

## **Chapter 7**

### **Ecology and Nature Conservation**

## Introduction

6.1.1 The purpose of this Chapter is to describe the ecological baseline of the site and surrounding area; assess the nature conservation value of habitats within the proposed development site; consider the presence of protected species of plants and animals; identify and assess the likely impacts of the proposed development; and, propose mitigation and conservation measures, as appropriate.

This Chapter is a summary of the full ecological baseline conditions established through desk studies and field surveys provided in Technical Appendix 7.1 and detailed Ecological Impact Assessment provided in Technical Appendix 7.2.

## Assessment Approach

### METHODOLOGIES

Reference has been made to the key publications and legislation to guide the assessment of ecological receptors. A full list of these publications is provided in the Reference sections within Technical Appendices 7.1 and 7.2.

### Desk Study

6.2.1 The Gloucestershire Centre for Environmental Records (GCER) were contacted in 2009 and asked to provide any information on non-statutory site designations within 2km of the site and records of protected and/or notable species within 2km of the site (4km for bats).

6.2.2 A web based search was undertaken in 2009 using the 'Local Live' website, the Multi-Agency Geographical Information for the Countryside (MAGIC) website and the National Biodiversity Network (NBN).

6.2.3 A review of local natural environment policies from the Cotswold Local Plan (2001-2011) and the Gloucestershire Local Biodiversity Action Plan (LBAP) was undertaken in 2009.

### Field Surveys

6.2.4 Field surveys have been undertaken by staff of *ecosulis* Ltd within the site in 2009. Details of the methods used are contained within Technical Appendix 7.1. The following surveys have been carried out on the Application Site using standard best practice methodologies:

- Phase 1 habitat survey;
- Daytime bats assessment of trees; and
- Habitat Suitability Index (HSI) assessment for great crested newt

### Evaluation

6.2.5 The evaluation methods and terminology that follow are based on the approved guidelines issued by the Institute of Ecology and Environmental Management (IEEM, 2006). Full details of the methods used for the evaluation are outlined within Technical Appendix 7.2.

### Ecological Impact Assessment

6.2.6 The assessment and terminology used in the main body of this Chapter is based on guidelines issued by IEEM in 2006. Technical Appendix 7.2 provides full details of the methods used for the assessment.

6.2.7 Valuations are afforded to Valued Ecological Receptors (VERs) according to a range of criteria such as site designations, inclusion within Red Data Books (RDB) or BAP, for example. However, other factors are also taken into account, for example, VERs that may be of low value in isolation may be subject to cumulative national decline and as such could be afforded higher values in certain circumstances. Values afforded to VERs include Negligible, Site, Local (Tetbury), District (Cotswold), County (Gloucestershire), National and International Value.

6.2.8 The IEEM guidelines recommend that the process of identifying the characteristics of the impacts should be made explicit by referring to the following when describing impacts: Confidence Levels, complexity, magnitude, duration, reversibility (permanency), timing and cumulative effects.

6.2.9 In assessing significance, the IEEM guidelines suggest making a decision about whether an impact is positive, negligible or negative and significant or not independent of the value of the receptor. In the first place significance is determined at the geographical level at which the resource has been valued. If an impact is found not to be significant at this level, it is then considered at progressively lower levels. The geographical value categories that have been used within this assessment mirror those used within the IEEM guidelines and characterise the extent to which impacts are significant.

6.2.10 The significance of the impacts has been assessed for each ecological receptor in the form of habitats and species from both the construction and the operational phases of the proposed development. The "significance" (characterising impacts) summarises such an assessment taking into account the characteristics of the impact.

6.2.11 If significant, the impact is identified as positive, negligible or negative.

- Positive (beneficial) – Advantageous or positive impact to an environmental resource
- Negligible (neutral) – An effect that is likely to have a negligible influence, irrespective of other effects
- Negative (adverse) Detrimental or negative impacts to an environmental resource or receptor

6.2.12 The residual impacts of the development have been considered in the medium-term (ten years post-development) and the longer-term (25 years post-development). Residual impacts have been assessed as significant or not significant and whether positive or negative against the assessment criteria following the guidelines by IEEM (2006).

#### POLICY FRAMEWORK

6.2.13 The relevant legislation and policy relating to ecology been considered within this assessment and are listed below and detailed within Technical Appendix 7.1.

- The United Kingdom Biodiversity Action Plan (BAP) 2002;

- The Wildlife and Countryside Act 1981 (and subsequent amendments);
- The Conservation (Natural Habitats & c.) Regulations 1994;
- The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2007;
- The Conservation (Natural Habitats, &c.) (Amendment) Regulations 2010;
- The Hedgerow Regulations 1997;
- Protection of Badgers Act 1992;
- Biodiversity. The UK Steering Group Report 1995;
- The Countryside and Rights of Way Act 2000;
- Planning Policy Statement 9: Biodiversity and Geological Conservation 2005;
- Planning Policy Statement 9: Biodiversity and Geological Conservation circular 2005;
- and the Natural Environment and Rural Communities Act 2006.

6.2.14 A list of relevant policies from Cotswold Local Plan (2001-2011) is provided below. For full details, reference must be made to the Local Plan itself.

- Policy 1 – Natural Resources
- Policy 4 – Environmental Impact
- Policy 10 - Trees, woodlands and hedgerows

6.2.15 The Gloucestershire LBAP is currently being updated, and the full habitat and species action plans are not yet available. Reference has therefore been made to the previous LBAP (2000) plans' actions and objectives for those habitats and species identified as being retained within the updated plans. Within the Gloucestershire LBAP tassel stonewort, bullfinch, song thrush, hedgehog, slow worm, dormouse and glow worm have their own Species Action Plan (SAP). Standing open water and ancient and/or species rich hedgerows have their own Habitat Action Plans (HAPs).

