

# CHAPTER 12: ECOLOGY

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## Chapter Alterations

A12.1 This chapter of the ES Addendum updates the ES with respect to the following:

1. Updated references to National Planning Policy Framework (NPPF)
2. Updated status of the West of England Joint Spatial Plan
3. Incorporation of the results of additional baseline surveys in relation to great crested newts, bat roosts and badgers.
4. Revision of habitat loss and gain calculations (Table 12.7) and associated references to habitat areas throughout text in response to layout changes.
5. Revision of impact assessment in relation to great crested newt in response to update survey results.
6. Further detail of great crested newt mitigation proposals.
7. Further detail of reptile mitigation proposals.
8. Further detail of badger mitigation proposals.
9. A revised Amphibian Survey Figure (Figure 12.3).
10. Amendments of Appendices 12.1, 12.5, 12.8 and 12.11 to incorporate Points 1, 2, 3, and 7.

A12.2 All amendments are highlighted in bold and underlined.

## **12.1 INTRODUCTION**

12.1.1 This chapter of the ES has been produced by EAD Ecology and sets out the assessment of effects of the Proposed Development in respect of biodiversity. Avoidance, mitigation, compensation and enhancement measures have been proposed for adverse effects, where appropriate. The assessment is in accordance with guidance provided by the Chartered Institute of Ecology and Environmental Management (CIEEM 2018) and BS42020: Biodiversity: Code of Practice for Planning and Development.

12.1.2 Detailed baseline information for the assessment and other supporting information is provided in Technical Appendices 12.1 to 12.13.

## **12.2 ASSESSMENT CRITERIA & METHODOLOGY**

### **Previous Assessment**

12.2.1 There are no previous assessments for the majority of the Project Site. Ecological assessments produced in support of planning applications for land directly east at Park Farm (PT11/1442/O and PT15/5528/RM) overlap with the eastern boundary of the Project Site. These reports have been reviewed for pertinent information and context; refer to Paragraph 12.2.11.

### **Scoping Opinion**

12.2.2 The Environmental Scoping Request and the South Gloucestershire Council (SGC) Scoping Opinion (PT18/012/SCO) dated 30<sup>th</sup> May 2018 (refer to Appendix 5.1) confirm the approach and scope of this chapter. Specific comments relating to ecology within the SGC Scoping Opinion, together with a response from EAD Ecology, are set out in Technical Appendix 12.12.

### **Legislative Context**

12.2.3 The following wildlife legislation is relevant to the Proposed Development:

- Conservation of Habitats and Species Regulations 2017 (as amended).
- Wildlife and Countryside Act 1981 (as amended).
- Countryside and Rights of Way Act 2000.
- Natural Environment and Rural Communities Act 2006.
- Protection of Badgers Act 1992.
- Hedgerow Regulations 1997 (as amended).

12.2.4 A summary of wildlife legislation with respect to species and habitats recorded in or adjacent to the Project Site is provided in Technical Appendix 12.1.

### **Planning Policy and Guidance**

#### National Planning Policy

12.2.1 The National Planning Policy Framework (NPPF; **2019**) includes the Government's policy on the protection of biodiversity through the planning system. A summary of the relevant paragraphs of the NPPF is provided in Technical Appendix 12.1.

## Local Planning Policy

### *Current Planning Policy*

12.2.2 The following strategic policies of the South Gloucestershire Core Strategy (SCS; 2006-2027) are relevant to the ecological assessment of the Proposed Development:

- POLICY CS1: High Quality Design.
- POLICY CS2: Green Infrastructure.
- POLICY CS9: Managing the Environment and Heritage.

12.2.3 The following policies from the South Gloucestershire Local Plan: Policies, Sites and Places Plan are relevant to the ecological assessment of the Proposed Development:

- POLICY PSP3: Trees and Woodland.
- POLICY PSP18: Statutory Wildlife Sites: European Sites and Sites of Special Scientific Interest (SSSIs).
- POLICY PSP19: Wider Biodiversity.

12.2.4 Details of these policies are provided in Technical Appendix 12.1.

### *Emerging Planning Policy*

12.2.5 **At the time the Outline Planning Application was submitted (December 2018), the four authorities of the West of England were at the Examination Stage of the Joint Spatial Plan (JSP). It is understood that following the examination hearing sessions in Summer 2019, it is likely that the JSP will be withdrawn from the examination process and attention instead focused on the preparation of individual Local Plans. Nevertheless, as this decision has not yet been made the following policy of the JSP has been considered as part of** the ecological assessment of the Proposed Development:

- Policy 6: Strategic Infrastructure Requirements.

12.2.6 The emerging South Gloucestershire Local Plan 2018-2036 is at an early stage with no specific policies prepared.

## Guidance/ Best Practice

12.2.7 The ecological assessment has been prepared in accordance with the Guidelines for Ecological Impact Assessment produced by the Chartered Institute of Ecology and Environmental Management (CIEEM 2018). It also accords with all relevant legislation, best practice (e.g. BS42020:2013) and planning policy requirements. The ecological assessment provides appropriate information that SGC may reasonably require to determine Likely Significant Effects

of the Project on European-designated sites, in accordance with its duties under the Conservation of Habitats and Species Regulations 2017 (as amended).

12.2.8 Local guidance documents, including South Gloucestershire's Biodiversity Planning Guidance (2005), Trees on Development Sites (2005), South Gloucestershire Biodiversity Action Plan (SGBAP) and the West of England Strategic Green Infrastructure Framework (2011) have been considered where relevant.

## **Baseline Data Collection**

### Data Searches

12.2.9 Biodiversity information was requested for a study area of 2km radius around the Project Site boundary (extended to 4km for previous records of bats) from Bristol Regional Environmental Records Centre (BRERC) in April 2016. Information requested included the location and details of the following:

- Designated sites of nature conservation value (statutory and non-statutory; extended to 10km for sites with international designations and 5km for sites with national designations using [www.magic.gov.uk](http://www.magic.gov.uk)).
- Previous records of protected and/or notable species, including Species of Principal Importance for the Conservation of Biodiversity in England ('Priority Species').

12.2.10 Information was also obtained from the following websites:

- [www.magic.gov.uk](http://www.magic.gov.uk) - Information on protected sites (accessed 15 May 2018).
- [www.jncc.defra.gov.uk](http://www.jncc.defra.gov.uk) – information on protected sites, Priority Habitats and Priority Species.
- [www.gov.uk/government/organisations/natural-england](http://www.gov.uk/government/organisations/natural-england) - information on protected sites and standing advice.

12.2.11 A review of ecological information associated with other proposed/approved development of land in proximity to the Project Site was undertaken as part of baseline data collection. This included ecological assessments for the committed development to the immediate east of the Project Site (see 12.2.1 above) for which the survey boundary overlapped with the Project Site. Documents reviewed comprised:

- Park Farm, Thornbury. Ecological Impact Assessment. MD Ecology of behalf of Barratt Developments (April 2011).
- Park Farm, Thornbury. Phases 2, 3 and 4 Updated Ecology Survey and Mitigation Strategy. MD Ecology of behalf of David Wilson Homes (November 2015).

- Park Farm, Thornbury. Updated Badger Mitigation Strategy. MD Ecology of behalf of David Wilson Homes (November 2015b).
- Land Adjoining Post Farm, Thornbury. Ecological Assessment. Tyler Grange (June 2015).

### Project Site Survey

12.2.12 Baseline ecological surveys were undertaken of a wider survey area than the Project Site boundary (refer to Figure 1.1). Where necessary for descriptions of survey results within this Chapter (including great crested newt and bat activity surveys), a distinction has been made between the ‘Survey Area’ (defined as all land within the Project Site boundary plus land to the immediate south and west; refer to Figure 12.1) and ‘Project Site’. Survey plans indicate both Project Site and Survey Area boundaries where appropriate.

12.2.13 An Extended Phase 1 Habitat Survey of the Survey Area was undertaken on 12 April 2016 and updated on 06 March 2018. The Phase 1 Habitat Survey followed Institute of Environmental Assessment (IEA) guidelines (1995) and JNCC methodology (2010) to identify the main habitat types within the Project Site along with the presence/potential presence of protected and notable species. The results of the survey were detailed on a Phase 1 Habitat Plan (refer to Figure 12.1) and Target Notes were used to identify specific features of ecological interest (refer to Technical Appendix 12.2).

12.2.14 The Data searches and Extended Phase 1 Surveys identified the potential for protected and notable species within the survey area. Further (Phase 2) surveys were therefore undertaken to determine if such species were present. A summary of these surveys is provided in Table 12.1 below; full details of survey methodologies, timings and results are contained in Technical Appendices 12.3 to 12.11.

**Table 12.1: Summary of Baseline Ecological Surveys**

<b>Survey</b>	<b>Dates</b>	<b>Details</b>
Hedgerow Regulations (1997) surveys. (Refer to Appendix 12.3).	July 2016	Survey of hedgerows to determine potential status as ‘important’ under ecological criteria of the Hedgerows Regulations 1997.
White clayed crayfish survey (Refer to Appendix 12.4).	September 2016	Presence/absence surveys of suitable watercourses within the Project Site.
Amphibians (Refer to Appendix 12.5).	May – June 2016; April -June 2018 <b><u>April – June 2019</u></b>	Habitat Suitability Index (HSI) and ‘Presence/Absence’ surveys for great crested newt of all suitable waterbodies within likely dispersal range for the species.
Reptiles (Refer to Appendix 12.6).	August – October 2016	Presence/absence survey for native reptiles in all areas of suitable reptile habitat.

Breeding birds (Refer to Appendix 12.7).	May – June 2016	Breeding bird survey to record all breeding birds and establish location of notable species.
Bats (Refer to Appendix 12.8).	May – June 2018  <u>June – August 2019</u>  May – October 2016	Preliminary roost assessment of all trees and buildings within the Project Site. Dusk/dawn survey of trees with bat roost potential which could be affected by the Proposed Development.  Transect and static detector surveys to record bat activity within the Project Site and identify important movement/foraging corridors.
Dormouse (Refer to Appendix 12.9).	June – October 2016	Presence/absence survey using nest tubes in all areas of suitable habitat within the Project Site.
Otter and water vole (Refer to Appendix 12.10).	July 2016; April 2018	Survey for field signs of both species along watercourses within the Project Site
Badger (Refer to Appendix 12.11).	June 2016; April 2018 <u>April - June 2019</u>	Search for badger setts within the Project Site. and any other signs of activity such as feeding signs, latrines, prints and tracks

## Assessment Methodology

12.2.15 The importance of the ecological features and an assessment of the ecological impacts of the Proposed Development during and after construction follows CIEEM guidelines (CIEEM 2018). Therefore, this ES Chapter's assessment differs slightly from the Generic Assessment Framework set out in Chapter 5 and used elsewhere in the ES as detailed below.

12.2.16 In accordance with CIEEM guidelines, the ecological importance of designated sites, habitats and species has been classified by the professional judgement of an experienced ecologist based on the results of the baseline data collection using an eight-level geographic scale from 'Sub-Parish' (very low) to 'International' (very high):

- International value (Very High);
- National value (High);
- Regional value (High to Medium);
- County Value (Medium);
- District Value (Medium to Low);
- Parish Value (Low); and
- Sub-Parish Value (Very Low).

## Assessment of Effects

12.2.17 An assessment of the ecological effects of the Proposed Development has been undertaken following CIEEM (2018). The ES chapter assesses the potential ecological effects of the proposals during construction and occupation, and takes into account both on-site impacts and

those that may occur to adjacent and more distant ecological features. Impacts can be positive or negative. Negative impacts can include:

- Direct loss of wildlife habitats;
- Fragmentation and isolation of habitats;
- Disturbance to species from noise, light or other visual stimuli;
- Changes to key habitat features; and/or
- Changes to the local hydrology, water quality and/ or air quality.

12.2.18 Direct, indirect, secondary and cumulative negative and positive impacts on nature conservation features have been characterised based on predicted changes as a result of the Proposed Development. In order to characterise the impacts on each feature, the following parameters are taken account of:

- The magnitude of the impact;
- The spatial extent over which the impact would occur;
- The temporal duration of the impact;
- Whether the impact is reversible and over what timeframe; and
- The timing and frequency of the impact.

12.2.19 The effect timescale is given as:

- Acute, immediate and discrete;
- short term: 0-3 years;
- medium term: 3-10 years; and
- long term: 10+ years.

#### Determination of Significance

12.2.20 The value of the resource and the magnitude of the impact are combined to provide an overall evaluation of whether the resulting effect is significant. The significance of effects is considered within a geographical frame of reference, i.e. from International to Sub Parish level (refer to Paragraphs 12.2.16), as per CIEEM (2018):

*' a significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation*

objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local’.

‘For designated sites, the following needs to be determined:

- *Is the project and associated activities likely to undermine the conservation objectives of the site, or positively or negatively affect the conservation status of species or habitats for which the site is designated, or may it have positive or negative effects on the condition of the site or its interest/qualifying features?’*

‘Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

- *habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area.*
- *species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.’*

12.2.21 In order to maintain consistency with other chapters within the ES, the significance of the effect on the ecological receptor has been summarised through a qualified description; refer to Table 12.2:

**Table 12.2: Definition of Significance**

<b>Significance</b>	<b>Definition</b>
Neutral / Negligible	Neutral - The effect is certain not to have any adverse effect on a species, designated site or habitat. Negligible – The effects would occur at less than Parish value (i.e. at ‘Sub-Parish’ level).
Minor	The effect is on an ecological receptor of low (Parish) value or is considered unlikely to significantly affect the conservation status or integrity of an ecological receptor of higher value.
Moderate	The effect is on an ecological receptor of medium (District, County or Regional) value or the effect is considered unlikely to have a permanent effect on the overall conservation status or integrity of a receptor of higher ecological value.
Major	Any significant effect on an ecological receptor of high value (National or International) value.

Avoidance, Mitigation, Compensation and Enhancement Measures

12.2.22 The parameters for the layout and design of the Project have been informed by the ecological baseline. Therefore, the impact assessment is of a partially-mitigated scheme. Additional avoidance, mitigation, compensation and enhancement measures for the construction and post-construction phases of the Project have been identified, where appropriate, in accordance with CIEEM Guidelines (2018).



### Residual Effects

12.2.23 Effects that were predicted to occur after mitigation were also assessed using the above method. Nearby developments (refer to Chapter 5) have also been reviewed to assess potential cumulative effects to which the Project contributes.

