returned by HERC). However, no evidence of brown hare was recorded at the Site. Given this lack of evidence on-site, the most recent record being c.20 years old and the proximity of existing built environment, the site is considered unlikely to be of significant importance for this species.

HEDGEHOG
Desk Study

- 7.4.54 HERC have provided eight records of hedgehog *Erinaceus europaeus* from within the search area dating from 1985 to 1999. The closest record is located within the same tetrad as the Site and dates to 1985.

Use of the Site

- 7.4.55 Much of the Site, including the grassland, woodland, hedgerows and scrub, provides opportunities for foraging/sheltering hedgehog. Further opportunities for this species are afforded by adjacent habitats including residential gardens to the east and hedgerows/woodland to the north, south and west.
- 7.4.56 However, no confirmed evidence or sighting of hedgehog was recorded and therefore effects cannot be definitively assessed. Measures to ensure small mammals, such as hedgehog, can continue to make use of much of the site have been included herein, such as gaps in fencing of new private gardens.

HARVEST MOUSE
Desk Study

- 7.4.57 HERC have provided two records of harvest mouse *Micromys minutus* from within the search area dating to 1985 and 1988. The closest record is located within a tetrad approximately 0.8km west of the Site dating to 1985.

Use of the Site

- 7.4.58 Given the management of the habitats present at the Site, the Site is considered sub-optimal for harvest mouse. This species favours areas of tall grasses/reeds/cereals such as road side verges, hedgerows, reed beds, dykes and salt marshes where nests can be built. The habitats at the Site are subject to agricultural management including flailing of hedgerows, intensive management of arable crops and cutting of hay meadows. As such, given the management of the habitats present, the Site is considered sub-optimal for harvest mouse.
- 7.4.59 Measures to ensure small mammals, such as harvest mouse, can continue to make use of much of the site have been included herein, such as provision of attenuation basins with reed habitats.

BIRDS

Desk Study

- 7.4.60 HERC have provided 892 records of 90 bird species from within the search area dating from 1981 to 2014. Those of potential relevance to the Site include barn owl *Tyto alba*, firecrest *Regulus ignicapilla*, fieldfare *Turdus pilaris*, redwing *Turdus iliacus*, brambling *Fringilla montifringilla*, woodlark *Lullula arborea*, red kite *Milvus milvus*, wood warbler *Phylloscopus sibilatrix*, tree sparrow *Passer montanus*, house sparrow *Passer domesticus*, spotted flycatcher *Muscicapa striata*, lesser redpoll *Acanthis cabaret*, reed bunting *Emberiza schoeniclus*, yellowhammer *Emberiza citrinella*, skylark *Alauda arvensis*, grey partridge *Perdix perdix*, cuckoo *Cuculus canorus*, lapwing *Vanellus vanellus*, song thrush *Turdus philomelos*, lesser spotted woodpecker *Dendrocopos minor*, starling *Sturnus vulgaris*, dunnock *Prunella modularis*, willow warbler *Phylloscopus trochilus*, marsh tit *Poecile palustris*, willow tit *Poecile montana*, mistle thrush *Turdus viscivorus*, wheatear *Oenanthe oenanthe*, yellow wagtail *Motacilla flava*, grey wagtail *Motacilla cinerea*, meadow pipit *Anthus pratensis*, swallow *Hirundo rustica*, house martin *Delichon urbicum*, bullfinch *Pyrrhula pyrrhula*, linnet *Linaria cannabina*, corn bunting *Emberiza calandra*, kestrel *Falco tinnunculus*, stock dove *Columba oenas* and swift *Apus apus*.

Use of the Site

- 7.4.61 The habitats present at the Site offer foraging and sheltering opportunities for common garden and farmland birds. The results of the breeding bird survey are provided at Appendix 7.6. In summary, 21 species of conservation interest (including six assumed British races) were recorded within/adjacent to the Site, although not all of these are likely to breed at the Site. Breeding was confirmed on-site for ten species including the notable yellowhammer and dunnock. Species recorded at the Site are common and widespread with most activity confined to hedgerows. Starling and house sparrow were confirmed breeding offsite within the surrounding houses. Other notable species considered 'probably' breeding at the Site include skylark, song thrush, house sparrow, linnet and bullfinch (as well as assumed British race of greenfinch, goldfinch and jay) with kestrel, stock dove, mistle thrush and willow warbler (as well as assumed British race of great-spotted woodpecker) considered 'possibly' breeding at the Site.
- 7.4.62 Given that a total of 38 species were confirmed/probably/possibly breeding at the Site, in accordance with Fuller, 1980⁹ (see Table 7.3 below), the breeding bird assemblage at the Site is considered to be of importance at the **Local** Level.

Table 7.3. Assessment criteria for breeding bird assemblage at site

Importance	Number of breeding species
Local	25-49
County	50-69
Regional	70-84
National	85+

REPTILES

Desk Study

- 7.4.63 HERC have provided two records of a single reptile species, namely common lizard *Zootoca*

⁹ Fuller, R.J., (1980), A method for assessing the ornithological interest of sites for conservation. *Biological Conservation* 17: 229-239

vivipara, from within the search area, both of which date to 2001. The closest record is located within a tetrad approximately 0.7km west of the Site.

Use of the Site

- 7.4.64 A reptile presence/likely absence survey was undertaken at the Site in April-July 2016. The results of the reptile survey are provided at Appendix 7.7. A peak count of four slow-worm *Anguis fragilis* were recorded at the Site. No other reptile species was recorded during the surveys. Slow-worm were recorded in fields F11 and F12, and the margins of F6 and F7. A single slow-worm was recorded along the eastern boundary of F1. Based on the density of slow-worm recorded per hectare¹⁰ (1.95 adult per hectare) a 'low' population of (<50/ha) is present. This population would also meet the criterion for a 'low' population according to the most recent guidance from Froglife¹¹ (<5 adult slow-worm recorded during any one survey visit). Given that this species is relatively common and wide spread, coupled with the 'low' population present at the Site, the slow-worm population at the Site is considered to fall short of the threshold for Local importance. However, given their legislative protection, reptiles are included in the assessment of effects in the context of this legislation.

AMPHIBIANS

Desk Study

- 7.4.65 HERC have provided 21 records of two amphibian species, namely great crested newt *Triturus cristatus* and common toad *Bufo bufo*, from within the search area, dating from 1975 to 1998. The closest record for great crested newt is located within the same tetrad as the Site and dates to 1982. Given the resolution of the data provided, a more precise location for this record could not be determined. The closest record for common toad is located c. 0.8km south-west of the Site and dates to 1975.

Use of the Site

- 7.4.66 There are no ponds or other aquatic habitats within the site that could be used by breeding amphibians such as great crested newt or common toad. Nonetheless, given the proximity of two ponds in wider landscape coupled with the availability of suitable terrestrial habitat within the Site, a great crested newt presence/likely absence survey of these off-site ponds was undertaken in April-May 2016. The results of this survey are presented at Appendix 7.8. In summary, no great crested newts were recorded in either of the off-site ponds. As such great crested newt are considered likely absent from the Site. It is therefore concluded that the Site is not of any significant importance for this species.
- 7.4.67 A number of common toad were recorded under the artificial refugia (transects A, B, C, D, G, I, K and Q) during the reptile presence/likely absence survey with a peak count of 4 adult common toads recorded. In the absence of potential breeding ponds on-site and the relatively low numbers recorded, the Site is considered unlikely to be of significant importance for this species. However, the scheme includes a number of features, including pond and wetland habitats which provide potential benefits for common toads and other amphibians.

INVERTEBRATES

¹⁰ Herpetofauna Groups of Britain and Ireland (1998) *Evaluating local mitigation/translocation programmes: Maintaining Best Practice and lawful standards. HGBI advisory notes for Amphibian and Reptile Groups (ARGs)*. HGBI, c/o Froglife, Halesworth. Unpubl.

¹¹ Froglife (1999) *Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation*. Froglife Advice Sheet 10. Froglife, Halesworth.

Desk Study

7.4.68 HERC have provided 202 records of 67 invertebrate species from within the search area dating from 1800 to 2014. Those of potential relevance to the Site include several notable butterfly and moth species. The closest record is for cinnabar moth located within the same 1km grid-square as the Site, dating to 2004.

Use of the Site

7.4.69 Site Assessment, by a qualified entomologist found the majority of the Site offers little niche variation or quality habitats, primarily related to intensive management, such that the invertebrate assemblage in these areas is likely to be limited.