#### SCOPING CRITERIA

6.2.16 The scoping assessment comprised a meeting with Cotswold District Council and subsequent correspondence, which addressed the mitigation measures and habitat enhancements proposed. All parties agreed that the Ecological Impact Assessment would be based on the results of surveys undertaken to date (Phase 1 habitat survey, daytime bats and HSI assessment) and a precautionary approach would be undertaken in relation to the possible presence of protected species for which Phase 2 surveys would be undertaken following the submission of this application of the site (hedgerows, badger, reptiles and great crested newts).

## LIMITATIONS TO THE SURVEYS AND ASSESSMENT

6.2.17 The assessment has been based on Phase 1 and Phase 2 surveys (daytime bat assessment and survey of trees and Habitat Suitability Index Assessment) undertaken to date and the desktop study. Owing to time constraints, further Phase 2 surveys have not yet been undertaken for hedgerows, bats, badger, great crested newt and reptiles. Their presence cannot be predicted with absolute certainty and therefore, the assessment is based on the likelihood of the presence of these species/species groups, presence has been assumed and mitigation is provided on a precautionary basis.

### **Baseline Conditions**

#### SITE DESCRIPTION AND CONTEXT

6.2.19 The Application Site is situated on the northern fringes of Tetbury (centred on OS grid reference ST 895 941), with residential areas to the south, arable and grazed farmland to the north, east and west and the A4135 (London Road), with industrial and commercial premises beyond, to the south east. The site is currently managed as farmland and comprises poor semi-improved grassland, ponds, hedgerows, trees and woodland copses. Stone walls are present throughout the site. In total the site covers approximately 10.25ha.

#### BASELINE SURVEY INFORMATION

6.2.20 Full desk study and field survey results are contained within Technical Appendix 7.1. Figures 1-3 of Technical Appendix 7.1 provides location of habitats and species on site. The main findings are summarised below.

6.2.21 There are no statutory designations relating specifically to nature conservation within 2km of the site. A non-statutory Key (County) Wildlife Site (KWS) lies 1km from the site and given its distance and isolation from the site it is not likely to be significantly affected by development.

6.2.22 A detailed summary of the field survey results, including Figures, are provided in Technical Appendix 7.1. The habitats/species within the Application Site and relevant results of the desk study are summarised below in Table 7.1. The following table also provides a summary of the evaluation of habitats/species, which is based on the IEEM guidelines 2006 (Technical Appendix 7.2 outlines detailed evaluation methodology and rationale).

**Table 7.1: Summary of the results of VERs identified on site**

Ecological Feature	Qualifying Criteria	Ecological Value (based on a scale between Site and International value)
<b>Habitats</b>		
Poor semi-improved grassland	Semi-improved cattle and horse-grazed grassland. Provides suitable habitat for a range of local wildlife, including badgers, bats, birds, reptiles, amphibians and invertebrates. Habitat is common and widespread in the local area	Local Value
Mixed plantation woodland	Provides limited habitat for range of local wildlife including birds, more common bat species, badgers, invertebrates, reptiles and small mammals, as well as potential foraging and refuge habitat for amphibians such as great crested newt. Enhances the wider hedgerow network to some degree	Local value
Hedgerows and trees	Provides habitat for a range of local wildlife including birds, more common bat species, badgers, invertebrates, reptiles and small mammals, as well as potential foraging and refuge habitat for amphibians such as great crested newt. Two hedgerows are species rich.  GCER and the NBN website hold records for several species of plant including bluebell, within 2km of the site  Species rich hedgerows are a priority habitat. These hedgerows are likely to be important under the Hedgerow Regulations	Local Value (preliminary)
Ponds	Ponds 1 and 2 on site provide suitable habitat for amphibians such as the great crested newt as well as a foraging resource for common reptiles such as grass snake and habitat for common invertebrates. Pond 3 just off site to the north adds to the aquatic habitat network.  Standing open water is a priority habitat	District Value

Ecological Feature	Qualifying Criteria	Ecological Value (based on a scale between Site and International value)
Adjacent habitats	<p>Local farmland habitats with hedgerow networks and associated copses provide foraging, commuting opportunities and refuge for species such as badgers, moer common bat species, birds, invertebrates, reptiles and amphibians.</p> <p>Local buildings and gardens also provide foraging and refuge for species such as hedgehog, common reptiles, invertebrates and birds. Highfield Farm buildings provide opportunities for roosting bats and nesting birds</p>	<p>District Value</p> <p>Local Value</p>
Species		
Badger	<p>Site used for foraging in combination with a wider territory. No setts present on site</p> <p>GCER and the NBN website hold records for badger (no records of setts), the closest being within 2km of the site</p>	Site Value (preliminary)
Bats	<p>Site may be used for foraging and commuting common bat species using the wider area (GCER and NBN Gateway) in combination with the wider area, but the site is unlikely to form a significant route due to its proximity to the urban area of Tetbury. The site has potential for some tree roosts</p> <p>GCER and the NBN website hold records for six species of bats within 4km of the site, including lesser and greater horseshoe bat, brown long-eared, common and soprano pipistrelle and noctule</p>	Local Value
Other mammals e.g. hedgehog, brown hare, dormouse	<p>The site provides limited suitable habitat for hedgehog and brown hare in the form of semi-improved grassland, hedgerows and trees. Dormouse are unlikely to be present due to the small, isolated areas of suitable habitat</p> <p>No records are held by GCER and the NBN website for hedgehog, brown hare or dormouse</p>	Site Value