### Geographical Scope

12.2.24 The ecological impact assessment considers all designated sites, habitats, protected species and notable species which could be directly or indirectly affected by the Proposed Development.

12.2.25 The study areas considered are as follows:

- 10 km Study Area: European-designated sites.
- 5km Study Area: Nationally-designated sites.
- 4km Study Area: Bats.
- 2km Study Area: Local statutory designated sites; non-statutory designated sites; protected/notable species (other than bats).

### Temporal Scope

12.2.26 The temporal scope of the assessment includes the pre-construction situation (the baseline), the construction phase and the occupation phase of the Proposed Development.

### Assumptions & Limitations

12.2.27 There were no significant limitations to assessment. Baseline surveys were undertaken of a larger survey area than the Project Site (hereafter referred to as 'the Survey Area' and shown as a blue line on plans). Other minor limitations to surveys are detailed in the relevant Technical Appendices (12.2-12.11). These include restricted access to ponds for amphibian survey and static bat detector equipment malfunction. None of these limitations represent an overriding constraint to the understanding of the ecological baseline of the Project Site or subsequent assessment of the Proposed Development.

## **12.3 CONSULTATION**

12.3.1 In addition to the EIA Scoping, discussed above, a telephone conversation was held between David Scholefield of EAD Ecology and SGC's Ecologist (Dave Willis) on 17 May 2018, which concluded that the scope of assessment as set out in EIA Scoping Report (Savills, April 2018) was appropriate to prepare the ecology chapter of the Environmental Statement.

## 12.4 BASELINE ENVIRONMENT

### Designated Sites of Conservation Value

#### European Designated Sites

12.4.1 There are no European-designated sites within or immediately adjacent to the Project Site. Six European designated sites occur within 10km of the Project Site. The closest of these are the overlapping Severn Estuary European sites which comprise the Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site (hereafter referred to as 'the Severn Estuary Site Complex'), which lies 2.8km to the west. The complex is designated for its estuarine habitats, wintering bird assemblage and migratory-fish populations. Other European-designated sites within 10km include Wye Valley and Forest of Dean Bat Sites SAC (approximately 10.0km to the north west), Wye Valley Woodlands SAC (approximately 9.5km west) and River Wye SAC (approximately 9.5km west), refer to the Designated Sites Plan in Technical Appendix 12.12 and Table 12.3 below.

#### Nationally-Designated Sites

12.4.2 Four statutory sites of nature conservation value lie within 5km of the Project Site. This includes the Severn Estuary Site of Special Scientific Interest (SSSI), designated for estuarine habitats, important populations of waterfowl; invertebrate populations and populations of migratory fish; refer to Designated Sites Plan in Technical Appendix 12.12 and Table 12.3. The remaining three SSSIs are geological SSSIs (Brinkmarsh Quarry; Buckover Road Cutting and Tytherington Quarry) and not considered further in this Ecology Chapter.

**Table 12.3: Designated Sites within Study Areas**

Site name	Nature conservation designation	Reason for designation	Approximate distance and direction from Project Site
<b>European Designated Sites within 10km</b>			
Severn Estuary	SAC	Annex I habitats that are a primary reason for designation: <ul style="list-style-type: none"> <li>• Estuaries;</li> <li>• Mudflats and sandflats not covered by seawater at low tide;</li> <li>• Atlantic salt meadows.</li> </ul> Annex II Species that are a primary reason for designation: <ul style="list-style-type: none"> <li>• Sea lamprey;</li> <li>• River lamprey;</li> <li>• Twaite shad.</li> </ul>	2.8km west
	SPA	Qualifies by regularly supporting at least 20,000 waterfowl, and by supporting populations of	

Site name	Nature conservation designation	Reason for designation	Approximate distance and direction from Project Site
		European importance of over-wintering Bewick's swan, curlew, dunlin, pintail, redshank and shelduck, and on-passage ringed plover.	
	Ramsar	Designated for its estuarine habitats, wintering birds and migratory fish populations.	
River Wye	SAC	Annex I habitats that are a primary reason for designation: <ul style="list-style-type: none"> <li>Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation;</li> </ul> Annex II Species that are a primary reason for designation: <ul style="list-style-type: none"> <li>White-clawed crayfish;</li> <li>Sea lamprey;</li> <li>Brook lamprey;</li> <li>River lamprey;</li> <li>Twaite shad;</li> <li>Atlantic salmon;</li> <li>Bullhead;</li> <li>Otter.</li> </ul>	8.2km west
Wye Valley and Forest of Dean Bat Sites	SAC	Annex II Species that are a primary reason for designation: <ul style="list-style-type: none"> <li><i>Lesser horseshoe bat</i>.</li> <li><i>Greater horseshoe bat</i></li> </ul>	9.5km northwest
Wye Valley Woodlands	SAC	Annex I habitats that are a primary reason for designation: <ul style="list-style-type: none"> <li><i>Asperulo-Fagetum</i> beech forests;</li> <li><i>Tilio-Acerion</i> forests of slopes, screes and ravines;</li> <li><i>Taxus baccata</i> woods of the British Isles.</li> </ul>	9.8km northwest
<b>Statutory Designated Sites within 5km</b>			
Severn Estuary	SSSI	The intertidal zone of mudflats, sand banks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuarine fauna includes: internationally important populations of waterfowl; invertebrate populations of considerable interest; and large populations of migratory fish.	2.8km west

#### Non-Statutory Designated Sites

12.4.3 Eleven non-statutory sites of nature conservation value, designated for a range of habitats including woodland, unimproved grassland, estuarine mudflats and standing water, lie within 2km of the Project Site. Park Mill Covert Site of Nature Conservation Interest (SNCI), which is designated as 'Ancient and Semi-Natural Woodland' on the Ancient Woodland Inventory, lies adjacent to the western boundary of the Project Site; refer to the Designated Sites Plan in Technical Appendix 12.12.

## Habitats within the Project Site Boundary

12.4.4 The majority of the Project Site comprised improved grassland fields bordered by a network of hedgerows and ditches. A narrow belt of semi-natural broadleaved woodland occurred in the southern half of the Project Site, and scrub and mature trees were scattered throughout. A fast-flowing stream (the Pickedmoor Brook) occurred through the southern half of the Project Site on an east-west alignment, and two ponds were also present. Habitat descriptions below should be read with reference to the Figure 12.1 and accompanying target notes; refer to Technical Appendix 12.2.

### Broadleaved Woodland (semi-natural)

12.4.5 This habitat occurred as several copses in the south and west of the Survey Area. The canopy included mature oak trees with willow species dominating wetter areas. The understorey comprised hazel, hawthorn and blackthorn; the ground flora was dominated by ivy and dog's-mercury, with lesser celandine, harts-tongue fern, English bluebell and lords-and-ladies also present. Lowland mixed deciduous woodland is a Priority Habitat; broadleaved woodland is also a South Gloucestershire BAP Habitat.

### Ditches

12.4.6 This habitat occurred in association with a number of the field boundaries within the Project Site. The majority were dry at the time of survey in March 2018, with only a few containing shallow water. Associated plant species included reed canary-grass, hemlock water-dropwort, brooklime, pond sedge and willowherb species.

### Hedgerows

12.4.7 Species-rich and species-poor hedgerows formed field boundaries within the Project Site. The hedgerows were dominated by hawthorn and blackthorn, with elder, elm, hazel, ash, pedunculate oak, holly, dogwood, bramble and rose species also recorded. The majority of the hedgerows were 1-2m high and 1-3m wide; some were associated with hedge banks and dry ditches. Mature trees were present in several of the hedgerows; these were mostly pedunculate oak, sycamore and ash trees. Some sections of hedgerow were defunct. The majority of the hedgerows were heavily managed and had been subject to recent flailing immediately prior to March 2018.

12.4.8 Of the hedgerows identified within the Project Site, six were determined to be 'Important' under the ecological criteria of the Hedgerow Regulations 1997 (as amended). These hedgerows qualified on the basis of species richness and associated features including ditches and standard trees. The locations of 'Important' and 'Other' hedgerows are shown on Figure 12.2

and detailed in Technical Appendix 12.3. Hedgerow is a Priority Habitat and South Gloucestershire BAP Habitat.

#### Improved Grassland

12.4.9 This was the dominant habitat throughout the Project Site. Species present included perennial rye-grass, broadleaved dock, greater plantain, white clover, dandelion and creeping buttercup. Fields were managed for silage and grazed with cattle. An evaluation of this habitat was undertaken against Priority Habitat 'Lowland meadow' classification criteria; the grassland did not meet these criteria for classification as Priority Habitat.

#### Running Water

12.4.10 One watercourse, Pickedmoor Brook, occurred in the south of the Project Site with east-west alignment. The watercourse was a fast, westward-flowing stream with a bed substrate of gravel, approximately 1m wide and 100-300 mm depth in March 2018. The watercourse had steep banks and formed a boundary between improved grassland fields and followed the margin of the woodland adjacent to the Project Site. Associated plant species included brooklime and pendulous sedge. A second small watercourse; a slow-flowing stream approximately 1m width with a bed substrate of sand/silt with dominant emergence vegetation and overhanging hedgerow covering the channel occurred along the southern boundary of the Survey Area (outside of the Project Site).

#### Scattered Broadleaved Trees

12.4.11 The majority of broadleaved trees within the Project Site were mature or semi-mature and included poplar, oak, sycamore and ash. Trees were generally within or close to field boundaries. Six trees classified as 'veteran' were present within the Project Site (refer to Technical Appendix 13.1)

#### Scrub

12.4.12 Dense and scattered bramble-dominated scrub was associated with field boundaries within the Project Site

#### Standing Water

12.4.13 Two small ponds were present along hedgerows within the Project Site boundary [TN8 & TN13, Figure 12.1], with a further two ponds present within woodland immediately adjacent to the western Project Site boundary [TN3 & TN4, Figure 12.1]. All ponds were heavily shaded, shallow and turbid with no associated aquatic vegetation. Ponds within the Project Site were seasonally wet but subject to annual drying (refer to Technical Appendix 12.5). An evaluation

of these ponds was undertaken against Priority Habitat 'Pond' classification criteria; none of these ponds was evaluated as 'Priority Habitat'.

### Surrounding Habitats

12.4.14 Urban development including a partially completed residential development occurred to the east of the Project Site. To the south of the Project Site were mature and semi-mature plantation woodland blocks and improved grassland. To the north, beyond Oldbury Road, was mixed farmland with associated hedgerow network, occasional detached properties, pockets of broadleaved woodland and ponds. To the west was an area of broadleaved woodland, designated as Park Mill Covert SSSI and 'Ancient Woodland', (refer to paragraph 12.4.3, and Technical Appendix 12.12) plus further agricultural land, plantation woodland and buildings. A Public Right of Way (footpath) runs along the western Project Site adjacent to Park Mill Covert.

### **Protected and Notable Species**

#### Plants

##### *Desk Study*

12.4.15 Numerous plant species have been recorded within the 2km Study Area, including English bluebell and snowdrop, which both receive limited legal protection, and tubular water-dropwort, cornflower and marsh stitchwort, which are Priority species. None of the records were from within the Project Site.

12.4.16 There were numerous records of invasive plant species within the Study Area including:

- Himalayan cotoneaster.
- Japanese knotweed.
- Canadian waterweed.
- Water fern.

12.4.17 All of these species are listed on Schedule 9 of the Wildlife and Countryside Act (WCA) 1981 (as amended), making it an offence to plant or otherwise cause these species to grow in the wild (refer to Technical Appendix 12.1).

##### *Site Survey*

12.4.18 Bluebell, which is protected against sale only, was recorded within the semi-natural broadleaved woodland within the Project Site. No further notable or non-native/invasive plant species were recorded and their presence was considered unlikely. No invasive species were recorded during the Extended Phase 1 habitat surveys.

## Invertebrates

### *Desk Study*

12.4.19 Numerous notable invertebrate species have been recorded within the 2km Study Area: refer to Table 12.4. None of the records were from within the Project Site.

12.4.20 Records of signal crayfish occur within the 2km Study Area, potentially along the Pickedmoor Brook upstream of the Project Site (the exact location could not be determined from the grid reference resolution of record). Signal crayfish are listed as an invasive species on Schedule 9 of the Wildlife & Countryside Act 1981 (as amended). It is illegal to release signal crayfish into the wild.

**Table 12.4. Notable Invertebrate Records within 2km Data Search Study Area**

<b>Species</b>	<b>Priority Species</b>	<b>Local BAP Priority Species</b>	<b>Nationally Notable<sup>1</sup></b>
<b>Coleoptera</b>			
Glow-worm		✓	
<b>Diptera</b>			
Dotted Bee-fly			✓
<b>Odonata</b>			
Beautiful Demoiselle			✓
<b>Lepidoptera</b>			
Small Heath	✓		
Knot Grass	✓		
Mouse Moth	✓		
Dusky Thorn	✓		
Garden Dart	✓		
Small Emerald	✓		
Buff Ermine	✓		
Blood-vein	✓		
Oak Hook-tip	✓		

<sup>1</sup> Known from 100 or fewer 10km squares.

### *Site Survey*

12.4.21 No evidence of white-clawed crayfish, a legally-protected and South Gloucestershire BAP Priority species, was recorded within the section of Pickedmoor Brook within the Project Site and this species was assumed to be absent (refer to Technical Appendix 12.4). No non-native crayfish species were recorded during surveys.

12.4.22 The areas of mature woodland, watercourse and hedgerow network within the Project Site provided habitat for a range of invertebrate species. In the context of the extent of alternative habitats of similar types in the surrounding area, it is unlikely that the Project Site is important or critical for any particular species or assemblage of invertebrates.

## Amphibians

### *Desk Study*

12.4.23 Five species of amphibian have all been recorded within the 2km Study Area. These are great crested newt (GCN), a legally-protected Priority Species and South Gloucestershire BAP Priority Species; smooth newt, palmate newt, common frog and common toad (a Priority Species). Records of GCN are historic (1987) and lie approximately 1.6km west of the Project Site boundary. All amphibians are legally protected to varying degrees; refer to Appendix 12.1.

12.4.24 An amphibian survey in 2014 to inform the ecological assessment supporting the planning application for development of Land at Post Farm (Planning reference: PT15/2917/O) identified a small population of GCN (peak count of 1 adult GCN) within a pond approximately 110m to the north-east of the Project Site.