7.4.70 However, those species-rich and old hedgerows, as well as the mature trees and associated deadwood at the Site, do provide important habitat for invertebrates and have the potential to support some species of conservation interest. It is therefore concluded that the Site is likely to be of importance for invertebrates at the **Local** Level.

Summary

7.4.71 Important ecological features have been evaluated and assigned a level of ecological importance, as summarised in Table 7.4.

Table 7.4 Evaluation of Sensitive Receptors

Level of Importance	Important Ecological Features
International	No species or habitats are present on-site that are considered to be important at the international level. However, Chilterns Beechwoods SAC is situated c. 3.3km north-west of the Site. The SAC is sensitive to increased recreational pressure (i.e. impact on deadwood affecting stag beetle) and increased Nitrous Oxide deposition (e.g. from traffic).
National	No species or habitats are present on-site that are considered to be important at the national level. However, Roughdown Common SSSI is situated c. 1.7km south-east of the Site.
County	<p>1. Off-site Shrubhill Common LNR/Shrubhill Common North LWS is situated c. 0.02km east of the Site. This designation comprises herb-rich unimproved chalk grassland, secondary woodland and a length of ancient green lane. Shrubhill Common LNR/LWS is considered an important feature (i.e. in terms of severance of connectivity, light pollution and recreational pressure) at the county level given its proximity to the Site.</p> <p>The remaining LNRs/LWSs in the local area are well separated from the Site and as such no impacts arising from the Site on these designations are anticipated. Howe Grove LNR, Boxmoor Common LWS, Westbrook Hay Golf Course Bourne End Golf Course LWS, Lower Little Heath Farm LWS, Moor End Farm LWS and Bovingdon Reach, Three Crofts, Barnfield LWS are therefore excluded from the assessment.</p>
Local	<p>2. Given the habitats present and the diversity of bat species recorded at the Site, in combination with the presence of barbastelle, which is considered rare in the UK, the bat foraging/commuting interest at the Site is of importance at the county Level.</p> <p>3. The broadleaved semi-natural woodland is considered likely ancient in origin and as such is of importance at the local level.</p>

	<p>4. 'Neutral' semi-improved grassland. F3, F12 and the margins of F6 and F7 comprise relatively species-rich, semi-improved neutral-calcareous grassland and as such are considered to be of importance at the local level.</p> <p>5. Hedgerow network. Given the favourable condition and high species-richness of the hedgerows at the Site coupled with the connectivity of these hedgerows within the Site and to the surrounding habitat, the hedgerow network is considered to be of ecological importance at the local level.</p> <p>6. Mature trees. Taken together mature trees at the Site, given their size and age, likely contribute to the biodiversity of the local area and are considered to be of ecological importance at the local level.</p> <p>7. Breeding birds. Given the diversity of species recorded breeding at the Site, including the notable dunnock and yellowhammer, the Site is considered to be of ecological importance at the local level.</p> <p>8. Invertebrates. The majority of the Site offers little niche variation or quality habitats and as such the invertebrate assemblage in these areas is likely to be limited. However, the species-rich and old hedgerows, as well as the mature trees and associated deadwood at the Site provide important habitat for invertebrates and have the potential to support some species of conservation interest.</p> <p>Off-site ancient semi-natural and replanted woodlands are present in the local area. However, given the separation of this habitat from the Site, no impacts arising from the Site on this habitat are anticipated. Ancient semi-natural and replanted woodlands in the local area are therefore excluded from the assessment.</p>
Other	<p>9. Badger. A number of badger setts are present at the Site and the Site offers opportunities for foraging. Badgers are common and not considered to be of conservation concern. However badgers and their setts are protected under the Protection of Badgers Act 1992 and are therefore included in the assessment of effects below in the context of this legislation.</p> <p>10. Reptiles. A very low population of slow-worm is present at the Site which predominantly make use of the tall grassland associated with F11 and F12 and the margins of F6 and F7. Slow-worm are common and widespread and as such the very low population present at the Site is considered to fall below the threshold for Local importance. However, all British reptile species are listed within Schedule 5 of the Wildlife and Countryside Act 1981, as amended and are afforded protection against killing and injury under part of sub-section 9(1) of the Act. Slow-worm are therefore included within the assessment of effects below in the context of this legislation.</p>

Biodiversity Metric

- 7.4.72 In addition to the above 'important' ecological features, and based on the Biodiversity Impact Assessment Calculator (Appendix 10), a 'Site Habitat Biodiversity Value' has been calculated with a score '169.42' and 'Site Linear Biodiversity Value' of 74.77. These scores will be used to assess to establish overall net loss/gain of biodiversity across all habitats and separately on linear features (hedgerows).

7.5 Potential Significant Effects

- 7.5.1 In the context of this assessment an effect is considered to be potentially significant if it could give rise to a change in the conservation status or degree of integrity of any important ecological feature. The assessment of effects set out below is made in respect of the Parameter Plans.
- 7.5.2 Included in the assessment was consideration of a number of proposed junction improvements in the wider environs of the site (see ES Chapter 3, para 3.61 and figure 3.18) and the likely future requirement for an off-site sewer connecting the Proposed Development to Berkhamsted Waste Water Treatment Works (see ES chapter 3, para 3.9.3-3.9.4 and Figure 3.19). In relation to any potential impacts on ecological features, all of the above works would take place within the boundaries of existing public highways. Therefore, with the incorporation of standard avoidance measures (such as restrictions on vegetation clearance during the bird breeding season), it is considered that those works would have not have a significant impact on ecology, and consequently are not considered further in this Chapter.

Chiltern Beechwoods SAC

CONSTRUCTION PHASE

- 7.5.3 Given the distance of the SAC from the Site (c.3.3km) no significant adverse effects arising from the construction phase are predicted.

OPERATIONAL PHASE

- 7.5.4 The SAC comprises nine separate sites spread throughout the Chilterns area. The closest of which is Ashridge Commons and Woods SSSI at 3.3km northwest which includes both beechwoods and dry calcareous grassland and scrub for which the SAC is designated.
- 7.5.5 No condition threats have been identified for any of the SSSI units within Ashridge Common and Woods¹². Deer browsing is addressed but considered to be having no current significant adverse effects¹³.
- 7.5.6 Threats/pressures to the SAC itself (rather than component SSSIs) have however been identified to include public access/disturbance and air pollution¹⁴. Potential adverse effects to consider arising from the development on the SAC therefore include increased recreational

¹² Natural England (no date). Designated Sites View: Ashridge Commons and Woods SSSI. Available at: <https://designatedsites.naturalengland.org.uk/SiteUnitList.aspx?SiteCode=s1000452&SiteName=&countyCode=&responsiblePerson=>

¹³ Natural England (2017). Designated Sites View: Condition of SSSI Units for Site Ashridge Commons and Woods SSSI. Available at <https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1000452&ReportTitle=Ashridge%20Commons%20and%20Woods%20SSSI>

¹⁴ Natural England (2015) Planning for the Future Improvement Programme for England's Natura 2000 Sites (IPENS): Site Improvement Plan Chilterns Beechwoods.

pressure and air pollution.

Air pollution

- 7.5.7 Dacorum Habitats Regulations Assessment (HRA)¹⁵ states that the principal source of nitrogen and sulphur deposition on the qualifying features of the SAC are livestock emissions (which account for 34% of nitrogen deposition) and Didcot A Power Station (which accounts for 25% of sulphur deposition). Road and transport account for only 10% and 3% of nitrogen and sulphur, respectively.
- 7.5.8 Analysis of traffic flows and NOx emissions in the area of Chilterns Beechwoods SAC for the 2008 HRA showed that there were no predictable major causes of concern in terms of NOx vehicle emission effects from roads within 200m of the SAC.
- 7.5.9 Furthermore, a recent study for Aylesbury Value District Council¹⁶ found that “...*traffic modelling conducted for the entire area (Buckinghamshire) in 2016 demonstrates that the forecasted increases in traffic along A-roads within 200 m of the SAC are well below the threshold for air pollution assessment...therefore, any changes in air quality are not expected to result in a likely significant effect*”. Furthermore, the increase in traffic emissions caused by this development have been assessed in Chapter 11 (Air Quality) to be negligible and that no mitigation is required in this respect.
- 7.5.10 Given the above, and supported by the Dacorum HRA which states that an Appropriate Assessment for the West Hemel development (referred to as LA3) is not required, no significant adverse pollution effects arising from the Site on the SAC are anticipated.