Ecological Feature	Qualifying Criteria	Ecological Value (based on a scale between Site and International value)
Birds	<p>Bird nesting opportunities are present within the hedgerows and trees, and the site may support a number of declining farmland species.</p> <p>GCER and the NBN website hold records for grey wagtail and house sparrow, within 2km of the site</p>	Local Value
Amphibians	<p>A moderate population is possible within Ponds 1 and 3. These ponds are suitable to support breeding great crested newt and other common amphibian species. Pond 2 provides sub-optimal breeding habitat, but is likely to be used for foraging by any local population</p> <p>GCER and the NBN website hold records for great crested newt, 500m from the site; common frog, common toad and smooth newt, between 0.35km and 0.8km from the site</p>	Local Value (preliminary)
Reptiles	<p>The site is likely to support a small to medium population of common species of reptiles. The site is likely to be used in combination with the wider area</p> <p>GCER and the NBN website hold records for grass snake and common lizard, 1.1km and 2km from the site</p>	Local Value (preliminary)
Invertebrates	<p>The structural diversity on site is likely to support a good range of common invertebrate species</p> <p>GCER and the NBN website hold records for several species of moths and butterflies which are included in the LBAP, within 2km of the site</p>	Site Value

6.2.23 In accordance with the IEEM Guidelines for Ecological Impact Assessment (2006), the individual features on site can be considered to have Site to District Value and overall the site is considered to have Local value with some features of higher and lower value. The values given to each ecological feature is provided in Table 7.1 above. Where presence or absence is unconfirmed, pending further survey, presence is assumed and the value is provided as a preliminary value.

## Key Impacts and Likely Significant Effects

### CONSTRUCTION AND OPERATIONAL IMPACTS

6.2.25 The impacts on VERs have been assessed, based upon the Landscape Design (Development Strategy Key Landscape Element, Dwg 96903E, LanDesign Associates, May 2009) and Illustrative Masterplan (DWG: 2440-18B, Ashley Design Associates, December 2009).

6.2.26 The potential impacts of the proposed construction phase and operation phase of development on VERs are identified within Table 7.2 below. The characterisation of the construction and operational phase impacts is considered in detail within Technical Appendix 7.2.

6.2.27 Impacts in relation to habitats and species focus on the presence or assumed presence of these species in the absence of some Phase 2 survey data. Broad consideration has been given to other species, namely other small mammals within Technical Appendix 7.2.

6.2.28 The changes in land use from agricultural land to residential areas during the construction phase ensures that only habitats that will be retained such as mixed plantation woodland, poor semi-improved grassland, hedgerows, trees and a pond, will be subject to operational impacts. Where positive impacts are identified, these relate to those that will primarily arise as a result of retention of habitat and change of land use only, which will occur during the construction phase.

**Table 7.2: Summary of the potential impacts of the proposed construction phase and operation phase of development on VERs**

<b>VER</b>	<b>Construction phase</b>	<b>Operation phase</b>
<b>On Site</b>		
<b>Grassland</b>	<p>Direct loss of approximately 7.8ha of grassland (approx 80% total grassland area) to development. Retention of approx 2ha of grassland</p> <p>Potential pollution from dust, run-off to boundaries of retained areas and potential hydrological changes</p>	<p>Increased recreational pressures</p> <p>Potential for hydrological changes and littering and dog nutrient enrichment</p> <p>Maturation of habitats</p>
<b>Woodland</b>	<p>Direct habitat loss of approximately 60% of woodland on site</p> <p>Visual, audio and potentially compaction root damage and vibration disturbance from construction machinery/operations and potential for pollution and light spill</p> <p>Creation of 0.1ha of woodland</p> <p>Enhancement planting of trees and scrub within buffer areas</p>	<p>Maturation of habitats provide larger area of native woodland</p> <p>Increased recreational pressures</p> <p>Increased risk of tree felling on health and safety grounds</p>
<b>Hedgerows and standard trees</b>	<p>Loss of some species poor and non-native hedgerows, but retention of both species rich hedgerows and new planting will increase overall hedgerow resource on site</p> <p>Approximately 30 trees will be lost, but 0.1ha of trees will be planted in woodland blocks and buffers along the northern site boundary, with additional trees within the wildlife area, grassland paddocks and community open space of more than 70 standard trees.</p> <p>Visual, audio and potentially compaction root</p>	<p>Increased disturbance and pollution</p> <p>Some retained hedgerows fragmented by roads</p> <p>Maturation of surrounding enhancement planting</p> <p>Indirect impacts of lighting</p>

<b>VER</b>	<b>Construction phase</b>	<b>Operation phase</b>
<b>On Site</b>		
	damage and vibration disturbance from construction machinery/operations and potential for pollution	
<b>Ponds</b>	<p>Loss of one of the two ponds on site, but replacement wildlife pond to be created, as well as a third pond primarily for drainage reasons</p> <p>Potential for pollution and disturbance from construction machinery/operations could affect water quality and the wildlife its supports.</p> <p>Potential impacts from hydrological changes</p> <p>Creation of wildlife area surrounding two wildlife ponds including shrub planting and wildflower grassland</p>	<p>Increased recreational pressures and disturbance to wildlife, including potential for damaging fish and invasive aquatic plant introductions</p> <p>Lighting limits commuting corridor for some species</p> <p>Potential for pollution and disturbance from run-off and low-level recreation could affect water quality and the wildlife its supports.</p> <p>Maturation of habitats improve connectivity and overall wetland habitat area, which will complement existing habitats</p>
<b>Badger</b>	<p>Up to around 20% of foraging habitat within a badger territory will be lost, although much of the highest quality habitat on site will be retained</p> <p>New roads severing hedgerows</p> <p>Woodland and buffer zone planting</p> <p>Potential disturbance to foraging behaviour from noise and lighting disturbance</p>	<p>Maturation of foraging corridors</p> <p>Elevated levels of disturbance and dog walkers</p> <p>New roads severing potential corridors and posing increased risk of mortality when in operation</p> <p>Areas of high quality foraging due to the enhancements to woodland, hedgerows and grassland</p>
<b>Bats</b>	<p>Loss of one of the ten trees with medium or low suitability for roosting bats. Some additional remedial tree works may be required to retained trees</p> <p>Retention of majority of boundary hedgerows,</p>	<p>Inappropriate lighting affecting potential roost sites, foraging and commuting routes</p> <p>Maturation of habitats, enhanced species/structural diversity, yet still fragmented by roads</p>