### *Site Survey*

12.4.25 **In April 2019**, a total of **fifteen** ponds were identified within 250m of the Survey Area (n.b this included land to the south of the Project Site). This comprised two ponds within the Project Site and a further **13** ponds up to 250m from the Project Site; refer to Figure 12.3 for pond locations.

12.4.26 **GCN were identified in two ponds over the course of the surveys.** In April 2018, GCN was confirmed in Pond 8 (which was considered to be an extension of Pond 7, refer to Technical Appendix 12.5), located 110m north-east of the Project Site. This correlates with the location of a previous GCN record (refer to Paragraph 12.4.24). At Pond 8, a GCN egg was recorded, which confirms that the pond represents a breeding pond. The lack of observations of adult GCN during the 2016 , 2018 **and 2019** surveys (a total of **16** survey visits over two separate years) indicates the presence of a 'small' GCN population' (Natural England 2001). **In 2019, a single male GCN was recorded in Pond 15, 150m to the west of the site on a single occasion (one of six survey sessions).**

12.4.27 Ponds 1 and 2 within the Project Site were classified as being 'Poor' for supporting breeding GCN. No evidence of GCN was recorded in Ponds 1 and 2 during the 2016, 2018 **or 2019** surveys. Both onsite ponds dried out in May 2016, April 2018 and April **2019. These ponds** would therefore be highly unlikely to support successful amphibian breeding in these years.

12.4.28 The pasture, hedgerows and woodland represent suitable terrestrial habitats for amphibians including GCN. The site does not represent 'core habitat' for the confirmed GCN population (50m zone, English Nature 2001). Approximately 0.95ha and **1.35 ha** of suitable terrestrial habitat between 100m and 250m of **Pond 8 and Pond 15 respectively**, occurs within the Project Site (refer to Figure 12.3). **The combined survey results indicate a low density, small meta-population of GCN distributed across the wider area.**



12.4.29 Populations of palmate newt and common frog were recorded within Ponds 1 and 2 within the Project Site. Common toad, common frog, palmate newt and smooth newt populations were recorded in offsite ponds.

## Reptiles

### *Desk Study*

12.4.30 Three species of reptile; grass snake, common lizard (both legally protected, Priority Species) and slow worm (legally protected, Priority Species, and South Gloucestershire BAP species) have all been recorded within the 2km Study Area.

### *Site Survey*

12.4.31 The reptile survey recorded a maximum count of two slowworm which equates to a 'low' population (Froglife, 1999) within the Project Site. No other species were recorded. All reptiles were recorded in the east of the Project Site (refer to Figure 12.4 and Technical Appendix 12.6).

## Birds

### *Desk Study*

12.4.32 Notable bird species recorded in the 2km Study Area which are relevant to the habitats within the Project Site are listed in Table 12.5. All wild birds are legally protected and many are also Priority Species and/or are 'Red' or 'Amber' Species of Conservation Concern (Eaton *et al.* 2015). 'Schedule 1' species receive additional legal protection against disturbance whilst breeding; refer to Technical Appendix 12.1.

**Table 12.5: Notable bird records from the 2km study area**

Species	BoCC status <sup>1</sup>	Priority Species	South Gloucestershire BAP Priority Species	WCASchedule 1
Barn owl			✓	✓
Brambling				✓
Bullfinch	Amber		✓	
Crossbill				✓
Cormorant	Amber			
Cuckoo	Red	✓		
Dunnock	Amber	✓		
Fieldfare	Red			✓
Firecrest				✓
Goldcrest	Amber			
House martin	Amber			
House sparrow	Red	✓		
Kestrel	Amber			
Lapwing	Red	✓		

Species	BoCC status <sup>1</sup>	Priority Species	South Gloucestershire BAP Priority Species	WCASchedule 1
Lesser redpoll	Red	✓		
Linnet	Red	✓		
Marsh tit	Red	✓		
Mistle thrush	Amber			
Nightingale	Amber			
Redstart	Amber			
Redwing	Red			✓
Reed bunting	Amber	✓		
Skylark	Red	✓		
Song thrush	Red	✓	✓	
Spotted flycatcher	Red	✓		
Starling	Red	✓		
Stock dove	Amber			
Swift	Amber			
Turtle dove	Red	✓		
Tree sparrow	Red	✓		
Willow warbler	Amber			
Yellowhammer	Red	✓		

### Site Survey

12.4.33 Hedgerows, scrub, woodland and trees within the Project Site provided suitable nesting and foraging habitat for a range of farmland and woodland birds, including Priority Species and Species of Conservation Concern (Red List/Amber List). A total of 35 species were recorded during the course of the survey within the Survey Area (refer to Technical Appendix 12.7 for full details). Of these, 25 species were recorded as confirmed, probable or possible breeding species.

12.4.34 Notable species identified as potentially breeding within the Survey Area were:

- Song thrush, a Priority Species, Red-listed Bird of Conservation Concern (Eaton et al 2015) and South Gloucestershire BAP Priority Species with possible territories recorded within a hedgerow in the centre of the Project Site and within woodlands to the west of the Survey Area.
- Dunnock, a Priority Species and Amber-listed Bird of Conservation Concern. A peak of seven birds were recorded and territories (defended over at least one week) indicated by singing males noted along the woodland belt in the south of the Survey Area and along the eastern Survey Area boundary.
- Stock dove, an Amber-listed Bird of Conservation Concern with singing males recorded within woodlands to the west of the Survey Area and the plantation in the south of the Survey Area.

12.4.35 Non-breeding notable species recorded during the surveys included house martin (Amber-list Species), swift (Amber-list Species), mistle thrush (Red list species) and starling (Priority and Red-list species). No evidence of barn owl or other specially-protected species (Wildlife and Countryside Act 1981 (as amended) Schedule 1 species) were recorded.

12.4.36 No records of bird species associated with the Severn Estuary were identified during the surveys and the habitats; refer to Table 12.3. The habitats include tall grassland leys with adjacent hedgerows with trees and woodland blocks, which are considered unlikely to be favourable habitat or important for wintering and migratory birds associated with the European-designated sites.

## Bats

### *Desk Study*

12.4.37 No records of bat roosts were identified within the Project Site. Bat records from within the wider 4km Study Area included roosts of common pipistrelle, unidentified pipistrelle species and brown long-eared bats. The closest bat roost record was of a common pipistrelle roost identified 0.4km east of the Project Site. Other (non-roosting) species recorded within the 4km study area comprise; *Myotis* species, soprano pipistrelle and noctule. All bats are legally protected and soprano pipistrelle and noctule are Priority Species.

### *Site Survey*

12.4.38 A total of 30 trees were assessed as being of 'Moderate' or 'High' bat roost potential (Collins 2016) within the Survey Area (refer to Figure 12.5 and Technical Appendix 12.8) of which 21 were located within the Project Site. Five trees that could potentially be affected by the Proposed Development were subject to dusk emergence and dawn re-entry surveys in 2018 and 2019. No evidence of bat roosts were recorded; refer to Technical Appendix 12.8.

12.4.39 The six transect surveys undertaken between May and October 2016 recorded a total of 798 bat registrations at the Sample Points with at least eight species recorded (refer to Appendix 12.8). The most frequently recorded species was common pipistrelle, which accounted for 75% of all bat registrations. Other species included noctule (11%), *Myotis* sp. (5%), serotine (3%) soprano pipistrelle (2%), *Nyctalus* sp. (2%), *Eptesicus* or *Nyctalus* sp. (2%), barbastelle (<1%) and long-eared sp. (<1%).

12.4.40 Common pipistrelle was the only species recorded on all survey sessions and at all Sample Points with a peak of 159 registrations recorded across the site on 31 May 2016 (refer to Figure 12.6 and Appendix 12.8). Noctule (peak of 53 registrations on 27 July 2016) and *Myotis* species (peak of 14 registrations 31 May 2016) were both recorded in five of the six survey sessions. A cumulative total of two barbastelle registrations were recorded during the six survey sessions with single registrations at Sample Points Q and U which both lie adjacent to mature woodland.

12.4.41 The Sample Point data recorded the highest bat activity at Point H, located in the north west corner of the Project Site adjacent to the hedgerow parallel with Oldbury Lane (2.08 bat passes/minute). Activity at this point primarily comprised common pipistrelle foraging passes (59%). Other species recorded here included soprano pipistrelle, noctule, serotine, and *Myotis* sp. The listening point which recorded the greatest diversity of bat species was Point Q, located along a narrow track through mature woodland to the south west of the Project Site where seven species were recorded (common pipistrelle, soprano pipistrelle, noctule, serotine, long-eared bat species, barbastelle and *Myotis* sp). The lowest bat activity was recorded at Listening point M (0.15 passes/minute) which is located in the centre of the northern Project Site.

12.4.42 No additional bat species were recorded between sample points and the recorded bat activity was considered to represent low numbers of foraging and commuting bats utilising hedgerows and woodland edges. No areas of concentrated foraging were recorded during surveys and no regular commuting routes were recorded.

12.4.43 The static detector survey recorded an average Bat Activity Index (BAI) of 237.72 registrations per detector per night across the survey period. At least eleven bat species were recorded during the static detector surveys; common pipistrelle was the most abundant species, comprising 76.9% of all recordings with a BAI of 182.95 registrations per night and present at all 6 Static Positions. Four other species recorded a BAI of greater than one registration per night with *Myotis* sp (BAI 38.5), soprano pipistrelle (BAI 10.9), (BAI 2.05) and serotine (BAI 1.09) all of these species with the exception of serotine were recorded at all Static Positions. Barbastelle, greater horseshoe, lesser horseshoe and long-eared bat, comprised less than 1% of recordings and all averaged less than one registration per night.

12.4.44 Static Position 5 in the north east corner of the Project Site recorded the highest level of overall bat activity (BAI 511.63), which included levels of activity for soprano pipistrelle and *Myotis* sp bats substantially above the background levels recorded at all other Static Positions.

12.4.45 Very low levels of barbastelle activity were recorded at Position 2 (5 registrations in June) Position 3 (5 registrations in June and 3 registrations in July), Position 4 (1 registration in July and September) and Position 5 (3 registrations in June and 1 registration in both July and August). Greater horseshoe bat was recorded in June, July and August with a peak of two registrations at Static Position 6 in June and lesser horseshoe bat were recorded in May, June, August, September and October with a peak of 12 registrations at Position 6 in October 2016. Based on the infrequency of recorded activity, during the surveys, it is considered that the Project Site does not represent core habitat for greater horseshoe, lesser horseshoe or barbastelle bats.

#### Hazel Dormouse

### *Desk Study*

12.4.46 There are no records of hazel dormouse from within the 2km Study Area. Hazel dormouse is legally protected and is a Priority Species and South Gloucestershire BAP Priority Species; refer to Technical Appendix 12.1.

### *Site Survey*

12.4.47 Hedgerows, scrub and woodland blocks within the Survey Area provided suitable habitat for hazel dormouse. However, no evidence of dormouse was recorded during the 2016 nest tube survey or feeding-sign survey. This species is, therefore, considered to be absent (refer to Technical Appendix 12.9).

### Otter

#### *Desk Study*

12.4.48 There are no records of otter from within the 2km Study Area. Otter is legally protected and is a Priority Species.

#### *Site Survey*

12.4.49 An otter spraint was recorded along the Pickedmoor Brook within the Project Site in June 2016 and on an adjoining watercourse to the south east of the Survey Area in April 2018 (refer to Figure 12.7 and Technical Appendix 12.10). No holts or other signs of otter were recorded in either survey.

12.4.50 The watercourses within and adjacent to the Project Site are narrow and shallow and it is considered unlikely that the Survey Area represents breeding habitat or core foraging habitat for otter. Based on the evidence recorded, it is assumed that otters commute along the watercourses on an occasional / infrequent basis as part of a larger territory.

### Water Vole

#### *Desk Study*

12.4.51 There are no records of water vole from within the Study Area. Water vole is legally protected and is a Priority Species.

#### *Site survey*

12.4.52 No evidence of water vole was recorded within the Survey Area and this species is assumed to be absent.

## Badger

### *Desk Study*

12.4.53 There are numerous records of badger from within the 2km Study Area. Badger setts including a main / subsidiary sett and outlier setts were recorded to the immediate east of the Project Site as part of the ecological assessment for Land at Park Farm (MD Ecology 2015b). Badgers and their setts are legally protected.

### *Site Survey*

12.4.54 A number of badger setts were recorded across the Project Site, including two likely 'main' setts, one active 'Subsidiary' sett and twelve active and inactive 'outlier' setts; refer to Figure 12.8 and Technical Appendix 12.11. The main setts were recorded in the marginal woodland along the western Survey Area boundary (Sett 1) where at least four active entrances were present and within the boundary hedgerow in the north east corner of the Project Site (Sett 2) where six active entrances were present on both sides of the hedgerow. **Based on the distance between Setts 1 and 2, it is considered that these setts represent separate 'Main' setts.** Further outlier setts were identified with entrances located at the base of hedgerows and within woodland belts throughout the Survey Area (refer to Figure 12.8).

12.4.55 Evidence of badger activity was recorded throughout the Project Site with foraging marks, latrines and paths along field margins. The pasture fields, woodland blocks and hedgerows provided suitable foraging habitat for badger.

## Other Terrestrial Mammals

### *Desk Study*

12.4.56 There are records from the Study Area of brown hare, harvest mouse and hedgehog (all Priority Species; hedgehog is also South Gloucestershire BAP Priority Species).

### *Site Survey*

12.4.57 The Project Site provided suitable habitat for hedgehog and brown hare, which are assumed to be present. Habitats within the Project Site were considered to be unsuitable for harvest mouse.

## **Summary of Baseline Position**

12.4.58 A summary of the baseline position and evaluation of ecological receptors is provided in Table 12.6 below in accordance with paragraph 12.2.16 above.

