South Gillingham Consortium

South Gillingham, Dorset

Extended Phase 1 Habitat Survey

27 November 2017

The Pavilion, 1st Floor, Botleigh Grange Office Campus, Hedge End, Southampton, Hampshire, SO30 2AF

Tel: 02382 022800 Fax: 02382 022889

Email: ecology@wyg.com

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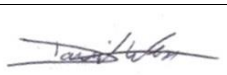
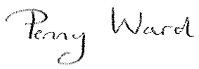
Prepared by:	David West Principal Ecologist	Signed: 
Reviewed by:	Penny Ward Principal Ecologist	Signed: 
Verified by: On behalf of:	Clare May Associate Ecologist Claire Wilmer Director of Ecology	Signed: 

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Executive Summary

Site Description and Scope of Works
The site is located to the south of the town of Gillingham in Dorset, centred on OS grid reference ST819488. It covers an area of approximately 91.8 ha and is divided into three areas. Park Farm, the eastern area is located to the east of Shaftesbury Road. West of Shaftesbury Road lies Ham Farm, the central area. West of Ham Farm lies Newhouse Farm, the western area. To the north of Ham Farm lies the residential area of Ham Common. West of Ham Common runs the River Lodden, with the Lodden Lakes beyond, which forms the northern boundary of Newhouse Farm. To the south and west of the site lie agricultural areas including both pasture and arable fields, with hedgerow networks. The northern and eastern boundary of Park Farm comprises Fern Brook, with further agricultural areas beyond. Park Farm comprises a matrix of habitats including improved grassland pasture grazed by horses, sheep and cattle, species-poor hedgerows with mature trees, broadleaved plantation woodland, neutral semi-improved grassland, bare ground and buildings. Ham Farm comprises a matrix of improved grassland pasture grazed by cattle, neutral semi-improved grassland, broadleaved plantation woodland, species-poor and species-rich hedgerows with mature trees and bare ground. Newhouse Farm comprises a matrix of improved grassland pasture grazed by cattle, species-poor hedgerows with mature trees and bare ground. There are six ponds located on site, a running ditch within Newhouse Farm and two watercourses flowing along the northern boundary of Newhouse Farm and the north and east boundaries of Park Farm.

Potential Constraints	Yes	No
Bats		
Has the site been assessed for bats?	✓	
Are there any structures or trees on site which have the potential to support roosting bats? (see section 5.3.3)	✓	
Breeding Birds including Barn Owls		
Has the site been assessed for breeding birds including barn owls?	✓	
Will areas of hedgerow, scrub, woodland, trees or other features likely to be used by nesting birds be affected by the proposal? (see Section 5.3.6)	✓	
Badgers		
Has the site been assessed for badgers?	✓	
Is there any evidence of badgers on or near the application site including setts, foraging or commuting? (see Section 5.3.4)	✓	
Dormice		
Has the site been assessed for dormice?	✓	
Is there suitable habitat for dormice on, or close to the application site? (see Section 5.3.5)	✓	
Great crested newts		
Has the site been assessed for great crested newts?	✓	
Is there suitable habitat for great crested newts on, or close to the application site? (see Section 5.3.1)	✓	
Reptiles		

Has the site been assessed for reptiles?	✓	
Is there suitable habitat on the site for reptiles? (see Section 5.3.2)	✓	
Other features of nature conservation interest		
Does the application site support Habitats of Principal Importance or Local Biodiversity Action Plan Priority Habitats?	The site supports ponds and important hedgerows.	
Does the application site support Species of Principal Importance or Local Biodiversity Action Plan Species?	Yes	
Great crested newts, reptiles, bats, dormice, birds, water voles, otters.		
Have details of biodiversity enhancements been included with the application?	✓	
Recommendations	**Yes**	**No**
Are further surveys/ ecological work recommended to inform the ecological impact assessment?	✓	

The following surveys are recommended to inform any future planning application:

- Great crested newt presence/likely absence surveys of all potentially suitable waterbodies on site and within 500m.
- Reptile presence/likely absence surveys.
- If any trees are to be impacted by the proposed development, a bat roost assessment should be undertaken to assess the potential of the trees to roosting bats. In the event that the tree holds potential to roosting bats, further emergence/return surveys are likely to be required.
- Bat activity surveys once per month from April to September including the placement of automated recorders.
- Dormouse presence/likely absence surveys.
- Breeding bird surveys
- Barn owl survey.
- Badger survey.