VER	Construction phase	Operation phase
<b>On Site</b>		
	<p>but loss of some central hedgerows and some fragmentation of retained hedgerows for road crossings</p> <p>Loss of one copse and one pond but extensive planting and creation of additional ponds</p> <p>Light pollution on retained areas during works affecting potential roost sites and foraging</p> <p>Potential for pollution to impact on the quality of foraging habitats</p> <p>Creation of new buildings will provide potential roost habitat for less sensitive species</p>	<p>Increased risk of trees needing to be felled on health and safety grounds</p> <p>Potential for pollution, especially lighting, to impact on the quality of foraging habitats</p>
<b>Breeding birds</b>	<p>Loss of some hedgerows and woodland, which provides nesting opportunities for birds. Some farmland species likely to be permanently displaced</p> <p>Increased disturbance may deter more sensitive species from site, but many likely to be habituated to some level of disturbance from adjacent residential area</p> <p>Extensive habitat creation (woodland and hedgerows)</p>	<p>Maturation of retained and created features including woodland, hedgerows, new buildings, marginal vegetation and buffer zones. Potential of inappropriate management to reduce value</p> <p>Increased human disturbance and cat predation</p>
<b>Reptiles</b>	<p>Some hedgerows and woodland will be directly lost or fragmented. Large proportion of highest quality habitat retained</p> <p>Enhancements from planting</p> <p>Risk of injury and death during site clearance works</p> <p>Disturbance from noise and vibrations during works</p>	<p>Maturation of planting and establishment of grassland margins and wetland habitats will increase area of suitable habitat</p> <p>Permanently elevated levels of disturbance including increase in domestic cats</p>

VER	Construction phase	Operation phase
<b>On Site</b>		
	Enhancements from planting and provision of suitable habitat within buffer zones	
<b>Amphibians</b>	<p>Loss of one pond (non-breeding), some hedgerows and woodland, and large areas of sub-optimal grassland habitat</p> <p>Creation of wildlife pond and enhancements to retained pond. Hedgerow and woodland planting and hibernacula creation</p> <p>Risk of injury and death during site clearance works</p> <p>Disturbance from noise and vibrations during works</p>	<p>Maturation of planting and establishment of surrounding wildlife area including tree and scrub planting, wildflower grassland and hibernacula will provide high quality habitat with good links to wider area</p> <p>Permanently elevated levels of disturbance, with risk of fish and invasive aquatic plant introductions to ponds</p> <p>Permanently elevated pollution levels, and risk of hydrological changes impacting on water levels and conditions in ponds</p> <p>Risks of road mortality and being trapped in gully pots</p>
<b>Invertebrates</b>	<p>Some hedgerows and woodland lost, but all species rich hedgerows retained</p> <p>Enhancements from planting and creation of wetland habitats</p> <p>Disturbance from noise and vibrations during works, and from pollution such as dust</p>	<p>Creation of large areas of additional habitat (hedgerows, woodland, buffers, ponds) which will increase in value as they mature.</p> <p>Permanently elevated levels of pollution (emissions) and disturbance</p>

## SIGNIFICANCE OF IMPACTS

6.2.29 Based on the impact descriptions and summary of key characteristics (Technical Appendix 7.2), and in order to inform mitigation for the proposals, the significance of the impacts on receptors is summarised in Table 6.3 below. An ecologically significant impact is defined as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.

Table 7.3. Significance of the impacts on VERs during construction and operation

<b>VER</b>	<b>Construction phase</b>	<b>Operation phase</b>
<b>On-site</b>		
<b>Grassland</b>	<p><i>Overall impact is negative, with significance at the Site level</i></p> <p>Negative (certain)</p> <p>Direct loss of majority of grassland</p>	<p><i>Impact is Negligible</i></p> <p>Not significant (probable)</p>
<b>Woodland</b>	<p><i>Overall impact is negative, with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Fragmentation of the site is likely to reduce its value to the wildlife it supports. Overall increase in woodland area but will take time to mature. Indirect impacts temporary</p>	<p><i>Impact is positive, with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Due to amount of native woodland being created</p>
<b>Hedgerows and standard trees</b>	<p><i>Overall impact is negative with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Small sections of hedgerows and low number of trees lost compared with amount retained and planted, but new planting will take time to mature</p> <p>Fragmentation of hedgerows likely to reduce their value to the wildlife they support. Overall increase in hedgerows due to planting. Indirect impacts temporary</p>	<p><i>Impact will be negative, with significance at the Site level</i></p> <p>Significant (probable)</p> <p>New planting will increase the length of hedgerows on site. Fragmentation will reduce their value to the wildlife they support</p> <p>Lighting will reduce value to nocturnal species</p>
<b>Ponds</b>	<p><i>Impact is negative, with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Significant amount of habitat creation, however this will take time to mature.</p>	<p><i>Impact is negligible</i></p> <p>Not Significant (probable)</p> <p>New surrounding habitat of higher quality will increase in value as it matures. Potential pollution and hydrological impacts could affect</p>