### **Table 12.6: Evaluation of Ecological Features**

Ecological feature	Ecological importance	Reason
European Designated sites within 10km <ul style="list-style-type: none"> <li>• Severn Estuary SAC, SPA, Ramsar</li> <li>• River Wye SAC</li> <li>• Wye Valley and Forest of Dean Bat Sites SAC</li> <li>• Wye Valley Woodlands SAC</li> </ul>	International	Valuation reflected by designation.
SSSIs within 5km	National	Valuation reflected by designation.
Park Mill Covert SNCI	County	Valuation reflected by designation.
SNCI within 2km	County	Valuation reflected by designation.
<b>Habitats within the Project Site</b>		
Dense scrub	Sub-Parish	Common and widespread species-poor habitat.
Improved grassland	Sub-Parish	Common and widespread species-poor habitat.
Running water	Parish	Aquatic habitat that forms an important ecological corridor. Streams are a Priority Habitat.
Scattered broadleaved trees	Parish	Common habitat although contributed to the mosaic of habitats present. One Veteran and eight Over Mature trees within Project Site.
Semi-natural broadleaved woodland	Parish	Provides suitable habitat for notable species including bats, birds and invertebrates. Lowland Mixed Deciduous Woodland is a Priority Habitat and Broadleaved Woodland is a South Gloucestershire BAP Priority Habitat.
Hedgerow	Parish	Hedgerows support a range of species and act as wildlife corridors. Hedgerows are a Priority Habitat and South Gloucestershire BAP habitat. Some hedgerows qualify as 'Important' under ecological criteria of the Hedgerow Regulations 1997 (as amended).
Standing water	Parish	Ponds provide habitat for a range of species such as invertebrates, amphibians and birds. The ponds do not qualify as Priority Habitat.
<b>Adjacent Habitats</b>		
Semi-natural broadleaved woodland	County	Park Mill Covert woodland designated as SNCI and Ancient Woodland. Lowland Mixed Deciduous Woodland is a Priority Habitat and Broadleaved Woodland South Gloucestershire BAP Priority Habitat.
Plantation woodland	Sub-Parish	Common, widespread habitat supporting a range of species. Does not meet 'Broadleaved woodland' Priority Habitat criteria
Improved grassland	Sub-Parish	Common and widespread species-poor habitat.
Hedgerow	Parish	Hedgerows support a range of species and act as wildlife corridors. Hedgerows are a Priority Habitat and South Gloucestershire BAP Priority Habitat. Some hedgerows qualify as 'Important' under ecological criteria of the Hedgerow Regulations 1997 (as amended).
Urban	Sub-Parish	Of limited intrinsic value.
<b>Protected and Notable Species</b>		

Ecological feature	Ecological importance	Reason
Plants	Sub-Parish	Bluebell widespread in suitable habitat. The presence of significant populations of other notable plant species was considered unlikely
Invertebrates	Sub-Parish	The Project Site was suitable for a range of common and widespread invertebrates. The watercourse does not support white-clawed crayfish.
Amphibians	Parish	A small population of GCN recorded to the east <b>and west</b> of the Project Site and the habitats within the Project site are likely to represent terrestrial habitat for the local population GCN is a Priority species and South Gloucestershire BAP species. Common frog and palmate newt identified within the Project Site during surveys.
Reptiles	Sub-Parish	The Project Site supported a low population of slow worm, a Priority Species and South Gloucestershire BAP species but common and widespread in the wider area.
Birds	Parish	Habitats within the Project Site support a typical range of farmland species, including some Priority and notable species such as mistle thrush, dunnock and stock dove.
Bats	Parish	Surveys identified activity for a range of species including Priority species and South Gloucestershire BAP species. No evidence of bat roosts was recorded.
Hazel Dormouse	Not recorded on site	No evidence of hazel dormouse was found in Project Site.
Otter	Sub-Parish	Otters utilise the minor watercourses on an occasional / infrequent basis; the presence of holts or resting places was considered very unlikely. Otter is a Priority Species.
Badger	Parish	Badger is a common / widespread species. Two main setts were recorded within / adjacent to the Project Site. Badgers and their setts are legally protected.
Hedgehog	Sub-Parish	The Project Site provided suitable habitat for this Priority Species and South Gloucestershire BAP species.
Brown hare	Sub-Parish	The Project Site provided suitable habitat for this Priority Species.

## 12.5 INHERENT DESIGN CONSIDERATIONS

12.5.1 The layout and design of the Proposed Development has been informed by the ecological baseline. Therefore, the impact assessment is of a partially-mitigated scheme.

12.5.2 The scheme provides significant public open space in accordance with the requirements of the adopted Core Strategy, and reflecting the site specific constraints which preclude development within part of the Project Site; notably in relation to the flood zones. A key element of the design process has been to consider the location of green infrastructure; as shown on the Green Infrastructure Parameter Plan (Figure 3.3). This retains and buffers sensitive ecological receptors from the built environment and creates a network of green infrastructure within the open space to the south of the built development, and forming corridors through the built development. Key aspects of the Green Infrastructure Parameter Plan with respect to ecology and nature conservation are as follows:



- Retention and buffering of non-statutory designated sites, Ancient Woodland and other Priority and South Gloucestershire BAP Habitats, including watercourses and semi-natural broadleaved woodland to prevent construction and operational damage and disturbance.
- Protection and creation of green infrastructure links across the Project Site to maintain connectivity of habitats around and through the Project Site.
- Design of a Sustainable Urban Drainage System (SUDS) as part of Green Infrastructure to include wetland habitats of biodiversity value.
- Extensive habitat creation, including broadleaved woodland, meadow grassland, ponds and hedgerows. Hedgerow translocation is also proposed.

12.5.3 The Illustrative Landscape and Green Infrastructure Masterplan (refer to Figure 3.6) supports the Green Infrastructure Parameter Plan.

## 12.6 POTENTIAL ENVIRONMENTAL IMPACTS & EFFECTS

### Construction Impacts and Effects

#### Designated Sites of Conservation Value

##### *Severn Estuary SAC, SPA, SSSI and Ramsar sites*

12.6.1 There would be no risk or probability of a likely significant effect on the interest features of the Severn Estuary European Site Complex and SSSI. Pickedmoor Brook discharges in to the Severn Estuary approximately 2.5km downstream of the Project Site. The majority of construction with the exception of landscaping would be located at least 140m north of the watercourse. Due to the distance from the Severn Estuary Complex, and associated dilution effect, adverse effects on water quality within the Complex during construction as a result of groundwater and/or surface-water contamination (e.g. as a result of surface runoff contaminated with silt, hydrocarbons or other construction materials, or from an accidental fuel or concrete spill) would not occur. There would be no risk or probability of a Likely Significant Effect. Effects on water quality within the Severn Estuary Complex would be neutral.

12.6.2 Bird species associated with the Severn Estuary designations were not present or reliant on habitats within the Project Site and therefore construction effects of habitat loss and potential disturbance would not occur. Effects of habitats loss or disturbance on bird species associated with the Severn Estuary SPA would be neutral. There would be no risk or probability of a Likely Significant Effect.

##### *Wye Valley and Forest of Dean Bat Sites SAC, Wye Valley Woodlands SAC and River Wye SAC*

12.6.1 Given the distance between the Project Site and all other European designated sites of nature conservation value (refer to Table 12.3), there would be no risk or probability of a likely significant effect on the interest features of these sites during construction. Effects would be neutral.

#### *Park Mill Covert SNCI*

12.6.1 Construction activities could result in damage to Park Mill Covert SNCI (including the associated Ancient Woodland) through physical damage to trees and associated root protection areas by construction vehicles, equipment or materials storage. Furthermore, dust generated through construction activities could have an adverse effect on associated vegetation through interference with photosynthesis, respiration and transpiration. This would be an adverse, long-term effect at the County level (Moderate adverse).

#### *Other Designated Sites of Nature Conservation Value*

12.6.2 Given the distance between the Project Site and all other designated sites of nature conservation value identified in Table 12.3, they are unlikely to be subject to any direct or indirect construction-related impacts. Effects would be neutral.

#### Habitats within the Project Site

12.6.3 Areas of habitat within the Project Site would be removed during site clearance (refer to Table 12.7 for habitat loss figures). All semi-natural woodland, veteran trees and running water would be retained. The majority of habitat loss would be improved grassland, a common and widespread habitat of low ecological value. The loss of this habitat and small areas of bramble scrub would be an adverse, medium-term effect at the Sub-Parish level (negligible).

12.6.4 The loss of approximately **1.28** km of hedgerows including two hedgerows that qualify as 'Important' under the Hedgerow Regulations 1997 (as amended) (H4 and H14, refer to Figure 12.2), **ten** broadleaved trees of which **three were classified** as 'mature', **six as 'early mature' and one 'young' tree** and four semi-mature (refer to Technical Appendix 13.1) and **two** seasonally wet ponds would be an adverse, medium-term effect at the Parish level (minor adverse effect).

12.6.5 Construction activities could lead to direct/indirect damage to retained habitats (broadleaved woodland, hedgerows and trees, potentially including veteran trees) through transgression of vehicles, use of construction equipment and/or storage of construction materials within root protection areas. Such activities could also lead to the generation of the following pollutants:

- Dust: this could have an adverse effect on plant through interference with photosynthesis, respiration and transpiration;
- Sediment and pollutants in surface-water run-off: this could have an adverse effect on the water quality of the watercourse.

12.6.6 These effects would be adverse and medium-term at the Parish level (Minor adverse).

### Protected and Notable Species

#### *Plants*

12.6.7 Hedgerow removal would result in the loss of habitat for bluebell, which is widespread in the vicinity. The retention of all semi-natural woodland within the Project Site would maintain substantial areas of suitable habitat for this species and habitat loss is not considered to affect the conservation status or local distribution. The effect of habitat removal on plants would be an adverse, medium-term effect at the Sub-Parish level (negligible).

#### *Invertebrates*

12.6.8 The loss of common and widespread habitats within the Project Site would not affect the populations or distribution of notable species. The retention of the watercourse, woodland and approximately **68%** of the hedgerow network within the Project Site would be expected to maintain the invertebrate assemblage currently present. Potential effects of pollution from dust and/or sediment-laden/polluted run-off would have an adverse effect on invertebrates through damage to supporting habitats or toxicity. Construction effects would, therefore, be an adverse, medium-term effect at the Sub-Parish level (negligible).

#### *Amphibians*

12.6.9 Site clearance could result in the killing or injury of amphibians. This includes great crested newt (GCN), and common toad. A small population of GCN was identified within ponds s approximately 110m **east and 150m west of the** Project Site. Whilst GCN may move up to 500m from ponds (English Nature, 2001), this species is considered to preferentially occupy core optimal habitat surrounding breeding habitats (i.e. within 50m of ponds) in preference to more distant habitats (Forestry Commission 2016, Cresswell and Whitworth, 2004). The risks of encountering GCN during site clearance are low. Nonetheless, if this occurred, it would be an adverse, short-term effect at the Parish level (Minor adverse effect).

12.6.10 Site clearance would also lead to a reduction in habitat for amphibians including loss of **two** ponds s, which may be used as foraging habitat but did not represent suitable breeding habitat for GCN. No core habitat surrounding the confirmed GCN ponds s (50m zone, English Nature 2001) would be lost. Approximately **2.3** ha of suitable terrestrial habitat between 100m and 250m of the confirmed GCN ponds s would be lost, which equates to approximately 5% of the

available habitat within 250m. The Project Site is therefore not considered to be critical to the life cycle of the identified GCN populations or comprise a significant part of the species' entire habitat in the local area. Habitat removal would be an adverse, medium-term effect at Sub-Parish level (negligible).

**12.6.11 Whilst the habitat loss associated with construction of the Project would reduce connectivity of habitats and could accordingly impinge GCN movement, continuous habitat connections both north – south and east – west would be maintained. Habitat fragmentation would be an adverse, medium-term effect at Sub-Parish level (negligible).**

#### *Reptiles*

12.6.12 Site clearance could result in the killing or injury of individual slow-worms. Given the 'low' population of this species recorded within the Project Site and their widespread local distribution, this would be an adverse, short-term effect at Sub-Parish level (negligible). Site clearance would also result in the loss of reptile feeding, basking and sheltering habitat. This would be an adverse, medium-term effect at Sub-Parish level (negligible).

#### *Birds*

12.6.13 No specially protected species i.e. listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were recorded breeding within the Project Site. The removal of 1.3 km of hedgerow and six broadleaved trees would reduce the available habitat for nesting and foraging passerine birds, although all woodland and approximately 62% of hedgerows would be retained. There would also be the loss of improved grassland that could be used by foraging birds. The loss of breeding habitat for the species identified within the Project Site would not have an adverse effect on the conservation status of the species concerned. Loss of breeding and foraging habitat would be an adverse medium-term effect at Sub-Parish level (negligible).

12.6.14 Construction activity has the potential to cause localised noise and visual disturbance, which may cause displacement of nesting birds in the immediate vicinity, although some would be tolerant of disturbance or would become habituated. This would be an adverse, short-term effect at Sub-Parish level (negligible).

12.6.15 There is also the potential for direct impacts to breeding birds, nests and young during site clearance. This would be an adverse, short-term effect at Sub-Parish level (negligible).

#### Bats

#### *Roosts*

12.6.16 No bat roosts would be lost during site clearance. Clearance would result in the loss of a single tree identified with 'high' bat roost potential (Tree 2; Figure 12.5) although no roosts were

recorded in this tree at the time of survey. The loss of potential roost resource would be an adverse, medium-term effect at Sub Parish level (negligible).

### *Commuting and Foraging*

12.6.17 The bat surveys did not identify regular or important commuting routes for bats within the Project Site. However, site clearance could affect any individual commuting bats through the loss or fragmentation of linear habitat features such as hedgerows. The effects of habitat fragmentation on commuting bats will vary depending on species. Research indicates that, where other conditions such as light levels remain suitable, common and soprano pipistrelle (which account for the majority of the bats recorded at the Project Site) can cross gaps of 200m (Downs & Racey 2006) and that noctule and serotine will also move freely across large open areas and are less reliant on linear features (Limpens & Kapteyn 1991, Verboom & Huitema 1997). Some species including greater horseshoe bat and lesser horseshoe bat and other slow-flying species associated with cluttered environments including brown long-eared bat and *Myotis* species are more susceptible to habitat fragmentation. However, these species were only recorded at very low levels during the activity surveys and the Project Site was not considered to represent core habitat for these species.

12.6.18 Site clearance would result in the loss of approximately **1.085** km of hedgerows across the Project Site. Whilst no significant commuting routes were recorded along individual hedgerows, removal of elements of the hedgerow network would reduce the overall connectivity of the habitats within the Project Site. The retention of the key elements of the habitat network including the mature woodland and retention of hedgerows would prevent isolation of any habitat and maintain links around the Project Site for commuting bats. Effects of loss of site clearance on commuting bats would be an adverse, medium-term effect at the Sub-Parish level (negligible).