Recreational Pressure

- 7.5.11 Increased recreational pressure is identified as a potential adverse effect on the SAC, with particular mention of impacts to deadwood habitat used by stag beetle, which is a secondary qualifying feature for the SAC.
- 7.5.12 There appears to be current evidence to suggest that visitor pressure on the SAC is currently, or in the future, likely to adversely affect the conservation objectives or integrity of the designation. Where SSSI units for the Ashridge Common area of the SAC have been found to be in an unfavourable condition, this is largely to do with grazing management practices rather than through visitor or recreational pressure. As such, no significant adverse effects arising from recreational pressure on the SAC as a result of the development are anticipated.
- 7.5.13 Given the above, and supported by the Dacorum HRA which states that recreational disturbance arising from the LA3 development would have no significant adverse effect on the SAC either alone or in combination with other elements, no significant adverse recreational effects arising from the Site are anticipated in this regard.

Roughdown Common SSSI

CONSTRUCTION PHASE

- 7.5.14 Given the distance of Roughdown Common SSSI from the Site (c.1.7km), no significant adverse effects arising from the construction phase are predicted.

¹⁵ Dacorum Borough Council (2011). Dacorum Core Strategy Habitats Regulations Assessment: Summary Report (Document: O Version: 1 Dacorum Core Strategy HRA Update Summary Report)

¹⁶ LUC (2017) Vale of Aylesbury Local Plan 2017 Submission. Habitats Regulations Appraisal Report

OPERATIONAL PHASE

- 7.5.15 Roughdown Common SSSI comprises an unimproved calcareous grassland. The common was cited originally to be “...*sheep grazed thus maintaining the grassland habitat, and the hawthorn scrub is undergoing active management to encourage regenerating juniper and provide areas of calcareous grassland throughout.*” Potential pathways of impact include recreational effects and air pollution. However, the single unit is currently in favourable condition and no condition threat has been identified¹⁷. As such, no significant adverse effects arising from the development are anticipated.

Shrubhill Common LNR/Shrubhill Common North LWS

CONSTRUCTION PHASE

- 7.5.16 Given the separation of these designations from the Site by Long Chaulden, no direct significant effects arising from the construction phase of the development are predicted. It is acknowledged that some minimal indirect effects could occur in relation to dust produced during construction.
- 7.5.17 The LNR/LWS is surrounded almost entirely by the built environment, with residential dwellings, roads and a recreational facility (Chaulden Adventure Playground) to the northwest. This urbanised context is anticipated to currently inhibit the potential dispersal of flora and fauna to/from the LNR/LWS. Furthermore, habitat connections between the main LWS/LNR area and the Site are limited to two narrow habitat corridors (c.10-20m) either side of the recreational facility.
- 7.5.18 However, the severance of semi-natural habitat corridors within the Site, primarily sections of the wider hedgerow network, has the potential to reduce dispersal opportunities for those fauna able to traverse Long Chaulden/other barriers, such as some bats, birds and invertebrates associated within the LNR/LWS. In the absence of mitigation, these indirect adverse effects are considered significant at the **Local** level.

OPERATIONAL PHASE

- 7.5.19 Direct access to these designations from the Site will be afforded by the proposed pedestrian linkages to the Chiltern Way Public Right of Way that runs along the eastern Site boundary and continues through these designations. A section of the Chiltern Way that runs adjacent to the Site will itself be upgraded under the proposals to 2-3m wide. The provision of c. 1100 residential units and the proximity of these designations with pedestrian links is predicted to increase visitor rates to the LNR/LWS. Potential consequences include soil compaction, trampling, littering, enrichment (dog fouling) and disturbance associated with increased recreation. Whilst it is noted that these designations are currently exposed to such disturbances as they are well used by the local community, these effects would likely be exacerbated by the anticipated increase in visitors. These effects are likely to occur frequently, but would be largely restricted to the footpaths.
- 7.5.20 Given the above, in the absence of mitigation, an adverse effect significant at the **Local** level is predicted.

¹⁷ Natural England (2017). Designated Sites View: Condition of SSSI Units for Site Roughdown Common SSSI. Available at: <https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1001729&ReportTitle=Roughdown%20Common%20SSSI>

Broadleaved Semi-natural Woodland

CONSTRUCTION PHASE

- 7.5.21 Construction of vehicular access and drainage features necessitate the removal of a section of the woodland copse, equating to a loss of c. 0.1ha of semi-natural woodland. Given that the existing woodland copse covers an area of c.0.3ha, this equates to a loss of c.33.3% of woodland. This loss includes the removal of some short sections of the old hedge banks, although the majority of these will be retained.
- 7.5.22 Damage/destruction of retained trees within the woodland could occur as a result of construction works occurring close to trees or Root Protection Areas.
- 7.5.23 Based on the above, in the absence of mitigation, an adverse effect significant at the Local level is predicted.

OPERATIONAL PHASE

Potential Effects

- 7.5.24 Unrestricted access to the woodland by residents could result in trampling impacts resulting in soil compaction and an altered ground flora. In the absence of mitigation an adverse effect significant at the Local level is predicted.

Neutral semi-improved grassland

CONSTRUCTION PHASE

- 7.5.25 Neutral semi-improved grassland (c.5ha) across at the Site will be affected as detailed below:
- Field F3 comprises c.3.5 hectares of neutral semi-improved grassland, the vast majority of which will fall within public open space and/or drainage features. However, it is anticipated that approximately 50% of this habitat (c.1.75ha) may be lost through the necessary landscaping of these areas.
 - The margins of field F6 and F7 comprise c. 0.9ha of good semi-improved grassland, approximately 0.4ha of which will be lost to the built development.
 - F12 comprises c. 0.6ha of neutral semi-improved grassland, the vast majority of which will be lost to the proposed permanently wet drainage basin and access road, with c.0.2ha retained.

- 7.5.26 The above effects will result in the loss of c. 2.55ha of neutral semi-improved grassland, with 2.45ha (49%) to be retained. Given this loss, an adverse effect significant at the **Local** level is predicted.

OPERATIONAL PHASE

- 7.5.27 Trampling of the retained grassland by residents and inappropriate management could adversely affect the sward resulting in a lower species diversity and an increase in undesirable perennial weeds such as broadleaved dock, common thistle and common nettle. As such, in the absence of mitigation, an adverse effect significant at the **Local** level is predicted.

Hedgerow Network

CONSTRUCTION PHASE

7.5.28 Based on the parameters plan, 450m of hedgerow of c.6,160m will be lost during construction to allow vehicular and pedestrian access onto the Site and into each field, which equates to 7.3% of the existing hedgerow lengths removed. The following hedgerow sections will be lost (measurements given approximate):

- 7m of H8 to accommodate the gypsy and traveller site (including access) in the south-west.
- 7m of H8 to accommodate the emergency access point at the south of the Site
- 10m of H24 to accommodate the new access road off The Avenue
- 4m of H24 to accommodate two pedestrian leisure routes (each 2m wide).
- 7m of H14 to accommodate a cycle/pedestrian leisure route (3m wide) and two pedestrian leisure routes (each 2m wide).
- Entire length of H3 (c. 50m)
- Entire length of H7 (c. 180m)
- 30m of H12 to accommodate an internal road and two cycle/pedestrian leisure routes (each 3m wide)
- 12m of H15 to accommodate a road (c.7m wide) a cycle/pedestrian leisure route (c. 3m wide) and a pedestrian leisure route (c. 2m wide)
- 10m of H16 to accommodate a road (c. 7m wide) and a cycle/pedestrian leisure route (c.3m wide)
- 17m of H17 to accommodate a road (c. 7m wide) and two cycle/pedestrian leisure routes (each c. 5m wide)
- 3m of H18 to accommodate a single cycle/pedestrian leisure route.
- 2m of H19 to accommodate a single pedestrian leisure route
- 11m of H22 to accommodate a road (c. 7m wide) and a pedestrian leisure route (c. 4m wide)
- Entire length of H25 (c. 100m)

7.5.29 The above losses equate to c.350m of species-rich hedgerow and 100m of species poor hedge (H25 only).

7.5.30 In addition to reduction in hedgerow length, the function of the hedgerows as a 'network' will be reduced through the severance and/or isolation of hedgerow sections.

7.5.31 Damage of retained hedgerows could also occur as a result of construction works occurring close to the hedgerows or within Root Protection Areas.