The following surveys are recommended if bridge works are proposed within 8m of either of the streams:

- Water vole and otter survey.

Is mitigation (including avoidance/compensation) and enhancement recommended?	✓	

The following recommendations are made:

<u>Design Recommendations</u>

- Ongoing consultation with ecology team throughout the design stage.
- An Ecological Mitigation and Management Plan is recommended to incorporate measures to prevent impacts to habitats during the construction and operational phases of the development.
- A 'bat sensitive' lighting scheme to be designed to direct lighting away from areas of retained habitat to provide dark corridors for commuting bats within and around the final development.
- Breathable Roof Membranes to be avoided within new buildings as these are dangerous to bats.
-

<u>Construction Recommendations</u>

- A buffer of at least 15m to be retained between the watercourses and any proposed development.
- Any construction works within close proximity to the watercourses should be carried out in accordance with best practice pollution prevention guidance.
- Hedgerows to be retained on site where possible. Any removal of vegetation to be undertaken outside nesting bird season, which runs from March to September inclusive. If this is not possible, then a thorough check for nesting birds should be made prior to site clearance. If any active nests are found they must remain *in situ* until all the young have fledged.

<u>Enhancement Recommendations</u>

- Retained hedgerows to be enhanced through infill planting of native hedgerow species of local provenance and new native hedgerows to be planted at the site where possible.
- A range of native trees and shrubs to be planted as part of the landscaping for the site.
- It is recommended that bird and bat boxes are installed on trees to enhance the site for bats and nesting birds.
- Dead wood to be retained on site to provide an enhancement for invertebrates, including stag beetles.

The details of this report will remain valid for a period of two years (until March 2017). Beyond this period, if works have not yet been started, it is recommended that a new review of the ecological conditions is undertaken.

1.0 Introduction

1.1 Background

WYG was commissioned by South Gillingham Consortium in March 2015 to undertake an extended Phase 1 Habitat survey of a proposed development at a site in South Gillingham (hereafter referred to as 'the site'). This survey follows previous assessments completed for individual parcels of land including Ham Farm by Ecology Solutions in 2012 and of Park Farm by SLR in 2012 and 2014. Observations taken during the 2012 Ham Farm survey informed an Ecological Constraints Plan by Ecology Solutions for Newhouse Farm in 2012, however no site survey was undertaken. At no time has the entirety of the site been comprehensively assessed. The site layout is shown in Figure 1, Appendix A.

1.2 Site Location and General Description

The site is located to the south of the town of Gillingham in Dorset, centred on OS grid reference ST819488. It covers an area of approximately 91.8 ha and is divided into three areas. Park Farm, the eastern area is located to the east of Shaftesbury Road. West of Shaftesbury Road lies Ham Farm, the central area. West of Ham Farm lies Newhouse Farm, the western area. To the north of Ham Farm lies the residential area of Ham Common. West of Ham Common runs the River Lodden, with the Lodden Lakes beyond, which forms the northern boundary of Newhouse Farm. To the south and west of the site lie agricultural areas including both pasture and arable fields, with hedgerow networks. The northern and eastern boundary of Park Farm comprises Fern Brook, with further agricultural areas beyond.

Park Farm comprises a matrix of habitats including improved grassland pasture grazed by horses, sheep and cattle, species-poor hedgerows with mature trees, broadleaved plantation woodland, neutral semi-improved grassland, bare ground and buildings. Ham Farm comprises a matrix of improved grassland pasture grazed by cattle, neutral semi-improved grassland, broadleaved plantation woodland, species-poor and species-rich hedgerows with mature trees and bare ground. Newhouse Farm comprises a matrix of improved grassland pasture grazed by cattle, species-poor hedgerows with mature trees and bare ground. There are six ponds located on site, a running ditch within Newhouse Farm and two watercourses flowing along the northern boundary of Newhouse Farm and the north and east boundaries of Park Farm.