12.6.19 Loss of habitat including improved grassland, trees, hedgerow and **two** small seasonally wet ponds (refer to Table 12.7 for areas of habitat loss) would decrease habitat for night-flying invertebrates, thereby reducing the overall value of the Project Site for foraging bats. The more valuable habitats for foraging bats, in particular the notable species, would be retained. This would include the woodland and watercourses (Bontadina *et al* 2002, Kapfer *et al* 2008, Akasaka *et al* 2009). The majority of habitat loss would be restricted to improved grassland, which is generally considered to be of lower importance to foraging bats (Russ & Montgomery 2002, Walsh & Harris 1996). Loss of foraging habitat would be an adverse, medium-term effect at Sub-Parish level (negligible).

12.6.20 Bats commuting and foraging across the Project Site could be adversely affected by construction lighting. This would have the greatest impact on the more light-sensitive species such as greater and lesser horseshoe bats and *Myotis* species bats (Stone *et al.* 2015, Rowse

*et al.* 2016). Given construction activities would be largely undertaken during the day when bats are not active, and as lighting requirements are likely occur largely during the winter months, when bats would be expected to be hibernating and therefore either absent or present in very low numbers, construction lighting would be an adverse, short-term effect at Sub-Parish level (negligible).

#### *Otter*

12.6.21 Any otters using the watercourses within and adjacent to the Project Site could be disturbed by construction noise and lighting. As construction is largely distant from the watercourses and otters are predominantly nocturnal, the effects would be largely avoided as work would be undertaken during the day. Without mitigation, this would be an adverse, short-term effect at Sub-Parish level (negligible).

#### *Badger*

12.6.22 The main and subsidiary badger setts would be retained within the green infrastructure of the Proposed Development. Depending upon patterns of badger activity at the time of construction, the Proposed Development could result in the loss of up to one subsidiary and two active outlier setts. This would be an adverse and short-term effect at the Sub-Parish level (Negligible).

12.6.23 Main Sett 2 (refer to Figure 12.8) would be retained but located in close proximity to the construction footprint. Construction could therefore result in accidental damage of these setts, and/or the killing, injury or disturbance of badgers. This would be an adverse and acute effect at the Sub-Parish level (Negligible).

12.6.24 The removal of habitat would result in a loss of approximately 34ha of badger foraging habitat **largely associated with the Sett 2 social group.** Such habitat removal is likely to mean that badgers within the impacted territory would forage beyond territorial boundaries, coming into conflict with other badger groups. This is likely to lead to a net loss of badger numbers in the long-term. This would be an adverse, long-term effect at the Sub-Parish level (Negligible).

12.6.25 Badgers could become trapped in open excavations during the construction phase and could potentially be harmed by construction materials. Without mitigation, this effect would be adverse and acute at the Sub-Parish (Negligible).

#### *Brown Hare*

12.6.26 Construction would remove suitable habitat for brown hare and displace this species from the Project Site. This would be an adverse, long-term effect at the Sub-Parish level (negligible).

## *Hedgehog*

12.6.27 Removal of habitats within the Project Site would reduce the area of habitat for hedgehog, although there is alternative habitat in the vicinity. This would be an adverse, long-term effect at Sub-Parish level (negligible). There is also potential for direct impacts (i.e. killing or injury) to hedgehogs during Site clearance. This would be an adverse, acute effect at Sub-Parish level (negligible).

## **Occupation Impacts and Effects**

### Designated Sites of Conservation Value

#### *Severn Estuary SAC, SPA, SSSI and Ramsar sites*

12.6.28 The Updated WoE JSP Habitats Regulations Assessment (HRA; November 2018) identified the potential for increased recreational pressure arising from residential development in a 7km zone around the Severn Estuary Site Complex. As stated in the HRA, this is a precautionary distance based on recreation studies for the Thames Basin Heaths SPA and would need to be subject to further work to determine relevant distances. The HRA states that ‘a package of [mitigation] solutions’ should be considered by LPAs within respective Local Plans, potentially including the maximisation of public open space within Strategic Development Land (SDL), Suitable Alternative Natural Greenspace (SANG) and/or other strategic measures (including measures within the designated sites), which could potentially be funded through developer contributions. Through the consideration and delivery of such measures, the HRA concludes that the **development proposed through the** WoE JSP would not have a likely significant effect on the Severn Estuary Site Complex.

12.6.29 The UK Marine SACs Project website<sup>1</sup> considers that recreation alone is unlikely to be a major influence on estuarine intertidal mud and sand flats or salt marshes. Potential recreational effects include disturbance to sensitive species, including wintering birds; and through habitat erosion and fragmentation. The closest components of the Severn Estuary SPA lie approximately 2.8km to the west of the Project Site. Limited public access points and infrastructure such as vehicle parking facilities occur at this point (Oldbury on Severn). The Severn Way long distance footpath, which follows the estuary edge, is not directly accessible from the Project Site by public footpath. The publicised ‘Thornbury link’ route<sup>2</sup> connecting Thornbury and the Project Site to the Severn Way path is approximately 7km in length.

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<sup>2</sup> <http://www.southglos.gov.uk/documents/leaflets/pte070005.pdf>

12.6.30 The public open space (POS; approximately 17.50 ha), which forms an integral part of the Proposed Development, would provide recreational space for activities such as dog walking, including further access to well-connected, off-road footpaths. As stated in paragraph 12.5.2, the POS is provided to reflect the adopted Core Strategy requirements in regard to the provision of suitable recreation space for new developments; this applies irrespective of the location of development sites within South Gloucestershire in relation to the Severn Estuary Site complex. However, it is considered that the POS would have the incidental effect of reducing the likely number of visits to the Severn Estuary Site complex by residents to the extent that there would be no risk or probability of a Likely Significant Effect, alone or in combination. Accordingly, no specific mitigation measures are proposed or required for potential recreational effects e.g. such as those proposed in the WoE JSP Habitats HRA; (November 2018). Effects would be neutral.

12.6.31 The drainage design of the Proposed Development (refer to Chapter 8) including implementation of a SuDS design would ensure that the pre-development greenfield characteristics were not exceeded i.e. there would be no significant increase in the quantity or change in the quality of water leaving the Project Site. Therefore, there would be no risk or probability of a likely significant effect on the Severn Estuary Site Complex during the occupation phase of the Project. Effects would be neutral.

12.6.32 The WoE JSP Habitats HRA; (November 2018) states that provided that sufficient sewage treatment capacity is put in place ahead of new development proposed in the JSP (as required), adverse effects on integrity of this SAC from changes in water quality could be avoided. Additional sewage associated with the Proposed Development would be managed through existing sewage treatment infrastructure and in accordance with existing legislative controls, including discharge consents. Accordingly, there would be no risk or probability of a Likely Significant Effect on these designated sites as a result of the Proposed Development. Effects would be neutral.

12.6.33 The WoE JSP HRA (November 2018) states that adverse effects on the integrity of the Severn Estuary Complex, based on air-quality modelling data, are unlikely to result from air pollution associated with development from the JSP. Effects are considered unlikely as the qualifying habitats of the Severn Estuary Complex (saltmarsh and mudflats, which support the SPA-qualifying bird species) are subject to daily tidal inundation and thus are submerged or partially submerged, which has a 'washing effect'. In addition, the HRA states that conditions within saltmarsh habitat would 'limit the potential for nutrient-loving plants to dominate'. Furthermore, the HRA states that less than 1% of the total SAC area (which is smaller than the total SPA/Ramsar area) is within 200m of the A370, A403, M48 and M5. The estuarine environment is also very open in nature and with the elevation of some of these roads above habitats, 'any emissions are likely to be quickly dispersed by the wind off the Estuary'. Whilst the WoE JSP HRA (November 2018) raises potential concerns regarding the scope of the air quality model



employed (the modelled data 'does not include some of the roads within 200m of the SAC'), it is considered that the conclusion regarding effects on the Severn Estuary Complex remain valid.

12.6.34. The HRA of the adjacent Forest of Dean District Council Allocations Plan (2015) also considered air quality effects on the Severn Estuary Complex and reached similar conclusions as follows:

*The Site Relevant Critical Loads available on the UK Air Pollution Information System (www.apis.ac.uk) indicate that many of the habitats and species for which the SAC was designated are either insensitive to atmospheric sources of nitrogen or sulphur (intertidal mudflats and sandflats, reefs, subtidal sandbanks) or are indirectly affected by nitrogen in marine situations (since nitrogen is usually the main limiting nutrient in marine systems and therefore influences eutrophication) but do not have specific critical loads for atmospheric sources (sea lamprey, river lamprey, twaite shad).*

*Nitrogen sources within the Severn Estuary are likely to be overwhelmingly dominated by a combination of marine and fluvial sources rather than atmospheric sources, as with any estuary or major tidal river.*

*Critical Loads for atmospheric nitrogen deposition are available for habitats for which the SAC was designated – mud flats/sandflats, saltmarsh and 'estuaries' generally. (no load class data available for mudflats and sandflats). In both cases where load class estimates are available the modelled nitrogen deposition rates available on APIS for a 3-year average 2009-2011 show levels below the critical load; average of 8 kg N/ha/yr for the estuary and saltmarsh; which is well below the critical load (20-30 kg N/ha/yr for both habitats). APIS also predicts that by 2020 deposition rates will have declined further from transport sources, essentially due to expected improvements in background air quality across the UK.*

*The UK Air Pollution Information System does not present critical loads for the species for which the SPA are designated since birds are only indirectly affected by atmospheric nitrogen deposition via their habitats. The two key habitats within the Severn Estuary SPA/Ramsar site of relevance to its waterfowl interest are the intertidal sandflats and mudflats and the saltmarsh. The Severn Estuary SAC habitats have modelled deposition rates well below their critical load, which provides a considerable 'buffer' for the SPA.*

*Assuming the APIS prediction that improvements in background atmospheric emissions will have reduced nitrogen deposition even further by 2020 then an even greater safety margin is provided. Additionally, nitrogen inputs to the mudflats and saltmarsh of the SPA are likely to be much more influenced by marine and fluvial sources than the (in quantitative terms) relatively small inputs from atmospheric deposition.*

*It is therefore considered that air quality issues from traffic emissions regarding the Severn Estuary can be scoped out of further consideration within this HRA.*

*On this basis, it is considered that there would be no risk or probability of a Likely Significant Effect through air quality changes on the Severn Estuary Site Complex as a result of the Proposed Development. Effects would be neutral. Wye Valley and Forest of Dean Bat Sites SAC.*

*Wye Valley Woodlands SAC and River Wye SAC.*

12.6.35 The Project Site is separated from all other European designated sites of nature conservation value (refer to Table 12.3), by the Severn Estuary. Therefore, the distance by road for the consideration of recreational effects and potential trip generated air quality effects is significantly greater than 10km. There would therefore be no risk or probability of a likely significant effect on the interest features of these sites arising from the occupation phase of the Proposed Development. Effects would be neutral.

*Park Mill Covert SNCI.*

12.6.36 There is potential for the Park Mill Covert SNCI to be adversely affected through increased human activity. Possible effects include dog fouling/nutrient enrichment, litter, erosion and trampling from recreational access. Such effects could also have long-term adverse effects on Ancient Woodland. Without mitigation, this would be an adverse long-term effect at the County level (Moderate Adverse Effect).

*Other designated Sites of Conservation Value*

12.6.37 Given the distance between the Project Site and all other identified sites of nature conservation value (see Table 12.3), there are unlikely to be any occupation phase impacts on these sites.

#### Habitats within the Project Site

12.6.38 Integral landscape proposals are summarised in Paragraph 12.5.1 and illustrated on the Green Infrastructure Parameter Plan (Figure 3.3) and Illustrative Landscape and Green infrastructure Masterplan (Figure 3.6). This includes the creation of Priority Habitats and high-value habitats including broadleaved woodland, species-rich hedgerows, wildflower meadow, ponds and native trees. The result of these proposals would be the establishment of well-connected green infrastructure, strengthening of the retained habitat connectivity and creation of habitat corridors around and through the areas of built development. Table 12.7 sets out the expected net habitat changes resulting from the Project. Although there would be a medium-term, adverse effect on habitats at the Sub-Parish - Parish level during Site clearance (a construction effect), once the proposed habitats mature, the effect would be beneficial, long-term at the Sub-Parish level (negligible). This is due to the extent of the areas of Public Open Space and the proposed gain

in Priority Habitats, including broadleaved woodland, wildflower meadow and ponds. All proposed and retained habitats would be managed in accordance with an approved Management plan, which would specify the principles and responsibilities for habitat management and monitoring to ensure habitats develop appropriately.

12.6.39 The SuDS design incorporates on-site storage and attenuation with surface water discharged into Pickedmoor Brook. The SuDS would ensure that the pre-development surface water characteristics were not exceeded and that there would be no adverse effects of water quality from run-off (refer to Chapter 8). Effects on watercourses are assessed as neutral.

12.6.40 Where retained habitats including woodland, hedgerows and watercourses occur in close proximity to new residential areas, they may be adversely affected by deliberate or incidental damage and inappropriate management. Residents may also tip garden rubbish into adjacent habitats and fly-tipping could occur. Without mitigation, this would be an adverse, long-term effect at the Parish level (Minor Adverse).

#### Habitats adjacent to the Project Site

12.6.41 Potential impacts on adjacent woodland, including the Park Mill Covert SNCI, are considered in paragraph 12.6.36.

12.6.42 The assessment of potential air quality effects during the occupation stage on ecological receptors (e.g. habitat adjacent to the local road network) did not identify any significant ecological effects; refer to Section 11.6 within Chapter 11 'Air quality'.

#### Protected and Notable Species

##### *Plants*

12.6.43 No significant effects on plants within the Project Site are predicted during the occupation phase. The proposed green infrastructure and management would establish enhanced habitats which could increase the botanical diversity of the Project Site. Overall effects are considered to be neutral in the long-term

##### *Invertebrates*

12.6.44 The proposed green infrastructure and associated management would establish suitable habitat for a range of invertebrates, potentially including notable species, mitigating habitat loss associated with site clearance. Overall, effects are considered to be neutral in the long-term.

##### *Amphibians*

12.6.1 The proposed green infrastructure and management measures including provision of **three** ponds, additional woodland and meadow grassland would provide enhanced

terrestrial and aquatic habitat for amphibians, including GCN within the Project Site. **The proposed ponds, which will be designed to hold water in least one year in three, will be located in areas accessible to the GCN populations recorded in baseline surveys.** There would also be an increase in the density and distribution of ponds within the wider landscape, benefiting the wider population. This would be a beneficial effect at Sub-Parish level (negligible) in the long-term.