VER	Construction phase	Operation phase
<b>On-site</b>		
	Potential pollution and hydrological impacts could affect overall habitat quality	overall habitat quality
<b>Badger</b>	<p><i>Impact is negative at the Site level</i></p> <p>Significant (probable)</p> <p>Severing of foraging corridors and likely disturbance to foraging</p>	<p><i>Impact is negative at the Site level</i></p> <p>Significant (probable)</p> <p>Maturation of new planting and corridors. Habitat connectivity reduced by road crossings and risk of mortality</p>
<b>Bats</b>	<p><i>Overall impact is negative at the Site level</i></p> <p>Significant (probable)</p> <p>Bats have high mobility and are likely to use the site in combination with other habitats in the wider area for foraging. Loss of one potential tree roost and disturbance are likely to affect bat activity in the short-term</p>	<p><i>Impact is negative, with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Enhanced habitat and structural diversity overall and long-term retention and maturation of better value foraging areas, but new builds will not immediately provide replacement roost potential</p> <p>Severance of and lighting on hedgerows</p>
<b>Breeding birds</b>	<p><i>Impact is negative and significant at the Site level</i></p> <p>Significant (probable)</p> <p>Retention and protection of areas of suitable habitats during construction</p>	<p><i>Impact is negative and significant at the Site level</i></p> <p>Significant (probable)</p> <p>Continued disturbance may dissuade more sensitive species. More tolerant species likely to increase due to additional habitat</p>
<b>Reptiles</b>	<p><i>Overall impacts are negative with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Large areas of suitable habitat to escape to but residual risk of injury or death</p>	<p><i>A positive impact with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Retention and enhancement of grassland areas will provide additional habitat and will minimise increased levels of disturbance</p>

VER	Construction phase	Operation phase
<b>On-site</b>		
<b>Amphibians</b>	<p><i>Overall impacts are negative with significance at the Local level</i></p> <p>Significant (probable)</p> <p>Significant risk of injury or death from proposed works</p>	<p><i>A negative impact with significance at the Local level</i></p> <p>Significant (probable)</p> <p>Retention and enhancement of ponds and surrounding areas will provide additional high quality habitat with good connectivity, but increased disturbance and risks from pollution and hydrological change</p>
<b>Invertebrates</b>	<p><i>Overall impacts are negative with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Dust and disturbance during construction likely to reduce value to invertebrates temporarily. Large areas of the best quality habitat retained</p>	<p><i>A positive impact with significance at the Site level</i></p> <p>Significant (probable)</p> <p>Significant increase in habitat area and quality</p>

## Mitigation and Enhancement

6.1.1 The key objective of the mitigation measures proposed is to maintain species and habitats (VERs) in favourable conservation status. This is when the conditions of the VERs are such that they can be viably maintained in the long-term and without reductions in natural range. Mitigation measures also meet national, regional and local planning policy objectives and aim to work towards additional objectives such as those outlined within the UK and LBAPs.

6.1.2 The presence (or assumed presence) of the identified features on and adjacent to the site has been considered in the design layout, where possible, and the measures given here will further ensure that the impacts on features are negligible wherever possible, or if effects are unavoidable, recovery will follow. Wherever possible and practicable to achieve, mitigation will aim to enhance the features, thus promoting biodiversity gain.

6.1.3 The following section provides the inherent mitigation and general mitigation principles during pre-construction, construction and operational phases. Specific mitigation for habitats and species is summarised in Table 7.4 and detailed mitigation strategies are provided in Technical Appendix 7.2.

### INHERENT MITIGATION

6.1.4 The informed design layout contains key areas for ecological benefit. For locations of described features, reference should be made to the illustrative landscape masterplan (Development Strategy Key Landscape Element, Dwg 96903E, LanDesign Associates, May 2009) and Illustrative Masterplan (DWG: 2440-18B, Ashley Design Associates, December 2009)) and Figure 2, Technical Appendix 7.1. These include:

- Provision of a wildlife area in the north-western corner of the development incorporated retained and created ponds, with associated wildflower grassland, shrub and tree planting
- Planting of a tree and shrub belt to strengthen the northern boundary of the site
- Retention of all native species rich hedgerows and new hedgerow planting, with incorporation of hedgerows into 3m wide buffers
- Provision of wildlife features within the community open space and buffer along the southern boundary of the development, including tree and shrub planting and bat and bird boxes
- Sustainable drainage for the site, which will include a balancing pond, reedbed and swales, providing additional ecological benefit

6.1.5 Care has been taken to retain the most important ecological features wherever possible, and to enhance/protect them by providing buffers between the features and development and with the use of strategic planting. In total, approximately 2ha of green space will be provided within the informed masterplan (not including gardens), amounting to approximately 20% of the total site area. This area will be made up of retained semi-natural habitat, buffers and additional green spaces.

## GENERAL MITIGATION - PRE-CONSTRUCTION AND CONSTRUCTION PHASES

6.1.6 The use of sustainable drainage systems (SuDS) within the development, appropriate design of the buffers and appropriate landscape/planting scheme will minimise the risk of pollution incidences and adverse hydrological impacts to the retained habitats on site. Contractors will be required to draw up method statements to demonstrate how they will manage their activities to avoid causing water and airborne pollution incidents during the construction period. An ecologist will be consulted on the future detailed design of these measures to ensure that there are no conflicts with ecology.

6.1.7 Prior to works commencing, protective fencing will be erected around all retained ecological features on and adjacent to the site, namely the standard trees (in accordance with BS5837 (2005)), hedgerows, ponds and retained grassland to ensure minimal disturbance to habitats during works.

6.1.8 A Precautionary Method of Works (PMW) will be prepared outlining sensitive site clearance methods, including detail in respect to timing and species including amphibians, birds and reptiles (detailed below). Where practicable all vegetation removal will take place outside of the bird-breeding season (generally between March and September, inclusive), or vegetation will be checked thoroughly by an ecologist prior to removal. The removal of tree stumps and hedgerow bases will also be undertaken outside of the hibernation season for reptiles and amphibians. The sensitive timing of works, or precautions to be taken should works be unavoidable during sensitive periods, will be detailed within the PMW.

6.1.9 All habitat enhancements (planting and pond creation), where practicable, will be undertaken prior to works commencing, or in the early stages of construction works.

6.1.10 Method Statements (and licence applications where appropriate) will be prepared for all works that may affect ecologically important features, including tree removal (as appropriate), closure of Pond 2 and planting adjacent to sensitive features such as the new and retained ponds.

6.1.11 A general ecological briefing will be given to construction site workers informing them of the ecological value of habitats and species present on site, protection measures put in place, safe working methods relating to ecology, and contingency plans in case of discovery of protected species during works.