1.3 Development Proposals

The site has been identified within Polocy 17 of the emerging North Dorset Local Plan 2011-2026. Development proposals are for up to 1800 residential dwellings with associated schools, new access roads open space and sustainable urban drainage. The masterplan framework for the site includes a significant buffer of approximately 100m from the River Lodden and Fern Brook as well as numerous other features of ecological interest.

1.4 Survey and Reporting Objectives

The ecological investigations undertaken by WYG included the following objectives:

- A desk study to obtain existing information on statutory and non-statutory sites of nature conservation interest, and records of protected/notable species within the site and its surroundings;
- An extended Phase 1 habitat survey involving a walkover of the site to record habitat types and dominant vegetation, invasive species, a reconnaissance survey for evidence of protected fauna or habitats capable of supporting such species;
- An external bat roost assessment of buildings to record any changes following the previous surveys at the site by Ecology Solutions and SLR;
- An assessment of the potential ecological constraints to the proposed works at the site and recommendations for further survey, avoidance, mitigation and enhancement where appropriate.

2.0 Desk Study

2.1 Methodology

Information was gathered from the Dorset Environmental Records Centre, the ecological records centre for Dorset, regarding the presence of nature conservation designations and protected and notable species within 2km of the boundary of the proposed development site (a 5km search was undertaken for bat species). In addition, a search for designations was made using the Multi Agency Geographic Information for the Countryside database (MAGIC).

The data search covers:

- Statutory nature conservation designations, such as National Nature Reserves and Sites of Special Scientific Interest;
- Non-statutory nature conservation designations, such as Sites of Importance for Nature Conservation;
- Records of protected species, such as badgers, great crested newts and bats; and
- Records of notable species, such as those listed in the local Biodiversity Action Plan.
- Review of previous ecological reports

The data search does not cover Tree Protection Orders or Conservation Areas.

2.2 Desk Study Results

2.2.1 Statutory Sites

There are no statutory designated sites located within 2km of the site. Five sites are located within 20km (see **Table 1**).

Designated site	Distance and direction from site	Reasons for designation
Fontmell & Melbury Downs SAC	7.2 km south east of the site.	This inland site supports consistently large populations of early gentian (*Gentianella anglica*) numbering many thousands of plants. The site includes large areas of species-rich chalk grassland and is one of three sites selected in the centre of the main range of the species.
River Avon SAC	14.2 km east of the site.	The Avon in southern England is a large, lowland river system that includes sections running through chalk and clay, with transitions between the two. Five aquatic *Ranunculus* species occur in the river system, but stream water-crowfoot (*Ranunculus penicillatus* ssp.) and river water crowfoot (*Ranunculus fluitans*) are the main dominants.
Prescombe Down SAC	15.4 km east of the site.	Prescombe down is one of three sites selected in the central part of the range for early gentian. It holds very significant populations of hundreds of thousands of plants in high-quality chalk grassland that has been sympathetically managed for many years. Marsh fritillary butterfly (*Euphydryas aurinia*) is present as a qualifying feature but not a primary reason for the selection.
Chilmark Quarries SAC	15.5 north east of the site.	This complex of abandoned stone mines provides suitable hibernation conditions for a range of bat species and has a long history of usage by greater horseshoe bats (*Rhinolophus ferrumequinum*) This complex of abandoned mines in central-southern England is regularly used by small numbers of barbastelle (*Barbastella barbastellus*) as a hibernation site. The site also contains an important assemblage of other bat species, including 1323 Bechstein's bat (*Myotis bechsteinii*) for which this site has also been selected, indicating that conditions at this site are particularly favourable for the survival of these bat species.
Rooksmoor SAC	15.7 km south west of the site.	Representing marsh fritillary in the southern part of its range in England, Rooksmoor supports an exceptionally large population within a cluster of sites in the Dorset stronghold. A large outlying population at Lydlinch has

Designated site	Distance and direction from site	Reasons for designation
		been included in this site as it is considered to be part of the metapopulation in this area.

2.2.2 Non-statutory Sites

The data received from DERC provides details of two non-statutory designated sites known as Sites of Nature Conservation Interest (SNCI) within 2km of the site. In addition there are two Habitat Restoration Sites (HRS). Refer to **Table 2** for details for these sites.