12.6.2 The creation of hardstanding, roads, buildings and garden fencing would create physical barriers to movement for amphibians on-site. Associated drainage would present hazards in the form of gully pots which could trap amphibians, resulting in killing or injury to individuals. Without mitigation, this would be an adverse effect at Sub-Parish level (negligible) in the long-term.

#### *Reptiles*

12.6.3 The proposed green infrastructure and management measures would provide a gain in habitat extent and value for reptiles. However, reptile populations may be vulnerable to increased predation from domestic cats. Overall, post-construction effects are assessed as neutral in the long-term.

#### *Birds*

12.6.4 The proposed green infrastructure, including broadleaved woodland and native hedgerow translocation and planting, would provide alternative habitat for foraging and nesting birds, including notable species such as song thrush and dunnock. This would be a beneficial effect at Sub-Parish level in the long-term.

12.6.5 It would be expected that a proportion of households within the new development will own cats and, therefore, local bird populations may be adversely affected by increased predation. However, it would also be expected that a proportion of households within the development area would also provide supplementary feeding for birds, which is likely to help winter survival rates within the local population of some species, and has been shown to improve breeding success in the following spring (Robb *et al* 2008). Overall, effects on bird populations are assessed as neutral in the long-term.

#### *Bats*

12.6.6 The Proposed Development would maintain functional flight routes for bats around the Project Site and would prevent the fragmentation or isolation of habitat across the wider landscape. Green infrastructure would provide a range of foraging habitats and alternative commuting routes for bats within the Project Site. This would reduce the effects of site clearance for all species to neutral in the long-term.

12.6.7 Street lighting and residential lighting from properties could have an adverse effect on bats, particularly the more light-sensitive species. The impact of public-realm lighting on foraging and commuting bats is variable and depends upon the species concerned and the nature of their activity, as well as on the type and intensity of the lighting. Certain bat species are known to be relatively tolerant of artificial lighting e.g. common pipistrelle and noctule (Stone et al 2009, Stone 2013). These species are likely to continue to forage over the urban areas of the Project Site and are unlikely to be significantly impacted by public-realm lighting. Lighting directed to features used by light-sensitive species such as greater horseshoe, lesser horseshoe, long-eared bat, barbastelle and *Myotis* bats could potentially sever flight-paths with such species likely to avoid illuminated areas (Jones 2000, Stone 2013). Given the low occurrence of these species during the surveys, it is considered unlikely that the Project would compromise the local conservation status of any bat species. Without mitigation, lighting would be an adverse, long-term effect at the Sub-Parish level (negligible).

#### *Otter*

12.6.8 Otters passing along the watercourses within and adjacent to the Project Site could be disturbed by noise, recreational activity and lighting. However, all watercourses would be buffered from built development by green infrastructure and as a result this effect is considered to be neutral. No holts have been identified and otters would predominantly use the stream corridor at night when human activity would be minimal (apart from lighting; refer to paragraph [12.7.41](#) for measures to reduce lighting impacts).

12.6.9 Roads would not cross any of the identified watercourses within the Project Site. Traffic would also be speed restricted in accordance with the residential nature of the Proposed Development. Therefore the potential for collision is negligible. Overall, the effect on otter in the long-term would be neutral.

#### *Badger*

12.6.10 The two main setts located along the eastern and western Project Site boundaries would **be separated** from all built development. There is a risk that retained setts in proximity to residential areas, particularly Sett 2 on north-eastern Project site boundary may be subject to intentional or accidental damage from human activity due to proximity to urban settlement. This would be a long-term and adverse effect at Sub-Parish level (negligible). Human disturbance may also result in badgers emerging later from disturbed setts, affecting foraging periods and associated success of the impacted badger population. This would be a long-term and adverse effect at Sub-Parish level (negligible).

12.6.11 The new road layout and associated increase in the number of vehicles within the Project Site during periods when badgers are active could result in increased badger mortality from collisions with vehicles. However, as the new roads would be restricted to low speed limits, the

risk of collisions is unlikely to increase significantly. The effect would be a long-term and adverse effect at Sub-Parish level (negligible).

12.6.12 The proposed green infrastructure, including woodland and meadows, would reduce the effect of habitat loss on badgers during construction. Once complete, the Project would represent a net loss of foraging habitat, compounded by the increase in human activity which is likely to reduce the value of retained habitats in proximity to the setts. This would be a long-term and adverse effect at Sub-Parish level (not significant).

#### *Hedgehog*

12.6.13 Post-construction, hedgehogs are likely to use gardens and open space within the Project Site for foraging and shelter. However, the presence of new roads and increased traffic volume within the Project Site could result in an increase in hedgehog mortality. Impacts to hedgehogs are considered to be long-term and adverse at Sub-Parish level (negligible).

#### *Brown Hare*

12.6.14 It is assumed that brown hare would not be present on the Project Site as the post-construction habitats would be unsuitable for this species. Post-construction effects to brown hare are considered neutral.

## **12.7 ADDITIONAL MITIGATION, COMPENSATION & ENHANCEMENT MEASURES**

### **General**

12.7.1 A Landscape and Ecological Management Strategy (LEMS) would be produced for the Proposed Development. This would detail the over-arching management strategy for all ecological avoidance, mitigation and enhancement measures. The LEMS would provide a framework for the delivery of the following documents to be produced for each development phase; which would be secured through planning condition:

- Construction Ecological Management Plans (CECoMPs).
- Post-construction Landscape and Ecological Management Plan (LEMPs).

12.7.2 The LEMS would also set out responsibilities for management actions and the framework for ecological monitoring.

### **Construction**

12.7.3 All ecological avoidance and mitigation measures during construction would be detailed in the CECoMP which would be appended to the Construction Environmental Management Plan (CEMP). This would include:

- Construction-phase avoidance and protection measures for retained and proposed habitats within and adjacent to the Project Site. For woodland, trees and hedgerows, this would include compliance with BS5837 'Trees in relation to design, demolition and construction – Recommendations'.
- Pollution-prevention measures (following [www.gov.uk/guidance/pollution-prevention-for-businesses](http://www.gov.uk/guidance/pollution-prevention-for-businesses)).
- Protected-species mitigation and management measures for the construction phase; as detailed below.
- Details of requirements for Natural England Mitigation Licences.
- Habitat creation measures, cross-referencing landscape plans and specifications; refer to Green Infrastructure Parameter Plan (Figure 3.3) and Illustrative Landscape and Green Infrastructure Masterplan (Figure 3.6).
- Translocation of the approximately **0.0.78km** of species rich hedgerow to minimise habitat loss and establish alternative connectivity of habitats around the Project Site; refer to Illustrative Masterplan. The following details would be provided:
  - The identification of sections of hedgerow to be translocated.
  - The preparation of the existing hedgerows for translocation.
  - The identification and preparation of receptor areas.
  - Methods of hedgerow translocation and establishment including aftercare following the translocation.
  - Contingency measures for replacement of failed transplants following the translocation.

#### Designated Sites of Conservation Value

12.7.4 Measures to protect the non-statutory Park Mill Covert SNCI from damage during construction would include the use of temporary barriers (e.g. Heras fencing) which would be installed prior to the start of construction. The location of all protective fencing would be set out in the CECoMP for the relevant phases. Construction would be undertaken in accordance with BS 5837 'Trees in relation to construction - Recommendations'; a minimum buffer of 15m would be established. No construction activities, vehicles or storage would be permitted within this buffer

#### Habitats within and adjacent to the Project Site

12.7.5 All semi-natural and plantation broadleaved woodland within and adjacent to the Project Site would be retained and protected during construction. Retained trees and hedgerows would be protected from potential damage during construction through the use of temporary barriers (e.g. Heras fencing), which would be installed prior to the start of construction. Construction would be undertaken in accordance with BS 5837 'Trees in relation to construction'.

12.7.6 The watercourse within the Project Site would be protected through the installation of fencing, which would remain in place throughout the construction period. Construction would be undertaken in accordance with measures set out in the LEMS and CEMP/CECoMP to minimise silt transport, ensure appropriate disposal of contaminated water, and the safe storage and use of cement, fuel and chemicals.

#### Protected and Notable Species

##### *Plants*

12.7.7 The requirement for an invasive species survey, prior to the commencement of each phase of construction, would be set out in the LEMS and CECoMP(s). Should an invasive species be recorded within the Project Site, treatment and removal would be undertaken in line with the current guidance e.g. <https://www.gov.uk/guidance/prevent-the-spread-of-harmful-invasive-and-non-native-plants>.

##### *Invertebrates*

12.7.8 Retained habitats suitable for notable invertebrates such as woodland and watercourses would be protected during the course of construction as set out above. In addition, as part of the green infrastructure network, habitats of value for invertebrates including broadleaved woodland, species-rich meadow grassland and ponds, will be created.

##### *Amphibians*

**12.7.9 The habitats within the Project site are not considered to be “crucial to the life cycle” of GCN, nor represent a “very important part of a species’ entire habitat, needed to ensure its survival”. However, as the 2018/2019 surveys recorded small GCN populations in ponds between 110m and 150m to the east and west of the Project site boundaries the presence of individual GCN within site habitats cannot be excluded.**

**12.7.10 Site clearance in areas where GCN could be present (land within 250m of the confirmed GCN ponds; refer to Figure 12.3) would be undertaken in accordance with a Natural England GCN Mitigation Licence. An application for a Mitigation Licence application would be prepared following receipt of the relevant Reserved Matters Consent. The application would be supported by a Method Statement detailing site clearance methodology with reference to Policy 1 of Natural England’s ‘new’ policies for European Protected Species licensing (Natural England 2016). This provides flexibility when excluding GCN from development sites where exclusion or relocation measures are not necessary to maintain the conservation status of the local population, the avoid-mitigate-compensate hierarchy is followed; and compensation provides greater benefits to the local population than would exclusion and/or relocation.**



12.7.11 The green infrastructure network will secure the connectivity of suitable habitats for GCN across the site and create new terrestrial and aquatic habitats of value for amphibians including great crested newt. The location of the new habitats will accord with Policy 2 of the 'new' policies for European Protected Species licensing (Natural England 2016). This provides greater flexibility in the location of newly created habitats that compensate for habitats that will be lost where there are good reasons for maximising development on the site of impacts, and where an alternative solution provides greater benefit to the local population.

#### *Reptiles*

12.7.12 Measures would be implemented to ensure that accidental killing or injury to reptiles during site clearance was avoided. As the current application is Outline with details including layout and phasing to be confirmed through Reserved Matters applications, this mitigation strategy is currently indicative.

12.7.13 Due to the low numbers and restricted distribution of reptiles recorded within the Project Site, a full capture and translocation is not expected to be required. To prevent reptiles from being harmed, the anticipated approach would involve habitat manipulation through sequential reduction of vegetation height to encourage dispersal to un-affected areas of habitat. Low numbers of slow worm were recorded along the southern margin of a section of the east-west hedgerow within the Project Site. Retention and appropriate protection of an adjoining section of hedgerow would provide a secure habitat resource to which the small number of reptiles anticipated could be displaced. On completion of development, this hedgerow would connect to the proposed allotments, which would provide suitable habitat for slow worm colonisation. Habitat manipulation would be followed by a destructive search of suitable habitat, including hedgerows and scrub, by a consultant ecologist. Any individual reptiles found would be moved to suitable retained habitat outside of the work area.

12.7.14 In the event that construction requirements or development phasing would not facilitate this approach, the habitat identified as supporting a low slow worm population would be subject to a reptile translocation following best practice methodology. The CEMP for the relevant Reserved Matters phase would provide detail of translocation proposals including methodology, timing, fencing requirements and confirmation of the receptor site.

12.7.15 Reptile habitat would be created within the Project including the creation/enhancement of hedgerows, wildflower grassland, woodland and ponds, which would provide foraging habitat and shelter for common reptiles, in addition, reptile hibernaculae and log piles would be created

in suitable locations. A minimum of 10 hibernaculae would be created and would be specified in the LEMS and detailed in the CEcoMPs and LEMPs.

#### *Birds*

12.7.16 Clearance of suitable bird-nesting habitat, including hedgerow, scrub and grassland, would take place outside of the main bird-breeding season (i.e. between October and February) or would be subject to an inspection by an appropriately qualified ecologist to ensure that no nesting birds would be affected. If active bird nests were found, work in that area would be delayed until all chicks had fledged as confirmed by the ecologist.

12.7.17 A range of nest boxes to provide alternative nesting habitat for a range of species would be provided. Boxes would include those suitable for swifts (and other urban nesting species) to be integrated into new buildings. Tree mounted boxes would include small and large hole boxes, open fronted boxes and owl boxes installed within the areas of retained woodland and trees. The number, specifications and phasing of delivery of bird boxes would be detailed within the LEMS with exact locations specified in the CEcoMPs; a minimum of 100 boxes on buildings and 50 boxes on retained trees/woodland would be provided

#### *Bat Roosts*

12.7.18 Where works to trees identified with bat roost potential are required, an update assessment would be undertaken in accordance with best practice (BCT; Collins, 2016) to review the potential presence of roosts prior to works. If bat roosts were recorded, an application would be made for a Natural England Bat Mitigation Licence. This would detail in full the proposed mitigation measures. Mitigation would include provision of alternative bat roost features in proximity to the affected roost.

12.7.19 The LEMS would specify the requirement for additional roosting habitat for bats within the Proposed Development. Roost boxes could be incorporated into new buildings and installed within the areas of retained woodland and trees located in the public open space. The number, specifications and locations of proposed roost features would be detailed within each CEcoMP; a minimum of 100 boxes on buildings and 50 boxes on retained trees/woodland would be provided.

#### *Commuting and Foraging Bats*

12.7.20 All construction compounds and any temporary accommodation for contractors would be sited away from retained watercourses, hedgerows and woodland edges to minimise potential disturbance to commuting or foraging bats. No lighting would be left on overnight during the construction period. Any security lighting would be low-level and motion activated on short-timers.

12.7.21 The retention of woodland and translocation and enhancement of the hedgerow network, in addition to the creation of meadow grassland habitat and provision of wetland habitat associated with SUDS drainage design would enhance habitat connectivity to provide potential commuting routes for bat species across the Project Site.