7.5.32 Based on the above, in the absence of mitigation, an adverse effect significant at the **Local** level is predicted.

OPERATIONAL PHASE

Potential Effects

- 7.5.33 No potential significant effects arising from the operational phase of the development are predicted on retained hedgerows.

Mature trees

CONSTRUCTION PHASE

- 7.5.34 A total of two 'semi-mature' trees within H22 and two 'early-mature' trees within H17 will be lost to accommodate the road network. Losses of trees of mature trees within the woodland copse are addressed below
- 7.5.35 Damage of retained trees could occur as a result of construction works occurring within the Root Protection Areas. Replacement tree planting in such circumstances would take many years to reach an equivalent level of maturity and ecological importance.
- 7.5.36 Based on the above, in the absence of mitigation, an adverse effect significant at the Local level is predicted.

OPERATIONAL PHASE

- 7.5.37 All retained trees at the Site will be incorporated into retained green space. Potential damage through recreational activities (e.g. public climbing trees, new footpaths leading to soil compaction around the base of trees, etc.) is considered unlikely given that the vast majority are protected within hedgerows or the woodland. The only exception is tree 120, a mature English oak tree which will be retained within the 'community hub' area of the development.
- 7.5.38 Based on the above no significant adverse effect arising from the development on retained trees is anticipated, although precautionary measures to protect tree 120 are set out below.

Bats

CONSTRUCTION PHASE

- 7.5.39 The construction phase will result in the permanent loss of the habitats utilised by bats for foraging and/or commuting, primarily including 450m of hedgerow (8.3% of total) and 0.08ha broad-leaved woodland (28% of total). The severance of linear hedgerows is also anticipated to interrupt some flightlines through the Site, with light-shy and low-flying species dissuaded from crossing open ground between hedge sections. Functionally the severance of hedges, may reduce further the amount of available foraging, and possibly roosting opportunities, for bats.
- 7.5.40 It is noted that the majority of habitats removed for development (open habitats- arable and pasture) showed significantly lower levels of bat activity and therefore their loss is not anticipated to result in significant adverse effects.
- 7.5.41 No bat roosts are predicted to be directly impacted by development of the Site. However, a substantive number of trees have the future potential to support roosting bats, and therefore the above loss and/or severance of habitats is predicted to reduce these roosting opportunities.
- 7.5.42 In addition, potential adverse effects arising from night working (i.e. noise and light pollution) within close proximity to the hedgerows include disturbance and avoidance of this area by

foraging/ commuting bats. This could potentially temporarily hinder movement between foraging and roosting areas for bats in the local area. This would primarily effect common and widespread species but could also affect low numbers of rare species.

- 7.5.43 Based on the above, in the absence of mitigation, an adverse effect significant at the Local level is predicted for the bat populations making use of the Site.

OPERATIONAL PHASE

- 7.5.44 Artificial lighting, increased levels of human activity and associated noise arising from the residential areas and road infrastructure are anticipated to have an adverse effect on foraging/commuting bats within the Site. This could permanently hinder movement between foraging and roosting areas for bats in the local area. These impacts are considered to primarily effect common species, although very low numbers of rarer species could also be affected. As such, and given the diversity of species that utilise the Site, in the absence of mitigation, an adverse effect significant at the Local level is predicted.

Breeding birds

CONSTRUCTION PHASE

- 7.5.45 Removal of the broadleaved plantation, coniferous plantation, small section of semi-natural woodland and sections of hedgerow to accommodate the built development and for road/ pedestrian links, could disturb/displace breeding dunnoek, yellowhammer, house sparrow, linnnet, song thrush, starling, willow warbler and bullfinch as well as a variety of other common birds. This habitat removal would result in a loss of potential nesting habitat.
- 7.5.46 In addition, it is anticipated that seven pairs of breeding skylark will be permanently displaced as a result of clearance of the semi-improved grassland, cereal crop and fallow arable land.
- 7.5.47 Based on the above, an adverse effect significant at the Local level is predicted.

OPERATIONAL PHASE

- 7.5.48 Given the retained habitat and extent of habitat creation that will occur at the Site, it is anticipated that the majority of birds, save for ground nesting birds (i.e. skylark), would continue to utilise the Site for breeding during the operational phase. However, the higher levels of human disturbance associated with residential development, it is anticipated that the more elusive species such as yellowhammer and bullfinch would be displaced to some extent. As such, it is predicted that four breeding territories of yellowhammer and one of bullfinch would be permanently lost under the proposals. In addition, the introduction of predators such as the domestic cat could result in a reduction in the abundance of breeding birds present at the Site.
- 7.5.49 Based on the above, in the absence of mitigation, an adverse effect significant at the Local level is predicted.

Invertebrates

CONSTRUCTION & OPERATIONAL PHASES

- 7.5.50 The vast majority of habitats at the Site of interest for invertebrates (i.e. species-rich hedgerows and trees) will be retained, albeit with increased potential disturbance or inappropriate management. As such, no significant adverse effects arising from the construction phase of the development are anticipated.

Badger

CONSTRUCTION PHASE

- 7.5.51 Seven outlier/subsidiary setts present at the Site, four of which were found to be 'in-use' at the time of survey. In line with current standing advice¹⁸, the following impacts on badgers arising from the development are considered: loss of setts; damage to setts; loss of foraging and; disturbing badgers while they're occupying setts with noise, lights, vibration, fires or chemicals.

Loss of setts

- 7.5.52 All four active setts (BS1, BS2, BS4 and BS6) lie within areas of retained vegetation, outside the areas of the built development, although within the zone of influence. Areas of built development will partially fall within 20m zones of setts BS1 and BS4. However, the orientation of the entrances of BS1 face towards field F11 and the tunnels appear to trace back towards the centre of the hedgerow. The entrance of BS4 faces field F5 and appears to trace back eastwards towards the current broadleaved woodland in an area proposed as open space. Accordingly, despite construction falling partially within 20m, it is anticipated that the setts would be retained within the development layout, albeit with some potential damage, as described below.

Damage to setts

- 7.5.53 The proposed development and associated construction activities will partially encroach within 20m of BS1 and BS4 which could potentially collapse badger tunnels. Without necessary safeguards/controls damage to tunnels may occur during construction which could result in offences being caused under the Protection of Badgers Act 1992.

Loss of foraging areas

- 7.5.54 The construction phase will result in the loss of foraging habitat associated with outlier subsidiary setts, including arable, grassland and some woodland. Whilst the extent of foraging lost is substantial, the potential for this to directly result in offences being caused is limited, particularly given the absence of a main sett on-site (which is most likely present off-site to the north, south or west).

Disturbing badgers while they're occupying setts with noise, lights, vibration, fires or chemicals

- 7.5.55 Natural England guidance advises that badgers are relatively tolerant of moderate levels of noise and activity around their setts and that low or moderate levels of apparent disturbance at or near to badger setts do not necessarily disturb the badgers occupying those setts. Therefore,

¹⁸ Natural England and Department for Environment, Food and Rural Affairs, 2015. Standing advice for local planning authorities who need to assess the impacts of development on badgers. [online] Available at: <<https://www.gov.uk/guidance/badgers-surveys-and-mitigation-for-development-projects>> [Accessed 06 April 2017].

offences are not considered likely for construction methods anticipated to be employed, as 'disturbance' is not likely to be greater than that which the badgers commonly tolerate.

- 7.5.56 Night working involving the use of artificial lights within close proximity to the setts could disturb badgers occupying those setts.

Summary

- 7.5.57 Based on the likely effects above and given the protection badgers received under the Protection of Badgers Act 1992, appropriate mitigation measures have been set out below, including the potential need for a derogation licence to damage setts. During construction works, there is also potential for badger utilising the site to become trapped in open excavations if these are left open overnight, and therefore avoidance measures have also been set out.

OPERATIONAL PHASE

- 7.5.58 It is anticipated that development will displace badgers to some extent, with the potential for adaption to suburban conditions, with badgers potentially foraging in gardens and/or retained open spaces. The development layout allows badgers continue to use habitats, albeit with hedges severed and loss of overall forage, subject to disturbance conditions. Occupation of the dwellings on-site is anticipated to increase human disturbance, with offences potentially caused by local residents and pets (e.g. dogs) interfering with setts.