Table 2: Details of SNCIs within 2 km of the site

Name	Distance and direction from development site	Reason for designation
King's Court Wood SNCI	1.53 km north east of the site.	A large oak/ash woodland not of ancient origin.
Palemead Coppice SNCI	1.00 km east of the site.	Oak woodland on a heavy clay soil.
Gillingham Secondary School HRS	0.5 km north west of the site.	Neutral grassland; Fen/sedge with pond.
Gillingham Showground HRS	1.4 km south east of the site.	Pond.

2.2.3 Protected and Notable Species

Invertebrates (includes White-clawed Crayfish)

The data provided by DERC included records of four notable invertebrates from within 2km of the site; small eggar butterfly (*Eriogaster lanestris*), wall butterfly (*Lasiommata megera*), white admiral butterfly (*Limenitis Camilla*) and small blue butterfly (*Cupido minimus*). The closest record is of small eggar 50m north of the development site within the Lodden Lakes. White-clawed crayfish surveys in 2011 recorded the presence of signal crayfish (*Pacifastacus leniusculus*) within the River Lodden.

Great Crested Newts

The data provided by DERC included 36 records of great crested newts (*Triturus cristatus*) within 2 km of the site. Five of these records were relating to ponds within 500m of the site, ponds P4, P11, P14, P15 and P16. The Ecology Solutions and SLR surveys carried out at the site in 2011 identified great crested newts in Ponds P6, P7, P10, P11 and P16.

Reptiles

The data provided by DERC included one record of a reptile which was for a grass snake (*Natrix natrix*) located 150m to the north of the site. The Ecology Solutions and SLR surveys carried out at the site in 2011 recorded low populations of slow worm, common lizard and grass snake.

Birds

The data provided by DERC included records of 26 bird species within 2 km of the proposed development site. Although most were common species, 13 are protected under Schedule 1 Part 1 of the Wildlife and Countryside Act 1981 (as amended); listed under Annex I of the Birds Directive or are Schedule 41 priority species under the NERC Act 2006 or are red listed species.

Schedule 1 or Annex 1 species included barn owl (*Tyto alba*), kingfisher (*Alcedo atthis*), fieldfare (*Turdus pilaris*) and redwing (*Turdus iliacus*).

Schedule 41 priority species included yellowhammer (*Emberiza citronella*), starling (*Sturnus vulgaris*), bullfinch (*Pyrrhula pyrhulla*), cuckoo (*Cuculus canorus*), and reed bunting (*Emberiza schoeniclus*).

Bats

The data provided by DERC included records of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. Pygmaeus*), whiskered bat (*Myotis mystacinus*), Natterer's bat (*M. nattereri*), Bechstein's bat (*M. bechsteinii*), Daubenton's bat (*M. daubentonii*), noctule (*Nyctalus noctula*), serotine (*Eptesicus serotinus*), brown long-eared bat (*Plecotus auritus*) and lesser horseshoe bat (*Rhinolophus hipposideros*) from within 5km of the proposed development site. The closest record of lesser horseshoe was 2.5km south east of the site in Port Regis. The closest record of Bechstein's bat was 2.7km to the south of the site in Duncliffe Wood. The site is not located within a consultation zone for bats. The Ecology Solutions surveys in 2011 identified a soprano pipistrelle roost within a mature tree adjacent to the southern boundary of Ham Farm (TN15).

Badgers

The data provided by DERC included 16 records of badgers (*Meles meles*) within 2km of the site, the closest approximately 160m northwest of Newhouse Farm. The Ecology Solutions and SLR surveys in 2011 observed badger setts at the eastern extent of Park Farm, and the eastern extent of Ham Farm. The Park Farm setts included a main sett and several annexes, whilst the Ham Farm sett comprised a main sett.

Otter

The data provided by DERC included seven records of otters (*Lutra lutra*) within 2km of the site. The closest records were of spraints from the River Lodden adjacent to the northern boundary of Newhouse Farm. Spraints were identified along Fern Brook in 2011 during the SLR surveys.

Water Voles

The data provided by HBIC included 15 records of water vole (*Arvicola amphibius*) within 2km of the site. The closest records were of burrows from the River Lodden adjacent to the northern boundary of the site. The Ecology Solutions and SLR surveys in 2011 identified signs of water voles in both the River Lodden and Fern Brook.