12.7.22 Mitigation for the loss of foraging habitat would be provided through new habitat creation as summarised in Table 12.7, including woodland, hedgerows, species-rich grassland and waterbodies. The detail of the habitat creation would be set out in the LEMS and respective CEcoMPs and LEMPs.

#### *Otter*

12.7.23 Any construction lighting would be directed away from the watercourses in order to prevent disturbance to otters. Watercourses would be protected from damage by protective fencing where construction activities are adjacent. Adherence to Pollution Prevention Measures would ensure that adverse effects on watercourses were avoided; these would be set out in the LEMS and phase-specific CEMPs/CEcoMPs.

#### *Badger*

**12.7.24** The Proposed Development has sought to retain and incorporate existing badger setts into green infrastructure wherever possible, and to provide green links between the setts and areas of foraging habitat. **The final iteration of the Outline Masterplan results in a reduced quantum of green infrastructure in proximity to Sett 2. This was related to wider site constraints including the provision of necessary easements for existing utilities affecting placement of adjacent development cells. Detailed layouts will be reviewed as part of the relevant Reserved Matters applications with a habitat buffer extended around the Sett 2 where feasible.**

**12.7.25** **Due to the potential for construction to occur in close proximity to Sett 2, where Reserved Matters layouts cannot maintain an appropriate buffer between development and the sett, and it is considered that an offence under the Protection of Badger Act 1992 could occur, construction would be undertaken under Natural England Badger Development Licence. On the assumption that status of the sett remains unchanged, it is proposed that the sett entrances are closed temporarily under Licence with an artificial sett established in advance in a secluded location within the public open space approximately 50m to the north east of the current sett. The retained entrances would be reopened on completion of construction to provide the badgers with the option of returning to their original sett.**

12.7.26 Where retention of **any other** sett was not possible (refer to paragraph 12.6.22), closure of the sett would be undertaken in accordance with a Natural England Badger Mitigation Licence. An

update badger survey would be undertaken prior to the commencement of construction; this would inform the mitigation required which would be identified within the LEMS and respective CEcoMP(s).

12.7.27 Prior to the commencement of construction, a security fence would be installed around the perimeter of development areas, which would deter badgers from entering the areas of active construction. The fence would be retained throughout the construction period. Additional Project Site management measures would also be undertaken:

- Fires would not be lit and fuel/oil/chemicals would be stored in secure sites within the construction compound; and
- Excavations and piping (>200mm in diameter) would be fenced/capped overnight to deter badgers from entering. Excavations that cannot be covered would have a means of escape for any animals that may fall in (e.g. sloping sides/ramps e.g. minimum of 1:2 gradient).

#### *Hedgehog*

12.7.28 A search for hedgehogs would be undertaken by an experienced ecologist alongside the search for amphibians and reptiles. Any sheltering hedgehogs would be relocated to suitable habitat outside of the construction footprint.

12.7.29 Hedgehog passes would be created within new all garden fences at the time of construction to allow hedgehogs to move around the Project Site post-development. Each gap would have a minimum dimension of 13cm x 13cm and would be cut out of a gravel board on the bottom of the fence, or a similar sized gap left at the end of a board. One hedgehog pass would be created in each boundary fence. This would be detailed in the LEMS and CEcoMP.

### **Operation**

#### Designated Sites of Nature Conservation

12.7.30 No specific mitigation measures are required or proposed for the Severn Estuary Site Complex or any other European-designated site.

12.7.31 Park Mill Covert SNCI adjacent to the Project Site boundary would be buffered from development through use of fencing and planting (**within the development site**) to prevent direct access from the Proposed Development and thereby reducing the risk of increasing recreational impacts to the woodland. On-site recreational routes and habitat creation would also direct walkers/dog-walkers away from the SNCI. These requirements would be set out in the LEMS and relevant LEMP.

12.7.32 Ecological input will be provided to the preparation of Homeowner Packs, which will be to all home purchasers. This would include information key ecological features within and adjacent to the Project Site (e.g. Park Mill Covey SNCI), and the proposed ecological mitigation and enhancement measures.

#### Habitats on the Project Site

12.7.33 The LEMS and associated LEMP(s) would detail long-term management and monitoring of new and retained habitats within the Project Site, including retained woodland, grassland, watercourses, retained and translocated hedgerows and ponds. All proposed and retained habitats would be managed in accordance with the LEMPs. Management would be informed by ecological monitoring, as set out in the LEMS and LEMPs. Table 12.7 summarises the Habitat Balance (net change in habitats and associated areas) for the Project Site.)

**Table 12.7. Habitat Loss and Gain (Based on Green Infrastructure Parameter Plan; Rev K)**

Habitat		Pre-construction Areas	Habitat Lost	Habitat Created	Habitat Net Loss / Gain	
Grassland	Improved grassland	<u>33.5</u>	<u>33.5</u>	<u>0</u>	<u>-33.5 ha</u>	<u>-19.75 ha</u>
	Parkland comprising wildflower meadow, SUDS basins (wet grassland)	<u>0</u>	<u>0</u>	<u>9.15 ha</u>	<u>+ 9.15 ha</u>	
	Amenity grassland	<u>0</u>	<u>0</u>	<u>4.6 ha</u>	<u>+4.6 ha</u>	
Woodland and scrub	Semi-natural broadleaved woodland	<u>0.95ha</u>	<u>0</u>	<u>0</u>	<u>No change</u>	<u>+0.63 ha</u>
	Plantation broadleaved woodland	<u>0</u>	<u>0</u>	<u>0.83 ha</u>	<u>+ 0.83 ha</u>	
	Dense scrub	<u>0.2ha</u>	<u>0.2ha</u>	<u>0</u>	<u>- 0.2 ha</u>	
Allotments		<u>0</u>	<u>0</u>	<u>0.3 ha</u>	<u>+0.3 ha</u>	
Hedgerow		<u>3.4km</u>	<u>1.28 km including Project site access zones</u>	<u>0.78 km (translocated sections of removed hedges)</u>	<u>--0.50 km</u>	
Scattered Broadleaved trees		<u>:</u>	<u>10 no. (1 'young', 6 'early mature', 3 'mature')</u>	<u>125 (estimate)</u>	<u>:</u>	
Running water		<u>0.3km</u>	<u>0</u>	<u>0</u>	<u>No change</u>	
Pond (including permanent water within SUDS basins)		<u>0.01ha (two ponds)</u>	<u>0.01 ha (two ponds)</u>	<u>0.03 ha (three ponds)</u>	<u>+ 0.02 ha</u>	

12.7.34 Where residential gardens abutted retained or proposed new hedgerows, a post and wire mesh fence would be installed (as opposed to a close-board fence). This would protect the hedge and allow the vegetation to grow through the wire-fencing, whilst avoiding any adverse effects of shading.

#### Protected and Notable Species

##### *Plants*

12.7.35 No mitigation is required post-construction as no significant effects on notable plants are predicted during the operation phase of Proposed Development.

##### *Invertebrates*

12.7.36 No mitigation is required post-construction as no significant effects on notable invertebrates are predicted during the operation phase of Proposed Development.

##### *Amphibians*

12.7.37 Habitats created as part of the Proposed Development would be managed in accordance with the LEMP(s) for the benefit of amphibians including great crested newt. This would include details relating to the frequency and height of grassland management and timing of maintenance of ponds to avoid the most sensitive periods for amphibians.

12.7.38 Highways and drainage design would include inset kerb stones around gully pots to reduce the risk of entrapment of amphibians, including GCN. Gaps would also be left under close-board fences along residential boundaries to allow GCNs to move around the site.

##### *Reptiles*

12.7.39 Habitats created as part of landscape strategy would be managed for the benefit of reptiles in accordance with each LEMP; this would include details relating to the frequency and height of grassland management.

##### *Birds*

12.7.40 The LEMP would include restrictions on timing of vegetation management to avoid impacts on nesting birds. Actions for bird boxes in the public realm to be checked and maintained annually (and replaced as necessary) would also be documented in the LEMS and respective LEMPs.

##### *Bats*

12.7.41 The detailed design of public-realm lighting would seek to minimise the adverse effects on bats in accordance with current research (Stone 2015, Rowse et al 2016). Lighting would be avoided as far as possible within the public open space (where health and safety considerations

permitted) to maximise the value of the retained and new habitats for light-averse bat species. Where essential, lighting would be the minimum necessary to meet public safety requirements and designed to direct light to discrete areas appropriate for the task and prevent spill on to adjacent habitats. Lighting parameters for key locations for bats including along the woodland edges would be incorporated in the LEMP. The lighting design would consider the following characteristics.

- Narrow Spectrum lights with no UV content; e.g. warm white LED (up to 3000K).
- Variable lighting regimes (motion sensors or part night lighting) in areas close to watercourse and Project Site boundaries
- Directional downlights - illuminating below the horizontal plane ideally at least 20° below the horizontal.
- Reducing the height of light units (whilst ensuring light does not spill above the horizontal plane).
- Use of fore/rear shields to restrict light direction.
- Avoidance of upward light (e.g. ground mounted floodlights up-lighting trees, buildings and vegetation).

12.7.42 As part of the lighting strategy, a lighting assessment, including lux contour plans from street lighting would be prepared and submitted in support of each LEMP; this requirement would be set out in the LEMS.

#### *Otter*

12.7.43 Lighting parameters set out in Paragraph **12.7.42** would avoid adverse effects on otter movements

#### *Badger*

12.7.44 The lighting parameters set out in Paragraph **12.7.42** would avoid adverse effects on badger movements and foraging.

## **12.8 RESIDUAL ENVIRONMENTAL IMPACTS & EFFECTS**

12.8.1 A summary of the residual impacts and effects is provided in Table 12.8.

### **Construction**

#### *Designated Sites of Nature Conservation Value*

12.8.2 There would be no risk or probability of a Likely Significant Effect on the Conservation Objectives of any European-designated Site as a result of the Development during construction. Effects are neutral.

12.8.3 Implementation of the LEMS and associated CECoMPs, including protective fencing and pollution prevention measures, would ensure that there would be no residual adverse impacts on Parkmill Covert SNCI, including associated Ancient Woodland. Effects are neutral.

#### *Habitats*

12.8.4 Loss of habitats during the construction phase would be an adverse, medium-term effect at up to Parish level; a Minor adverse effect. This would be mitigated in the long-term as created habitats mature; effects would be beneficial at the Sub-Parish level in the long-term (Negligible significance but gain achieved). Mitigation to control disturbance, accidental damage and pollution through a CECoMP (appended to a CEMP) would ensure there was a negligible residual effect on retained habitats during construction.

#### *Species*

12.8.5 Habitat loss during construction affecting plants, invertebrates, amphibians, reptiles, breeding birds, and otter, would be an adverse, medium-term effect at Sub-Parish level (negligible). Effects on bats, badgers, brown hare and hedgehog would be adverse at the Sub-Parish level in the long-term.

12.8.6 Species-specific measures would be implemented during construction to avoid or mitigate disturbance or direct impacts (e.g. killing or injury) affecting amphibians, reptiles, birds, bats, otter, badger, and hedgehog.

### **Occupation**

#### *Designated sites of nature conservation value*

12.8.7 There would be no risk or probability of a Likely Significant Effect on the Conservation Objectives of any European-designated Sites as a result of the Proposed Development during the occupation phase. Effects would be neutral.

12.8.8 Implementation of the LEMS and associated LEMPs would ensure that Parkmill Covert SNCI, adjacent to the Project Site was protected during the occupation phase of development. Management actions in the LEMS and respective LEMPs would also ensure that potential adverse impacts of human access were avoided. Therefore, residual effects would be negligible. No effects on other statutory sites are predicted.

#### *Habitats*

12.8.9 Loss of improved grassland, broadleaved trees, hedgerow and one pond during the construction phase would be mitigated in the long-term by new habitat creation within the Project Site, including new woodland, hedgerow, wildflower meadow, orchard and ponds. The SUDS design would ensure that there would be no significant change to the quality or quantity of water



entering the watercourses. Implementation of the LEMS and associated LEMP would ensure effective long-term management of these habitats. Overall, it is considered that there would be a beneficial, long-term effect on habitats at Sub-Parish level (negligible but gain achieved).

### *Species*

12.8.10 New habitats within the Project Site would provide habitat for a range of species, including invertebrates, amphibians, reptiles, birds, badger, bats, and hedgehog. This would reduce the effects during construction to neutral to beneficial at the Sub-Parish level for plants, invertebrates, amphibians, reptiles, birds and otters in the long-term (negligible). Effects on bats, badgers, brown hare and hedgehog would be adverse at the Sub-Parish level in the long-term (negligible); whilst adverse, it is considered that the integrity of the local populations of these species would be not be adversely affected.

## **12.9 CUMULATIVE EFFECTS**

12.9.1 Details of other developments that may affect the same receptors identified within this assessment are detailed in Chapter 5. These sites have been considered in the assessment of cumulative effects below.

12.9.2 There would be no risk or probability of a Likely Significant Effect on European Sites as a result of the Project alone or in-combination with any other proposed developments. Effects would remain neutral.

12.9.3 Habitat loss resulting from the Proposed Development has potential to contribute towards cumulative impacts in the medium-term, where similar habitats are affected on other sites. However, this would not change the significance of any of the habitat effects identified in isolation. Furthermore, there would be a net gain at the habitat level in the long-term, which means that there would not be any adverse effects carried forward for cumulative effects in the long-term. Overall, effects would remain neutral to beneficial at the habitat level.

12.9.4 Residual adverse effects at the Sub-Parish level (negligible) are predicted for bats, badgers, brown hare and hedgehog (refer to Table 12.8) The Proposed Development may contribute towards cumulative effects on these species via the adverse effects set out in this assessment. However, it is considered that the in-combination effects would not increase beyond those identified in isolation i.e. limited to the Sub-Parish level and negligible. Effects on other species may also occur in the medium-term in-combination but, again, would not increase beyond those identified in isolation. There would not be any in-combination effect on these species in the long-term.

## 12.10 ASSESSMENT SUMMARY

### Methodology

12.10.1 The ecological assessment has considered the effects of the Proposed Development on features of ecological value. The assessment was undertaken in accordance with BS42020:2013 and Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines (2018).