Reptiles

CONSTRUCTION PHASE

- 7.5.59 Works during the construction phase including habitat clearance could potential kill and/or injure slow-worms, particularly associated with field F11 and the margins of F6 and F7 and the eastern margin of F1, and the re-profiling works of F12 to accommodate the new pond. Given the low population of slow-worm recorded at the Site and the small extent of habitats utilised at the Site by this species, these affects are considered low in magnitude and extent, and therefore not significant. However, based on their legal protection, offences could be caused by the killing and/or injury of this species during construction.

OPERATIONAL PHASE

- 7.5.60 Potential effects during the operational phase include inappropriate management of retained habitats leading to further killing and/or injury of reptiles.

Net Loss / Gain of Biodiversity

- 7.5.61 Based on the predicted effects on all habitats, a substantive 'Habitat Impact Score' of 110.02 is predicted. In respect of 'Linear' impacts, based on those features effected a limited 'Linear Impact Score' of 0.85 predicted (see appendix 7.10).
- 7.5.62 In accordance with the NPPF, 'Mitigation' and 'Enhancement' measures are required to address these adverse effects in order to avoid a net loss of biodiversity.

7.6 Mitigation and Enhancement

MITIGATION

- 7.6.1 Inherent and additional mitigation measures are set out below, and are also shown in the Green Infrastructure Parameter Plan (Figure 3.3) and the Illustrative Green Infrastructure Strategy (Figure 3.16) where relevant.

Chiltern Beechwoods SAC

- 7.6.2 No mitigation required. The provision of open space at the Site is anticipated to further reduce any minimal increase in visitor rates to the SAC resulting from the proposed development.

Roughdown Common SSSI

- 7.6.3 No mitigation required. The provision of open space at the Site is anticipated to further reduce any minimal increase in visitor rates to the SAC resulting from the proposed development.

Shrubhill Common LNR/Shrubhill Common North LWS

- 7.6.4 Best practice construction measures will be implemented to avoid/minimise generation of litter, dust, noise and vibration (including mitigation provided in Chapter 11: Air Quality). In addition, measures will be implemented to avoid/minimise potential for fuel and chemical spills in line with current best practice and pollution prevention guidelines. The above measures would be set out within the Construction Environmental Management Plan (CEMP) for the scheme which could be secured via a planning condition.
- 7.6.5 Potential fragmentation affects will be mitigated (reduced) by design. Hedgerow H24 will be largely retained (save for the loss of a section to provide the new access road off The Avenue and two 2m sections to accommodate pedestrian leisure routes) and enhanced with additional woodland edge landscaping and management, thereby maintaining a north-south corridor through the Site, limiting the isolation of the common. Hedgerow H22 will be treated in a similar manner, with additional woodland edge landscaping and management, to ensure north-south routes are reinforced
- 7.6.6 In addition to the above an east-west corridor will be reinforced making use of the existing woodland copse to the east and hedgerow H17 (which will be enhanced with additional woodland edge landscaping and management as above), with further new tree and shrub planting to connect with the western boundary (H14) in the west. This second corridor from the Shrubhill Common area will create route through Site to further limit the isolation of the common.
- 7.6.7 In addition, a new east-west corridor will be reinforced making use of the existing woodland copse to the east and hedgerow H17 (which will be enhanced with additional woodland edge landscaping and management as above), with the addition of new tree and shrub planting to connect with the western boundary (H14) in the west. This second corridor from the Shrubhill Common area will create route through Site for faunal, and floral, dispersal limiting the isolation of the common.
- 7.6.8 The above mitigation would be secured through the control of detailed landscape design and a suitably worded condition to include production of a Landscape and Ecology Management Plan (LEMP).

- 7.6.9 The proposed development will include provision of on-site recreation including cycle and pedestrian leisure routes, fitness trail stations, Locally Equipped Areas of Play (LEAP), Neighbourhood Areas of Play (NEAP) and various informal play areas (logs, boulders, bunds etc.). These will divert some recreational pressure away the LWS/LNR. This mitigation would be secured through the control of detailed landscape design and a suitably worded condition to include production of a LEMP.
- 7.6.10 The lighting scheme for the Site will be sensitively designed so as to avoid excessive illumination of the north-south corridor and east-west corridor, thereby maintaining the functionality of these corridors as connectivity features through the Site, between the LNR/LWS and the wider landscape. Sensitive Lighting design could be secured via a suitably worded planning condition.

Broadleaved semi-natural woodland

- 7.6.11 Extensive tree planting will be undertaken throughout the Site including an area of c.0.5ha of new woodland planting to the north of H13 which, in time, will mitigate for the loss of 0.1ha of woodland copse. Native trees of local provenance will be used, including a variety of nut-, fruit- and seed-bearing species with differing fruiting and flowering seasons, thereby maximising the ecological benefits of this tree planting.
- 7.6.12 The retained woodland to the east of the Site will be managed through selective thinning of poorer quality trees, with any timber arisings retained as deadwood. Some limited selective coppicing will be undertaken to establish good structural diversity thereby encouraging a diverse ground flora. Management will be used to encourage ground flora and shrub layers, rather than under-planting of new species within the woodland. On the woodland edge some landscaping and management will be undertaken to establish an 'ecotone' from high canopy down through shrub layers to tall herbs and grassland.
- 7.6.13 Woodland will be protected in line with standard arboricultural practice (BS5837:2012).
- 7.6.14 Planting schemes and management would be secured via detailed designs and/or a suitably worded planning condition, including the provision of a LEMP, as described above.
- 7.6.15 Footpaths will be clearly marked around the woodland to limit public access into the wood. In addition, signage/interpretation boards will be erected adjacent to the woodland explaining its ecological importance and history (i.e. old hedge banks) to encourage responsible recreation. These measures would be secured via control detailed designs and/or a suitably worded planning condition, including the provision of a LEMP.

Neutral semi-improved grassland

- 7.6.16 To mitigate for the loss of existing grassland retained grassland in the south of the Site will be enhanced to create species-rich grassland. The existing grassland will be harrowed and sown with a species-rich neutral/calcareous wildflower mix, to include yellow rattle *Rhinanthus minor*. This hemi-parasitic species would reduce the vigor of grasses, thus aiding to develop a diverse sward. Where possible, local sources of seed will be obtained, such as through the use of green hay, or by harvesting seeds.
- 7.6.17 In addition, wildflower grassland habitats will be established within basins and swales, where topsoils are removed or reduced, exposing lower nutrient subsoil, such as exposed chalk, and sown with suitable seed mixes. Where possible local sources of seed will be obtained, such as through the use of green hay, or by harvesting seeds.

- 7.6.18 These measures would be secured via control of detailed designs and a suitably worded planning condition, including the provision of a LEMP.
- 7.6.19 The retained and enhanced, or new grasslands will be managed intensively in the first two years to reduce vigour of coarse grasses and weed, and subsequently managed with an annual hay-cut after flowering. Mown pathways through and around the grassland will be created to demarcate footpaths and minimise unauthorised access away from the designated footpaths.
- 7.6.20 Detailed management objectives and principles will be set out within a LEMP which would be secured via a planning application.

Hedgerow Network

- 7.6.21 Existing hedgerows will be reinforced and 'gapped-up' with new shrub and tree planting comprising native species of local provenance.
- 7.6.22 New 'woodland-edge' habitats will also be created along hedgerows across the Site, managed to establish grassland/tall herbs, grading to native shrub and trees, thereby establishing an 'ecotone' with the depth of this margin 'scaloped' to maximise structural diversity. This will ensure the value of retained hedgerows are maximised.
- 7.6.23 Retained hedgerows will be protected in line with standard arboricultural practice (BS5837:2012).
- 7.6.24 New green infrastructure connections (including tree and shrub planting) are also proposed to connect H17 with H14 (establishing a continuous east-west link) and, further north, connecting H15 with H14. This will allow for 300m of new hedgerow planting. These two connections will strengthen the hedgerow network and mitigate for the loss of hedgerows.
- 7.6.25 The above measures would be secured through control of detailed design and via the production of a LEMP.

Mature Trees

- 7.6.26 Retained trees will be protected in line with standard arboricultural practice (BS5837:2012).
- 7.6.27 Permanent design features will be included to protect tree 120 during construction, such as a circular bench, protective fencing, signage and/or planting. This protective measure would be secured via control of detailed design measures and/or a suitably worded planning condition.