6.1.12 The PMW and species method statements will be detailed in a Construction Environmental Management Plan (CEMP; or similar) prepared prior to works commencing.

## GENERAL MITIGATION - OPERATIONAL PHASE

### Landscape and Ecology Management Plan

6.1.13 Post-construction it is the intention that the long-term management of the retained and created habitats will be undertaken in order to ensure that the habitats remain in favourable condition for wildlife. A management company is proposed to fund management and monitoring of the site for up to ten years, which will follow detailed Capital and Annual Works Plans to be drawn up following detailed landscaping plans for the site.

#### 6.1.14 Capital Works Plan:

1. A Landscape and Ecology Management Plan (L&EMP) will be compiled detailing the capital and annual works plan, monitoring and reviews of the success of management principles
2. An interpretation board will be positioned within the wildlife area to inform of the sensitive nature of the habitats, the species that use them and ways to minimise disturbance to wildlife
3. Strategic planting will take place within the wildlife area with the aim of reducing disturbance to habitats from low-key recreational activities, such as dog walking
4. Bird and bat boxes will be positioned on suitable trees within the woodland, hedgerows and community open space and log piles will be provided adjacent to the ponds to provide habitat for reptiles, amphibians and invertebrates
5. Installation of alternative bat roosting sites (purpose-designed features) within new buildings
6. Installation of protective fencing around retained habitats

#### 6.1.15 Annual Works Plan:

1. Annual monitoring of the habitats and species will be undertaken and triggers for management assessed. Triggers for management could include:
  - > 20% scrub cover within the grassland associated with the community open space or wildlife area will trigger clearance
  - > 5% loss of grassland cover will trigger re-sowing and temporary exclusion areas
  - > 30% aquatic vegetation cover in water bodies will trigger vegetation removal
2. The L&EMP will be updated as required based on annual monitoring and reviews

#### General Management Principles

##### 6.1.16 General management principles will include the following:

6.1.17 A minimal intervention and organic approach will be used. Weed killer and other chemicals will be used as little as possible on site. Spot removal of weeds will be carried out by hand where removal is necessary. If herbicides need to be used within the site, for example around the base of planted trees and shrubs, then these will be restricted to types approved by Natural England and the Environment Agency as suitable for use near watercourses. Guidelines for the use of herbicides on weeds in or near to watercourses (PB2289) will be followed.

6.1.18 Hygiene works will be avoided, for example, fungal fruiting bodies should not be removed nor trees felled because they have bracket fungi on them unless classified as dangerous by an arboriculturalist. Where possible, trees will be allowed to age naturally and dying trees will be allowed to decay in-situ. Where a tree poses a health and safety hazard, advice will be sought from an arboriculturalist. General tree works will conform to BS3998 (1989). Every effort will be made to avoid altering important ecological features associated with the mature trees. Where tree works are unavoidable, a bat and nesting bird survey and assessment will be undertaken and appropriate mitigation and licences sought if present.

6.1.19 Where possible, planting within the buffer zones, will use native species and those of known wildlife value.

6.1.20 Litter will be removed from the site as part of on-going general management.

6.1.21 Monitoring will be used to determine whether or not objectives for the site and component features (for example amphibians, bats, badger and reptiles) have been met using focused and efficient data collection.

6.1.22 The L&EMP will be reviewed and revised annually following annual monitoring of habitat conditions and species populations. An annual monitoring report will recommend any necessary changes to the L&EMP and identify management requirements for the following year.

**Table 7.4: Summary of the specific mitigation for VERs during construction and operation**

VER	Construction phase	Operation phase
<b>On-site</b>		
<b>Grassland</b>	<ul style="list-style-type: none"> <li>• CEMP</li> <li>• SuDS features to maintain water quality and hydrology</li> <li>• Protection of areas of retained grassland</li> <li>• Creation of grassland and wildflower habitats</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional management of retained and created habitat with the aim of benefiting structural and species diversity (L&amp;EMP)</li> <li>• Sensitive management and maturation of habitats</li> </ul>
<b>Woodland</b>	<ul style="list-style-type: none"> <li>• CEMP and toolbox talk</li> <li>• Protection fencing around all retained habitats</li> <li>• Habitat creation equal to area lost, but all native planting</li> </ul>	<ul style="list-style-type: none"> <li>• Appropriate management (L&amp;EMP)</li> <li>• Use of interpretation board and planting</li> <li>• Assessment of trees by arboriculturalist and ecologist and minimalist approach to management</li> <li>• Method statements for tree works</li> </ul>
<b>Hedgerows and standard trees</b>	<ul style="list-style-type: none"> <li>• Retention, protection and enhancement of hedgerows of most ecological interest</li> <li>• Protection fencing in appropriate areas close to construction</li> <li>• Incorporation of buffer along hedgerows of width 3m</li> <li>• Habitat creation</li> <li>• Sensitive timing and phasing of works in accordance with CEMP and toolbox talk</li> </ul>	<ul style="list-style-type: none"> <li>• Sensitive management of hedgerow habitat (L&amp;EMP) with the aim of benefiting structural and species diversity and meeting LBAP targets</li> <li>• Sensitive lighting</li> <li>• Assessment of trees by arboriculturalist and ecologist and minimalist approach to management</li> <li>• Method statements for tree works</li> </ul>