### Baseline

12.10.2 There are no European designated sites within or immediately adjacent to the Project Site. Six European designated sites occur within 10km of the Project Site. The closest of these are the overlapping Severn Estuary European sites which comprise the Severn Estuary Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar Site (hereafter referred to as 'the Severn Estuary Site Complex'), which lies 2.8km to the west. There are four national statutory designated sites (Sites of Special Scientific Interest (SSSI)) within the 5km of the Project Site; Severn Estuary SSSI, 2.8km to the west and three geological SSSI.

12.10.3 Eleven non-statutory sites of nature conservation value, lie within 2km of the Project Site including Park Mill Covert Site of Nature Conservation Interest (SNCI), which lies immediately adjacent to the western boundary of the Project Site. This is also designated for Ancient Woodland.

12.10.4 Agricultural habitats including improved grassland surrounded by species-poor hedgerows form the majority of the Project Site. Other habitats included semi-natural and plantation broadleaved woodland, broadleaved trees, running water, dry and wet ditches and standing water.

12.10.5 Small populations of great crested newt (GCN), which is legally protected and a Priority Species, were recorded ponds approximately 110m east and 150m west of the Project Site. No evidence of GCN was recorded in ponds within the Project Site however the hedgerows, woodland and grassland provided suitable terrestrial habitat. Common frog and palmate newt were recorded within the Project Site and common toad may also occur.

12.10.6 A 'low' population of slow-worm, which is legally protected and Priority Species, occurred within the Project Site. A total of 35 species of birds was also recorded; breeding 'Species of Conservation Concern' and Priority Species included dunnock, song thrush and stock dove. All breeding birds, their nests, eggs and young are legally protected.

12.10.7 No bat roosts were identified within the Project Site. At least ten species of bat were recorded foraging and navigating within the Project Site. Very low levels of activity from notable species including greater horseshoe bat, lesser horseshoe bat and barbastelle were recorded. All bat

activity was recorded was considered to be indicative of foraging and commuting activity by low numbers of bats. All bats and their roosts are legally protected, and several species are Priority Species.

12.10.8 A number of badger setts were recorded across the Project Site, including two 'Main' setts. Badgers and their setts are legally protected. Evidence of otter activity was recorded along Pickedmoor Brook. Otters and their resting places are legally protected; otter is also a Priority Species. No dormice, water vole or white clawed crayfish were recorded.

## **Mitigation**

12.10.9 Measures to mitigate adverse Project Site impacts and provide biodiversity enhancement would include the following:

- Retention, protection and buffering of non-statutory designated sites and other Priority Habitats.
- Protection and creation of robust habitat corridors.
- Extensive habitat creation, including woodland, meadow grassland, hedgerow and ponds.
- Construction management measures to protect retained habitat and protected/notable species.
- Residential garden fencing to protect adjacent habitat and also allow species movement.
- Mitigation measures for drainage and roads to avoid long-term effects on great crested newt.
- Boxes for bat and birds on buildings and retained trees/woodland
- Lighting specifications to maintain continuous dark corridors for bats and otters.

12.10.10 The Environmental Impact Assessment Scoping Report (refer to Appendix 5.1) correctly identified the need for this Environmental Statement to assess the potential effects of the Project on European-designated sites, and that mitigation measures may be required for adverse effects. The assessment process undertaken within this chapter has concluded that there would be no risk or probability of a Likely Significant Effect on any of the identified European- designated sites. Therefore, no mitigation measures are required or proposed.

## **Residual Construction Effects**

12.10.11 Table 12.8 contains a summary of the likely effects of the Proposed Development. There would be no risk or probability of a Likely Significant Effect on any of European Site as a result of the Project. With the provision of the identified mitigation impacts on all other designated

sites would be negligible i.e. not significant. Loss of habitats during the construction phase would be Minor adverse in the medium-term.

**12.10.12** Effects of construction on plants, invertebrates, amphibians, reptiles, birds, and otter, would be adverse (negligible) in the medium-term. Effects of construction on bats, badger, brown hare and hedgehog would be adverse (negligible) in the long-term.

### **Residual occupation effects**

12.10.13 There would be no risk or probability of a Likely Significant Effect on any European Site as a result of the Project. With the provision of the identified mitigation impacts, no residual effects on other designated sites are predicted. Residual habitat effects would be beneficial (negligible) in the long-term.

12.10.14 Effects during the occupation phase on plants, invertebrates, amphibians, reptiles, birds and otter, would be neutral/negligible in the long-term medium-term. Effects on bats, badger, brown hare and hedgehog would remain adverse (negligible) in the long-term.

### **Cumulative Impacts**

12.10.15 There would be no risk or probability of a Likely Significant Effect on European Sites as a result of the Project alone or in combination with other developments.

12.10.16 Habitat loss resulting from the Project has potential to contribute towards cumulative impacts where similar habitats are affected on other sites. The low level of importance assigned to these habitats and proposed design and mitigation measures incorporated into the Project mean that construction effects would remain at Minor adverse in the Medium term, changing to beneficial in the long-term (negligible). Similarly, effects for most species would remain at Minor adverse/negligible in the medium-term, reducing to neutral in the long-term. Long-term effects would remain for bats, badgers, brown hare and hedgehog in the long-term. However, when considered in combination with other projects, these would not affect the integrity of local populations of these species.

**Table 12.8: Ecology Assessment Summary**

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
<b>Construction effects</b>								
Pollution of Severn Estuary SAC, SPA, SSSI and Ramsar site	International	No impact	Neutral	Neutral	No specific mitigation required. Standard Construction pollution prevention measures to be implemented through CEcoMP/CEMP.	Neutral	Neutral	High
Damage to Park Mill Covert SNCI, including Ancient Woodland	County	Medium term	County	Neutral	Construction habitat protection measures including installation of fencing to be implemented through CEcoMP/CEMP	Neutral	Neutral	High
Loss of improved grassland.	Sub-Parish	Medium term	Sub Parish	Negligible	Habitat creation in accordance with Landscape Strategy	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
Loss of hedgerows, broadleaved trees and pond	Parish	Permanent	Parish	Minor Adverse	Habitat Creation in accordance with landscape strategy to include translocation of hedgerows	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
Damage to retained habitats within and adjacent to site (broadleaved woodland, broadleaved trees, hedgerows and water courses)	Parish - County	Long term	Parish - County	Negligible	Construction habitat protection measures including installation of fencing to be implemented.	Neutral	Neutral	High
Pollution of water courses	Parish	Short term	Parish	Minor adverse	Standard Construction pollution prevention measures to be implemented	Neutral	Neutral	High
Loss of habitat for range of invertebrates	Sub-Parish	Medium - term	Sub-Parish	Negligible	Habitat creation including broadleaved woodland, meadow grassland and ponds in accordance with landscape strategy.	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
Risk of killing/injury of amphibians	Parish	Acute	Sub-Parish	Minor Adverse	Implementation of mitigation strategy <b>in accordance with</b>	Neutral	Neutral	High

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
					<u>Natural England Mitigation Licence(s)</u> .			
Habitat loss for amphibians	Parish	Medium - term	Sub-Parish	Minor Adverse	Habitat creation in accordance with landscape strategy <u>and Natural England Mitigation Licence(s)</u> .	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
<u>Habitat fragmentation for amphibians</u>	<u>Parish</u>	<u>Medium - term</u>	<u>Sub-Parish</u>	<u>Minor Adverse</u>	<u>Habitat retention and creation in accordance with landscape strategy and Natural England Mitigation Licence(s)</u> .	<u>Sub Parish</u>	<u>Negligible</u>	<u>High</u>
Risk of killing/injury of reptiles	Sub-Parish	Acute	Sub-Parish	Negligible	Implementation of mitigation strategy including habitat manipulation and hand searches prior to site clearance.	Neutral	Neutral	High
Habitat loss for reptiles	Sub-Parish	Medium - term	Sub-Parish	Negligible	Habitat creation in accordance with Landscape Strategy. Provision of hibernacula to enhance habitats.	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
Direct impacts on nesting birds	Sub-Parish	Acute	Sub-Parish	Negligible	Retention of habitats to maintain current range of habitats Site clearance outside nesting season or checks undertaken by ecologist.	Neutral	Neutral	High
Construction noise and visual disturbance on nesting birds,	Sub-Parish	Short term	Sub-Parish	Negligible	Retention of habitats to maintain current range of habitats Site clearance outside nesting season or checks undertaken by ecologist.	Sub Parish	Negligible	High

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
Loss of bird nesting and foraging habitat	Sub-Parish	Medium - term	Sub-Parish	Negligible	Habitat creation including hedgerows and woodland in accordance with landscape strategy.  Provision of a range of nest boxes in woodland and integrated into new buildings.	Sub Parish	Negligible in long-term as habitats mature.	High
Loss of bat roost resource	Sub-Parish	Medium term	Sub-Parish	Negligible	Provision of alternative roosting opportunities including bat boxes in retained woodland and integrated into buildings	Sub Parish	Negligible to Minor Beneficial in the long term	High
Habitat loss/ fragmentation for foraging / commuting bats	Parish	Medium term	Sub-Parish	Negligible	Retention of most valuable habitat features including watercourses and woodland.  Habitat creation in accordance with Landscape Strategy to include translocation of hedgerows	Sub Parish	Negligible to Minor Beneficial in long-term as habitats mature.	High
Habitat fragmentation for foraging / commuting bats from construction lighting	Parish	Short term	Sub-Parish	Negligible	Control of construction lighting through CEcoMP/CEMP.	Sub Parish	Negligible	High
Badger Sett damage or destruction and killing or injury of badgers	Sub-Parish	Acute	Sub-Parish	Negligible	Retention of setts and access to foraging habitat <b><u>and / or creation of an artificial replacement sett.</u></b>  <b><u>Temporary or permanent</u></b> closure of any setts undertaken under Natural England Badger Development Licence	Sub Parish	Negligible	High
Badger habitat loss	Sub-Parish	Long term	Sub-Parish	Negligible	Habitat creation in accordance with landscape strategy.	Sub Parish	Negligible	High
Entrapment / injury of Badgers	Sub-Parish	Short Term	Sub-Parish	Negligible	Installation of perimeter fencing, safe storage of construction materials and provision of escape routes from trenches.	Sub Parish	Negligible	High
Risk of killing/injury of hedgehogs	Sub-Parish		Sub-Parish	Negligible	Hand search prior to site clearance	Sub Parish	Negligible	High

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
		Acute						
Hedgehog habitat loss	Sub-Parish	Long term	Sub-Parish	Negligible	Habitat creation in accordance with landscape strategy.	Sub Parish	Negligible	High
Brown hare habitat loss	Sub-Parish	Long term	Sub-Parish	Negligible	None	Sub Parish	Negligible	High
<b>Operation effects</b>								
Recreation damage to Severn Estuary SAC, SPA, SSSI and Ramsar site	International	No impact	Neutral	Neutral	No mitigation required. Inherent provision of Public Open Space suitable for recreational activities including dog walking.	Neutral	Neutral	High
Air / water pollution damage to Severn Estuary SAC, SPA , SSSI and Ramsar site	International	No impact	Neutral	Neutral	No mitigation required.	Neutral	Neutral	High
Recreation damage to Park Mill Covert SNCI	County	Long term	County	Minor Adverse	Structural planting and public access controls as part of landscape strategy. LEMS to provide framework for habitat delivery and management. LEMPs to be prepared for each Development phase. Wildlife information leaflets provided for all new residents to inform about importance of habitats within and adjacent to the site.	Neutral	Neutral	High
Retained and created habitats including woodland, meadow grassland, hedgerows and ponds.	Parish	Long term	Sub-Parish	Negligible – Minor Benefit	LEMS to provide framework for habitat delivery and management. LEMPs to be prepared for each Development phase.	Sub Parish	Negligible – Minor Benefit	High



Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
Damage from residents on retained/proposed habitats including hedgerows, woodland and ponds. .	Parish	Long term	Sub-Parish	Negligible	LEMS to provide framework for habitat delivery and management. LEMPs to be prepared for each Development phase. Separation of hedgerows from boundaries to residential plots.  Wildlife information leaflets provided for all new residents to inform about importance of habitats within and adjacent to the site.	Neutral	Neutral	High
Killing / injury of amphibians through drainage / gully pots	Sub-Parish	Long term	Sub-Parish	Negligible	Design of drainage to include offset or slope kerbs adjacent to gully pots.	Neutral	Neutral	Medium
Cat predation on nesting birds	Sub-Parish	Long term	Sub-Parish	Negligible	Predation risk offset through proposed habitat creation measures.	Sub Parish	Negligible	High
Bat habitat fragmentation (lighting)	Parish	Long term	Sub-Parish	Negligible	Lighting design for public realm informed by a lighting assessment to minimise impacts on bats and maintain dark corridors along key flight paths.	Sub Parish	Negligible	High
Otter Habitat fragmentation (lighting)	Parish	Long term	Sub-Parish	Negligible	Lighting design for public realm to consider impacts on otters and maintain dark corridors	Neutral	Neutral	High
Badger habitat fragmentation, lighting and roads	Sub-Parish	Long term	Sub-Parish	Negligible	Lighting design for public realm to minimise impacts on badgers and maintain dark corridors. LEMS to provide framework for habitat delivery and management, including for badgers. LEMPs to be prepared for each Development phase.	Sub Parish	Negligible	High
Badger vehicle collisions / mortality	Sub-Parish	Long term	Sub-Parish	Negligible	None	Sub Parish	Negligible	High
Hedgehog vehicle collisions / mortality	Sub-Parish	Long-term	Sub-Parish	Negligible	Habitat creation in accordance with landscape strategy.	Sub Parish	Negligible	High

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect	Confidence Level
					Hedgehog passes incorporated into boundary fences.			
<b>Cumulative Effects</b>								
Recreation damage to Severn Estuary SAC, SPA, SSSI and Ramsar site		All new housing in proximity to the Severn Estuary sites may introduce recreational pressures to the Estuary.			No specific mitigation. Provision of Public Open Space including well connected footpath network would have the incidental effect of reducing the likely number of visits to the Severn Estuary Site complex by residents.		No risk or probability of a likely Significant Effect alone or in combination with other projects or plans	High
Habitats		Habitat loss resulting from the Project has potential to contribute towards cumulative impacts where similar habitats are affected on other sites. This includes the loss hedgerows, improved grassland and broadleaved trees.			Habitat creation through in accordance with Landscape Strategy.		Negligible	High
Species		The Project may contribute towards cumulative effects on bats, badgers, brown hare and hedgehog.			Habitat creation through in accordance with Landscape Strategy.		Negligible	High

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