Bats

- 7.6.28 Potential adverse effects through severance of hedgerows will be mitigated through design. Hedgerows will be enhanced with buffer planting thereby maintaining navigational corridors ('flight-lines') on-site and to the wider landscape, with key routes along H22, H24 and H17. At severance points, landscaping and management of trees and shrubs will be managed to establish bat 'hop-overs', where vegetation encourages bats to fly up and over roads/gaps. No artificial lighting will be installed at these severance points. The above measures will be implemented to ensure bats can continue to utilise the Site to navigate through the landscape.
- 7.6.29 The loss of the extensive foraging opportunities will be mitigated through increasing the

quality of retained and created habitats (as described above), both in respect of structure, diversity and species-richness:

- New grassland creation/ restoration and management
- Woodland management, edge planting and management
- New woodland planting
- Retained hedgerow management and landscaping, as above
- New orchard planting (see below)

- 7.6.30 The enhancements and new habitat creation detailed above will provide a structurally diverse and species-rich habitat which is anticipated to result in an increase in invertebrate biomass and thereby enhance the foraging potential at the Site for bats.
- 7.6.31 No bat roosts were confirmed to be present at the Site through transect surveys, ground based inspections or aerial surveys. However, prior to felling or significant tree surgery works, those trees identified to have potential to support roosting bats would be subject to precautionary tree climbing inspection surveys, with any subsequent mitigation required carried out.. Enhancement measures set out below would provide new roosting opportunities for bats across the Site.
- 7.6.32 These measures would be secured via detailed designs and/or a suitably worded planning condition, including the provision of a LEMP.
- 7.6.33 The lighting scheme for the Site will be sensitively designed so as to avoid light spill along the existing hedgerows (particularly severance points), retained section of the woodland, and all enhanced and created habitats detailed above, thereby maintaining these habitats as foraging/commuting features for bats. This would be secured via control of detailed lighting designs and/or a suitably worded planning condition.

Breeding Birds

- 7.6.34 Based on their legal protection, any clearance of potential nesting habitat (i.e. scrub, broadleaved plantation and other trees, sections of hedgerow, grassland fields F1 and F5, cereal crop (F13) and fallow arable (F6&F7) should be undertaken outside of the bird nesting season (March-August inclusive), or immediately following confirmation by a suitably qualified ecologist that no active nests are present.
- 7.6.35 Extensive planting of native trees will be undertaken throughout the Site including scattered trees, woodland and an orchard thereby providing extensive foraging and nesting habitat for birds. This planting will include abundant seed-, fruit- and nut-bearing species to provide a high quality foraging resource. In addition, the habitat creation at the Site including parkland, grassland, woodland, SuDS and orchards is anticipated to attract an abundant invertebrate biomass – an important foraging resource for a variety of birds.
- 7.6.36 Scrub and extensive tree planting will be undertaken immediately adjacent to boundary hedgerows along the majority of the northern, western and southern Site boundaries, thereby screening these hedgerows from the development and the impacts of human disturbance and, in addition, providing adequate cover suitable for the more elusive bullfinch and yellowhammer.
- 7.6.37 Furthermore, public access will be discouraged within the retained section of semi-natural woodland, thereby reducing disturbance upon nesting/breeding habitats for birds.
- 7.6.38 These measures would be secured via detailed landscape designs and/or a suitably

worded planning condition, including the provision of a LEMP.

Badger

- 7.6.39 It is anticipated that all badgers setts on-site can be retained alongside development. However, there remains a limited risk that construction works could collapse badger tunnels associated with these setts, particularly BS1 and BS4. Works in these areas will potentially generate a higher level of disturbance than the existing situation, although these are anticipated to fall within the acceptable tolerances of badgers.
- 7.6.40 Given this potential sett damage a licence from Natural England may be required to work in the proximity of setts BS1 and BS4, potentially to include partial and/or temporarily sett closure works. Once construction is complete, these setts would be reopened to allow badger to utilise the setts during the operational phase of the development. A licence from Natural England can only usually be obtained once full planning permission has been granted.
- 7.6.41 In addition, the following precautionary measures will be implemented, and would be secured via a suitably worded Planning Condition:
- Pre-construction badger survey and monitoring for signs of new sett digging.
 - Covering any open excavations with wooden boards, or fitting them with appropriate escape ramps, in order to prevent badgers falling into them and injuring themselves or becoming trapped.
 - Monitoring of site for any new sett excavation during prolonged remediation, construction or landscaping works.
 - Night time working within 30m of retained setts will be avoided to prevent noise disturbance and night time illumination near to setts.
- 7.6.42 The following mitigation measures will be implemented to minimise disturbance to badger arising from the operational phase of the development:
- The lighting scheme for the site will be sensitively designed so as not to illuminate the vegetation which covers the badger setts, or excessively illuminate features which are likely to function as 'badger corridors'.
 - Protective shrubs i.e. prickly/thorny species, will be planted around the retained Badgers setts to deter interference from dogs and local residents. Species used will be native and also provide foraging potential, such as Blackthorn.
- 7.6.43 These measures would be secured via control of detailed landscape design and/or a suitably worded planning condition.

Reptiles

- 7.6.44 An *in-situ* translocation exercise will be implemented, prior to the commencement of construction to minimise the risk of killing and/or injury of slow-worm, adhering to the following principles:
- Creation of on-site reptile receptor area during the first phase, well in advance of clearance works;
 - A minimum of 50 artificial reptiles refugia/ha will be installed within areas where slow-worm have been recorded at the Site.
 - Artificial and natural refugia in these areas will be checked daily for a minimum period of 60 days within the active reptile period (March-September).
 - Any slow-worms captured will be translocated to the pre-prepared receptor area located immediately to the south of hedgerow H13.

- As appropriate through the translocation exercise, i.e. when capture rates reduce, habitat manipulation will be undertaken to increase capture rates. This will involve reducing the amount of suitable vegetation (i.e. strimming or brush-cutting brambles and rough grass and reducing the height of the grass sward), leaving 'islands' of rank vegetation around which to concentrate capture effort.
- Immediately following the 60-day translocation exercise, a destructive search will be undertaken, supervised by a suitably experienced ecologist, whereby any rubble/log piles are dismantled by hand, followed by gradual stripping of vegetation/spoil using a toothed excavator.

7.6.45 The reptile receptor area will:

- be created during the first phase significantly in advance of the translocation exercise, with translocation only commencing when habitats provide sufficient structure and refuge to support slow-worms;
- encompass a minimum area of 0.6 ha
- be over-seeded with an appropriate species-rich wildflower grassland mix, to create a structurally and floristically diverse habitat, thereby providing optimal conditions for slow-worm.
- be demarked with wooden posts/fence/knee rail to prevent potentially harmful management practices of the surrounding land encroaching into this area (but retained for informal public use).
- be managed on a biennial and rotational basis, with no more than 50% of the entire grassland cut in any one year.
- be enhanced with provision of 3 No. hibernacula to create refuges for the translocated slow-worms.

7.6.46 To avoid dog fouling problems within the long-sward grassland, bins will be provided adjacent to the reptile receptor areas.

7.6.47 Reptile mitigation measures would be secured via a suitably worded planning condition.

7.6.48 Appropriate management of the reptile receptor area and other habitats at the Site will be set out within a LEMP thereby ensuring that these areas receive appropriate management and that the receptor area continues to provide suitable habitat for reptiles in the long term.

ENHANCEMENT

7.6.49 General enhancement measures proposed at the Site are set out below and are shown in the Green Infrastructure Parameter Plan (Figure 3.3) and the Illustrative Green Infrastructure Strategy (Figure 3.11). All enhancements would be secured through control of detailed landscape designs and via a suitably worded planning condition to include the provision of a LEMP.

North-South Corridor and East-West Corridors

7.6.50 Existing hedgerow H22 & H24 will be largely retained and enhanced with buffer and in-fill planting thereby maintaining a north-south corridor through the Site. The buffer and in-fill planting will comprise native trees and shrubs of local provenance and tall wildflower grassland margins, thereby establishing an ecotone as described above.

7.6.51 In addition, the east-west corridor will be reinforced created, making use of the existing hedgerow H17 and providing new tree and shrub planting to connect with the retained hedgerow H14 in the west and the partially retained semi-natural broadleaved woodland

in the east.

- 7.6.52 The north-south and east-west corridors described above will ensure connectivity is maintained from Shrubhill Common LNR / Shrubhill Common North LWS, through the Site with habitats in the surrounding landscape to the north and west and will provide an important wildlife corridor for a variety of fauna including bats, badgers, hedgehogs, birds, reptiles, amphibians and invertebrates.