	<ul style="list-style-type: none"> <li>• Sensitive lighting</li> <li>• Sensitive timing of removal of hedgerows trees (bats, birds, reptiles and amphibians)</li> </ul>	
<b>Ponds</b>	<ul style="list-style-type: none"> <li>• CEMP and toolbox talk</li> <li>• SuDS</li> <li>• Protection fencing in appropriate areas close to construction</li> <li>• Enhancements to ponds and planting within surrounding area</li> <li>• Creation of one pond and a network of wetland features, including swales, ditch features and reedbed</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term, sensitive management of ponds and surrounding terrestrial habitat (L&amp;EMP)</li> <li>• Information boards and strategic planting to manage access</li> <li>• SuDS features and wildflower planting to maintain hydrology and water quality</li> <li>• Sensitive lighting</li> </ul>
<b>Badger</b>	<ul style="list-style-type: none"> <li>• Retention of areas of suitable habitat and habitat creation/enhancement</li> <li>• CEMP and toolbox talk</li> <li>• Sensitive lighting</li> <li>• Trenches that are left open have a means of escape</li> </ul>	<ul style="list-style-type: none"> <li>• Provision of tree and scrub planting comprising beneficial species</li> <li>• Sensitive lighting</li> <li>• Information boards with respect to disturbance from dogs</li> <li>• L&amp;EMP - Appropriate management of retained and new features</li> <li>• Use of speed restrictions and underpasses where appropriate</li> </ul>
<b>Bats</b>	<ul style="list-style-type: none"> <li>• Majority of best quality foraging habitats retained within development</li> <li>• One tree with bat potential will be felled or pruned in accordance with a PMW and</li> </ul>	<ul style="list-style-type: none"> <li>• Habitat creation/enhancement works including replacement habitat in the form of roosting opportunities</li> <li>• Enhance foraging by sensitive management</li> </ul>

	<p>additional trees planted to compensate for loss</p> <ul style="list-style-type: none"> <li>• Planting, pond creation and grassland management (L&amp;EMP) will maintain and enhance connectivity across site and foraging opportunities</li> <li>• Provision of roosting features within new builds and retained trees</li> <li>• Sensitive lighting</li> <li>• SuDS to protect value of foraging habitat</li> <li>• Incorporation of buffer around retained boundary hedgerows of at least 3m</li> </ul>	<p>of woodland edges, scrub, aquatic features and species rich grassland (L&amp;EMP)</p> <ul style="list-style-type: none"> <li>• Sensitive lighting alongside habitats where possible</li> <li>• Retain and promote deadwood habitat</li> <li>• Maintain mixed age class of trees to ensure future potential roost sites</li> <li>• Information board and leaflets to residents</li> </ul>
<b>Breeding birds</b>	<ul style="list-style-type: none"> <li>• Planting of wildlife area and community open space with grassland, scrub, trees and wildflower grasslands</li> <li>• Creation of new hedgerows</li> <li>• Protection of retained features</li> <li>• Provision of bird boxes on retained trees</li> <li>• CEMP and toolbox talk</li> <li>• Sensitive timing of works</li> <li>• L&amp;EMP - Appropriate low intensity management and monitoring of habitat quality</li> </ul>	<ul style="list-style-type: none"> <li>• L&amp;EMP - Sensitive management of retained and created habitats</li> <li>• Information board and leaflets to residents</li> </ul>
<b>Reptiles</b>	<ul style="list-style-type: none"> <li>• Retention of best quality habitat</li> <li>• Relocation of reptiles to suitable receptor habitat on site under a PMW</li> </ul>	<ul style="list-style-type: none"> <li>• L&amp;EMP - Appropriate low intensity management and monitoring of habitat quality</li> <li>• Information board and leaflets for residents</li> </ul>

	<ul style="list-style-type: none"> <li>• Habitat creation through hedgerows, woodland, buffer and wildflower grassland planting, hibernacula creation</li> <li>• CEMP and toolbox talk</li> <li>• Sensitive timing of works</li> </ul>	<ul style="list-style-type: none"> <li>• Establishment of new habitats</li> </ul>
<b>Amphibians</b>	<ul style="list-style-type: none"> <li>• Works under licence from Natural England (where great crested newt presence confirmed)</li> <li>• Exclusion fencing and pit-trapping exercise (where great crested newt presence confirmed)</li> <li>• Protection and enhancements of retained habitats</li> <li>• Habitat creation through hedgerows, woodland, buffer and wildflower meadow planting, hibernacula creation and pond creation</li> <li>• CEMP</li> <li>• Sensitive timing of works</li> </ul>	<ul style="list-style-type: none"> <li>• L&amp;EMP - Appropriate low intensity management and monitoring of habitat quality</li> <li>• Monitoring of populations and reactive management as necessary</li> <li>• SuDS</li> <li>• Information board and leaflets for residents</li> <li>• Establishment of new habitats</li> </ul>
<b>Invertebrates</b>	<ul style="list-style-type: none"> <li>• Retention and protection of better quality habitats</li> <li>• Habitat creation through hedgerows, woodland, buffer, wildflower meadow planting and hibernacula creation</li> <li>• CEMP and toolbox talk</li> </ul>	<ul style="list-style-type: none"> <li>• L&amp;EMP - Appropriate low intensity management and monitoring of habitat quality</li> <li>• Establishment of new habitats</li> </ul>



## RESIDUAL EFFECTS

11.7.1 A summary of the residual impacts (mitigated) on the VERs is provided below in Table 7.5 below. The confidence in predictions is detailed within Technical Appendix 7.2

**Table 6.6 Summary of Residual Impacts**

VER	Residual Impacts	
	<u>Post-Development Medium-Term</u>	<u>Post-Development Long-Term</u>
Grassland	Significant Positive (Minor)	Significant Positive (Minor)
Woodland	Not Significant (Negligible)	Significant Positive (Minor)
Hedgerows and standard trees	Not Significant (Negligible)	Significant Positive (Moderate)
Ponds	Not Significant (Negligible)	Significant Positive (Minor)
Badgers	Not Significant (Negligible)	Not Significant (Negligible)
Bats	Not Significant (Negligible)	Significant Positive (Minor)
Breeding birds	Significant Negative (Minor)	Significant Positive (Minor)
Reptiles	Significant Negative (Minor)	Not significant (Negligible)
Amphibians	Significant Positive (Minor)	Significant Positive (Minor)
Invertebrates	Not Significant (Negligible)	Significant Positive (Minor)

### Summary

6.2.1 The majority of the area proposed for development within the Application Site constitutes well managed pasture (poor semi-improved grassland), with a small proportion of other habitats including mixed plantation woodland, hedgerows, trees and ponds. These habitats have suitability to support notable and protected species, including badger, common species of bat, breeding birds, amphibians, reptiles and invertebrates.