Woodland & Associated Habitat Creation

- 7.6.53 New woodland planting (c.0.5ha) is proposed to the north of H13 and a tree belt (c1.0ha) is proposed adjacent to the boundary hedgerows along almost the entire, northern, western and southern Site boundaries. The planting will include a range of native, broadleaved trees of local provenance and suited to the prevailing soil conditions. A habitat 'eco-tone' will be created along the woodland edge comprising shrub/scrub and a grassland margin. These habitats will be maintained for their ecological interest and will enhance opportunities at the Site for a variety of fauna including bats, birds and invertebrates
- 7.6.54 The data search returned woodland species of butterfly from within the local area, although none have been recorded since 2000. The new development creates the opportunity to encourage a variety of woodland species to the Site, as such the following enhancements are proposed:
- To encourage white-letter hair streak *Satyrion w-album* (a butterfly listed as a Priority Species under Section 41) to the Site, elm (the sole larval food plant for this species), preferably wych elm, will be incorporated within the planting schedule and in particular will be planted along the edge of the proposed new woodland and as stand-alone trees elsewhere within the Site.
 - To encourage brown-letter hair streak *Thecla betulae* (a butterfly listed as a Priority Species under Section 41) to the Site, blackthorn (the primary larval food plant for this species) will be incorporated within the planting schedule and in particular will be planted within the woodland edge habitats and associated with hedgerows.

Drainage Features

- 7.6.55 A suite of new drainage features will be constructed throughout the Site including permanently wet ponds and several swales. Whilst the primary function of these drainage features is hydrological, the drainage features will be landscaped to provide benefits for biodiversity. The permanently wet features will include a permanently wet wildlife pond, surrounding wet grassland and marginal habitats, along with reedbed and wetland scrub areas. The numerous swales throughout the site will be over-seeded with an appropriate species-rich neutral/calcareous wildflower seed mix.
- 7.6.56 Dry basins proposed at the Site will be sown with a neutral/calcareous wildflower mix with chalk sub-soils exposed and arisings used to create a chalk bank, thereby enhancing habitat at the Site for butterflies, particularly dingy skipper (a butterfly listed as a Priority species under Section 41 and was recorded within the adjacent Shrubhill Common in 2014), a species of south-facing chalk downland. To maximise insolation, a proportion of the dry basins will comprise south-facing 'kidney' shaped basins.

Bird and Bat Boxes

- 7.6.57 A number of bird and bat box features will be installed at the Site to provide additional

nesting and roosting opportunities respectively. These features would ideally be integrated into new dwellings located adjacent to open space or structural landscaping and/or erected on healthy, semi-mature trees across the Site. The total numbers will be subject to detailed design, but an average of one bat/bird box unit per 15 dwellings would be appropriate.

Timber Fence Treatments

- 7.6.58 To enable small mammals, including hedgehog, to continue to use habitats the Site (i.e. private gardens) >13cm holes at the base of new timber garden fences will be incorporated into the detailed design of the plot landscaping.
- 7.6.59 The above enhancement measures will provide a range of benefits to local wildlife including bats, birds, amphibians, invertebrates and small mammals (including harvest mouse and hedgehog).

NET LOSS / GAIN OF BIODIVERSITY

- 7.6.60 Based on the implementation of the above mitigation and enhancement measures a 'Habitat Mitigation Score' of '110.24' could be achieved, resulting in a minor net gain of '0.22' ('Habitat Biodiversity Impact Score'). In respect of linear features a substantial net gain of 32.06 ('Linear Biodiversity Impact Score') could be achieved through proposed mitigation and enhancement measures (see appendix 7.10).
- 7.6.61 Based on these predicted outcomes, the scheme is predicted to comply with the NPPF in respect of no net loss of biodiversity.

7.7 Residual Effects

Chiltern Beechwoods SAC

- 7.7.1 No residual effects arising from the development on Chilterns Beechwoods SAC are anticipated.

Roughdown Common SSSI

- 7.7.2 No residual effects arising from the development on Little Heath SSSI or Roughdown Common SSSI are anticipated.

Shrubhill Common LNR/Shrubhill Common North LWS

- 7.7.3 Subject to the implementation of the proposed mitigation measures, no significant residual affects arising from the proposed development are anticipated.

Neutral Semi-improved Grassland

- 7.7.4 Subject to the implementation of the proposed mitigation measures, including management of retained grassland and creation of new wildflower grassland, no significant residual affects arising from the proposed development are predicted.

Hedgerow Network

- 7.7.5 The overall network of hedgerows will be largely retained and maintained for the benefit of biodiversity, albeit with necessary severance for access routes. Two new connections between hedgerows will be provided east-west through the Site. As such, no residual effects arising from the development are therefore predicted.

Woodland, Plantation and Mature trees

- 7.7.6 The proposed development would result in the net gain of tree cover, given the loss of broadleaved plantation, a small area of woodland and several individual trees, balanced by extensive tree planting across the Site. As such, no significant adverse residual effects arising from the proposed development on trees, plantation and woodland are anticipated.

Bats

- 7.7.7 Subject to the implementation of the above mitigation measures, navigational corridors through and around the site will be available for bats throughout the construction and operational phase of the development. The provision/enhancement/creation of freshwater, grassland, woodland and linear features at the Site will ensure bats can continue to make use of the Site for foraging and commuting throughout the operational phase of the development. These habitat types (freshwater, grassland, woodland and linear features) are cited as principle habitats used by foraging bats¹⁹ and will provide important foraging habitats for a variety of bats including the rare Nathusius' pipistrelle and barbastelle which have been recorded at the Site. Although there will be a net loss in the extent of foraging habitat available at the Site, the measures set out above will enhance the foraging potential of retained habitats, whilst newly created habitats will be designed in detail, to maximise foraging potential. Light spill will also be minimised. As such, no significant residual adverse effects arising from the proposed development are anticipated.

Breeding birds

- 7.7.8 The scheme will deliver a net gain of potential nesting bird habitat, albeit with a loss of opportunities for ground nesting skylark. An abundant foraging and nesting resource will be available for common garden and woodland birds. The landscape planting described above will ensure sufficient screening from human disturbance, thereby enabling an abundance and variety of bird species, including the more elusive species, to continue to breed within the Site. There is no possible provision of suitable habitat for ground nesting birds, such as skylark, resulting in the permanent loss of seven skylark territories. Accepting that the composition of the breeding bird assemblage will change with the loss of those species associated with existing agricultural practice, it is predicted that the opportunities for a breeding bird assemblage is maintained. As such no significant adverse residual effects arising from the proposed development are anticipated.

Invertebrates

- 7.7.9 Based on the mitigation and enhancement measures set out above, including creation of species-rich grassland, ponds, dry basins and woodland, it is considered there will be some net gain in the quality and extent of invertebrate habitat at the Site. However, overall no significant residual effects are predicted.

Badger

- 7.7.10 The mitigation measures set out above will ensure disturbance to badgers and their setts

¹⁹ Entwistle et al. (2001). Habitat Management for Bats: A guide for land managers, land owners and their advisors. Peterborough: JNCC

during the construction and operational phase of the development is minimised. Obtaining a licence from Natural England post-planning will ensure construction works undertaken in close proximity to the setts at the Site is lawful.

Reptiles

- 7.7.11 The implementation of the proposed mitigation measures will minimise risk of killing and/or injury of slow-worm and, in addition, will ensure enhanced habitat at the Site is available for slow-worm in the long term. These measures would allow for the lawful development of the Site.

7.8 Cumulative effects

- 7.8.1 Cumulative adverse effects of the proposed development are considered in combination with the following other projects:

- Land off Dacorum Way between Marlowes, Combe Street and River Gade, Hemel Hempstead, HP1 1HL (4/03624/14/MOA) - outline permission granted for residential development (up to 207 units) and ancillary retail unit (up to 375 sq m)
- Symbio Place, Whiteleaf Road, Hemel Hempstead, HP3 9ph (4/03441/15/MFA) - full permission for demolition and replacement of a 4 storey office building with 16 storey residential development, featuring 272 apartments, on-site gym, leisure facilities, coffee shop, roof garden, internal arboretum, function room and underground parking facilities.
- Martindale JMI School, Boxted Road, Hemel Hempstead, HP1 2QS (4/01630/17/MFA) – Residential Development on former Martindale School site to provide 65 new dwellings (amended scheme) approved in October 2017. (NB previous approval for 43 dwellings on the same site was reference 4/00925/14/MOA granted in February 2015).
- St Marys Dominican Convent, Green End Road, Hemel Hempstead, HP11 1QW (4/00493/16/FUL) – Change of use of existing buildings from class C2 to class C3 dwelling house, alterations and refurbishment of listed buildings granted in June 2016. This will provide 20 additional residential units and the refurbishment of one existing residential unit.