6.2.2 In general, construction impacts include the direct loss of a large proportion of poor semi-improved grassland, a small copse and a small proportion of trees, species poor hedgerows and a pond. All species rich hedgerows will be retained and protected, although one will be severed for a road access. The pond of highest value to wildlife will be retained, as will a large area of poor semi-improved grassland and a small copse and the majority of standard trees with suitability to support roosting bats. Habitat creation includes replacement and additional hedgerow and tree planting, replacement pond creation, habitat enhancement planting of the retained grassland to improve species diversity and the creation of wetland features (balancing pond, reedbed and swales). Indirect impacts to retained habitats include potential pollution from dust, noise, lighting, run-off and hydrological change. Indirect impacts to species include disturbance to badger, common species of bat, reptiles, amphibians and invertebrates breeding, from visual, noise and lighting from construction activities. Further indirect impacts to species are from habitat

loss. Direct impacts to species include risk of injury or death to reptiles and amphibians. In general, operational impacts include the establishment and maturation of retained and created habitats, which will improve their inherent ecological value and increase the resources available to local wildlife. Lighting, noise and recreational disturbance have potential to negatively impact on local wildlife.

6.2.3 Key mitigation inherent in the design includes: The provision of a wildlife area in the north-western corner of the development incorporated retained and created ponds, with associated wildflower grassland, shrub and tree planting; the planting of a tree and shrub belt to strengthen the northern boundary of the site; the retention of all native species rich hedgerows and new hedgerow planting, with incorporation of hedgerows into 3m wide buffers; the provision of wildlife features within the community open space and buffer along the southern boundary of the development, including tree and shrub planting and bat and bird boxes; and, sustainable drainage for the site, which will include a balancing pond, reedbed and swales, providing additional ecological benefit.

6.2.4 All of these features provide opportunities for increasing biodiversity on the Application Site. Additional mitigation proposals further enhances these inherent design features for wildlife with the aim of minimising the identified impacts on key habitats/species.

#### HABITATS

6.2.5 The informed illustrative masterplan has been designed to provide a number of opportunities for building-in positive biodiversity features whilst retaining key existing features. Key on site mitigation includes the retention of the majority of the VER's within the redevelopment site, including a third of the woodland, all species rich hedgerows, one pond and 2ha of the poor semi-improved grassland.

6.2.6 The development layout has been designed to minimise fragmenting and isolating VER's by retaining the majority of the existing network of natural habitats around the Application Site boundaries (species rich hedgerows) and incorporating green corridors (buffers and public open spaces) into the design to link new and existing stepping stone features (hedgerows, new and existing aquatic features, large specimen trees to bridge hedgerow gaps, for example) with larger habitat patches off site. This will help to promote the migration, dispersal and genetic exchange of species in the wider environment. Where severance has been unavoidable, provisions have been made to mitigate loss of habitat connectivity, such as provision of underpasses, alternative corridors and strategic planting.

#### SPECIES

6.2.7 In terms of the criteria used in this assessment, measures have been proposed to protect from the negative effects of development, the species present that receive statutory protection and other species identified as requiring conservation action. The long-term residual impacts anticipated for the majority of species are positive, including badger, bats, breeding birds, amphibians and invertebrates, with negligible impacts predicted to reptiles. No negative long-term impacts are predicted. Further surveys would be required to determine the need for Natural England great crested newt and bat mitigation licences.

6.2.8 The development provides the opportunity to contribute to national, regional and local biodiversity targets by enhancing and creating habitat that is valuable to European protected species, including bats and great crested newt, and to nationally protected species including badger and breeding birds.

#### ASSESSMENT OF THE DEVELOPMENT AGAINST LOCAL PLANNING POLICIES AND LBAP OBJECTIVES

6.2.9 The opportunities provided by the development proposals would comply with national, regional policies and work towards a range of objectives set out within local planning policies (Cotswold District Local Plan 2001 - 2011) and Gloucestershire BAP (currently being

updated) and the Gloucestershire Biodiversity Action Plan (BAP) objectives. (Further details are provided in Technical Appendix 7.2):

#### Cotswold District Local Plan (2001 – 2011)

- Policy 1 – Natural Resources

The development includes an informed layout proposed to retain many of the ecologically valuable features on site and includes for a wide range of enhancements and habitat creation to ensure that the biodiversity value of the site is retained in the long term. SuDS will also be incorporated into the development.

- Policy 4 – Environmental Impact

The overall residual impacts of the development on habitats and species are positive or not significant, and therefore the development is not considered to significantly harm the biodiversity of the site

- Policy 10 - Trees, woodlands and hedgerows

Although the development will require the loss of a number of TPO trees, overall the area of native woodland, and the number of standard trees will increase within the development. All native species rich hedgerows on site will be retained and protected, and significant hedgerow planting will occur to increase this resource across the development site.

#### Gloucestershire BAP (2008):

- Neutral Grassland HAP

The development will aim to reseed existing areas of species poor grassland on site to be managed as wildflower grassland

- Woodland HAP

Although a small patch of woodland will be lost on site compensatory planting aims to increase the woodland cover on site overall, to include a variety of native species, which will be sensitively managed in the long-term

- Ancient or Species-rich Hedgerows HAP

The two species rich native hedgerows on site will be retained and protected with grassland buffers, and additional species rich native hedgerows will be created with new planting across the site

- Standing Open Water HAP

On small ephemeral pond will be lost, but two additional ponds will be created on site, and these will be enhanced with marginal native planting and long-term suitable management