- 7.8.2 The submitted ecological information for the “Land off Dacorum Way”, “Symbio Place” and “Martindale JMI School” projects suggests the Sites are of very limited ecological interest. However, the "Land off Dacorum Way" Site incorporates part of the River Gade and associated vegetation which is considered to offer potential foraging/commuting habitat for bats, although a specific survey was not carried out. The ecology report for the Site recommends implementation of a sensitive lighting scheme that does not increase lighting along the River Gade, thereby safeguarding this corridor as a commuting/foraging feature for bats. The "Symbio Place" development offers negligible opportunities for bats. The ecology report for the Martindale JMI school development identified the Site to have negligible ecological value and identified no ecological impacts of the development. Based on the above, no significant cumulative adverse effects on bats arising from the development in combination with the other projects are anticipated. No other possible cumulative effects are anticipated in respect of these projects.

7.9 Summary

7.9.1 Table 7.5 below sets out a summary of the important ecological features, potential significant effects, mitigation, enhancement and resulting residual effects.

Table 7.5 Summary of Ecological Impact Assessment

Important Ecological Feature	Ecological importance	Likely Significant effects (before mitigation)		Mitigation / Enhancement	Residual Effects
Chilterns Beechwoods SAC	International	Construction Phase	No significant adverse effects	None	No significant adverse effects
		Operational Phase	No significant adverse effects	None	
Roughdown Common SSSI	National	Construction Phase	No significant adverse effects	None	No significant adverse effects
		Operational Phase	No significant adverse effects	None	
Shrubhill Common LNR / Shrubhill Common North LWS	County (LWS)	Construction Phase	Adverse, county (indirect effects arising from construction)	Avoidance measures to be included within CEMP	No significant adverse effects
		Operational Phase	Adverse, local (recreational impacts, artificial lighting of connectivity corridors)	Provision of on-site pedestrian/cycle leisure routes and areas of play. Implementation of sensitive lighting scheme.	
Neutral Semi-improved Grassland	Local	Construction Phase	Adverse, local (partial loss of habitat)	Enhancement of retained grassland.	No significant adverse effects
		Operational Phase	Adverse, local (trampling arising from human movement)	Grassland creation and management-Implementation set out within LEMP	
Hedgerow network	Local	Construction Phase	Adverse, county (loss of hedgerows including sections of ancient hedgerows)	Strengthening/buffering of retained corridors. Creation of new east-west corridor. Compliance with standard arboricultural practice	No significant adverse effects
		Operational Phase	No significant adverse effects	None	
Broadleaved semi-natural woodland	Local	Construction Phase	Adverse, county (partial loss of habitat)	Enhancements of retained section, extensive tree planting throughout site incl. creation of 0.5ha of new woodland)	No significant adverse effects (some increase in tree cover over time)
		Operational Phase	Adverse, local (trampling, soil compaction)	Design measures to encourage responsible recreation	
Mature trees	Local	Construction Phase	Adverse, local (potential damage to retained trees)	Compliance with standard arboricultural practice. Extensive tree planting throughout Site.	No significant adverse effects
		Operational Phase	No significant adverse effects	Precautionary Protection of tree 120	
Bats	Local	Construction Phase	Adverse, local (loss of foraging habitat and direct linkages along navigational corridors; disturbance to	Enhancement of navigational corridors. Creation of east-west corridor through the Site. Restrictions on night-time working.	No significant adverse effects

Important Ecological Feature	Ecological importance	Likely Significant effects (before mitigation)		Mitigation / Enhancement	Residual Effects
			foraging/commuting bats)	Enhancement of foraging habitat.	
		Operational Phase	Disturbance to foraging/commuting bats	Sensitive lighting scheme	
Breeding birds (and 'nesting birds')	Local, protected species	Construction Phase	Adverse local (reduction in breeding habitat)	Measures to safeguard nesting birds during construction. Extensive tree planting and other habitat creation	No significant adverse effects (accepting that breeding bird assemblage will change from farmland species, but that overall diversity is retained) & no legal infringements
		Operational Phase	Adverse, local (disturbance)	Buffer planting to screen hedgerows. Provision of habitat free from human disturbance (fenced-off woodland)	
Invertebrates	Local	Construction Phase	No significant adverse effects	No mitigation. Various habitat creation measures (pond, grassland)	No significant adverse effects (some limited gains for invertebrate opportunities)
		Operational Phase	No significant adverse effects	None	
Badger	Protected Species only	Construction Phase	Risk of legal infringement (Badger Act) – damage to setts. Loss of foraging habitat	Obtain Natural England Mitigation Licence. Safeguards during construction.	No legal infringements
		Operational Phase	Risk of legal infringement (Badgers Act) – disturbance/sett interference	Sensitive lighting scheme. Protective planting around setts.	
Slow-worm	Local; protected species	Construction Phase	Risk of legal infringement (Wildlife & Country Side Act) – killing and/or injury	In-situ translocation exercise. Provision of enhanced foraging/sheltering habitat and dispersal corridors	No significant adverse effects & no legal infringements
		Operational Phase	Risk of legal infringement (Wildlife & Countryside Act) – killing and/or injury arising from inappropriate habitat management	Appropriate management to be set out within LEMP	

7.9.2 In addition to the assessment of individually important ecological features, based on the 'Biodiversity Impact Assessment Calculation' undertaken, small net gains in respect of all biodiversity (habitats) are predicted, with larger potential net gains for linear habitats alone. Inevitably the proposed development will result in a change to the farmland communities of species and habitats present, although as demonstrated there is scope for the scheme to maintain biodiversity through mitigation and enhancement measures.

- 7.9.3 Based on the above, the scheme is considered to be in accordance with all National and Local planning policies relating to wildlife and biodiversity including policies CS26 and CS29 of the Dacorum Borough Core Strategy Local Plan and saved policies 99, 100, 101, 102 and 103 of the Local Plan (adopted 2004).
- 7.9.4 Key measures which will need to be implemented to ensure impacts are mitigated and enhancement delivered, are listed below, and should be controlled through suitably worded conditions and/or control of detailed scheme design:
- **Landscape and Ecological Management Plan (LEMP)** setting out how new habitats will be created and managed, and existing habitats will be restored/enhanced and managed to the benefit of wildlife as well as for recreation
 - **Construction Environmental Management Plan (CEMP)** including measures to be put in place to safeguard habitats, species and nearby designated sites
 - **Tree Protection Measures** employed to ensure trees, woodland and hedgerows are protected
 - **Establishing Key Habitat Corridors:** including new planting, seeding and management of hedgerow and adjacent habitats
 - **Habitat Creation** and subsequent appropriate management including:
 - Two ponds at Long Chaulden Gateway.
 - Community Orchard.
 - Wildflower grassland within SuDS basins and swales.
 - Woodland and scattered tree planting.
 - **Reptile Mitigation** measures put in place, including preparation of a reptile receptor area as part of the first phase of development, in-situ translocation of slow worms and ongoing management of the receptor area and other suitable habitats for reptiles.
 - **Safeguards for protected species** including nesting birds and badgers to ensure compliance with legal protections.
 - **Sensitive External Lighting Design** to ensure adverse effects on bats and other nocturnal wildlife are minimised.

7.10 Conclusion

- 7.10.1 Subject to the implementation of proposed mitigation and enhancement measures, and the control of detailed landscape design, no significant adverse effects are predicted in respect of ecology and biodiversity.
- 7.10.2 Of all the potential effects to be mitigated, those relating to the connectivity of habitats (i.e. hedgerow corridors) through the Site of are of greatest importance and, as such, these areas will require careful control of detailed design and robust future management. The proposed LEMP document, bringing together the detail of mitigation, enhancement and management measure will be instrumental in ensuring the necessary measures are successful.
- 7.10.3 Furthermore, where proposed enhancement measures are successfully implemented and appropriate management regimes are established, the scheme is predicted to deliver some minor beneficial effects in terms of tree cover and in providing a more diverse range of habitats for invertebrates and other fauna.