Hazel Dormouse

The data provided by DERC included one record of hazel dormouse (*Muscardinus avellanarius*) located at the southern boundary of Ham Farm. Surveys carried out on site by Ecology Solutions and SLR in 2011 recorded no evidence of dormice on Park Farm or Ham Farm. Newhouse Farm was not surveyed.

Priority Species

The data provided by DERC included one record of hedgehog (*Erinaceus europaeus*) located approximately 175m south west of Newhouse Farm. The data also included eight records of brown hare (*Lepus europaeus*), the closest 120m west of Newhouse Farm. Both are priority species under Section 41 of the NERC Act 2006.

3.0 Survey Methodology

An extended Phase 1 habitat survey was completed on 24th March 2015 by Principal Ecologist David West CEnv MCIEEM. All areas of the site were investigated, including those parts that are not expected to be affected directly by the works but may be indirectly impacted upon.

3.1 Habitats

The habitat types within the site were noted during the walkover survey in accordance with the categories specified for a Phase 1 Habitat Survey (Joint Nature Conservation Committee, 2010). Dominant plant species were recorded for each habitat present.

3.2 Protected and Notable Species

The site was inspected for evidence of and its potential to support protected or notable species, especially those listed under the *Conservation of Habitats and Species Regulations 2010* (as amended), the *Wildlife & Countryside Act 1981* (as amended), the *Natural Environment and Rural Communities (NERC) Act 2006,* the *Countryside & Rights of Way (CRoW) Act 2000* or local Biodiversity Action Plans.

The following species were considered:

3.2.1 Great Crested Newts

The site was appraised for its suitability to support great crested newts. The assessment was based on guidance outlined in the Joint Nature Conservation Committees' published *Herpetofauna Workers' Manual* (Joint Nature Conservation Committee, 2003) and the *Great Crested Newt Conservation Handbook* (Langton, Beckett & Foster, 2001).

As recommended by Natural England, a Habitat Suitability Index (HSI) following Oldham *et al.* (2000) was calculated for ponds on site and to those within 500m of the site in connected habitat. These were identified using Ordnance Survey maps and aerial images. There are five ponds located within the development site boundary and a further 13 ponds located within 500m of the site. Details of ponds and ditches that were assessed are described in Section 4.2.1.

3.2.2 Reptiles

The site was appraised for its suitability to support reptiles. The assessment was based on guidance outlined in the Joint Nature Conservation Committees' published *Herpetofauna Workers' Manual* (Joint Nature Conservation Committee, 2003).

3.2.3 Bats

One building is located within the development site boundary, a garden centre, which was assessed for suitability to support breeding, resting and hibernating bats using survey methods based on those outlined in the Bat Conservation Trust's *Bat Surveys: Good Practice Guidelines* (Hundt, 2012) and English Nature's *Bat Mitigation Guidelines* (2004). A full bat roost assessment of trees was not completed during the extended Phase 1 habitat survey, but should any trees be impacted by future proposals for the site, these trees should be assessed for their potential to support roosting bats. The habitats within the site were assessed for their potential as foraging habitats or commuting routes for bats.

3.2.4 Dormice

The site was appraised for its suitability to support dormice. The assessment was based on guidance outlined in Bright *et al*, (2006), the *English Nature Dormouse Conservation Handbook.*

3.2.5 Badgers

The site was surveyed for evidence of badger setts or other badger activity such as paths, latrines or signs of foraging. Methodologies used and any setts recorded were classified according to published criteria (Harris, Cresswell & Jefferies, 1989). It is recommended by English Nature's *Badgers and Development* (2011) that a 30m buffer around the site is investigated for evidence of badger activity where possible. This was observed around the majority of the site, except where it borders private dwellings.

3.2.6 Otters

Watercourses on site were assessed for their suitability to support otters. This assessment was based on guidance outlined in *Monitoring the Otter* (Chanin, 2003).

3.2.7 Water Voles

Following methods set out in the *Water Vole Conservation Handbook* (Strachan & Moorhouse, 2011), an assessment of waterbodies within and adjacent to the site was undertaken to determine their suitability to support water voles and a search for evidence of activity was conducted, including droppings, latrines, burrows, footprints and feeding lawns, of any areas considered suitable.

3.2.8 Other Species

The site was also appraised for its suitability to support other protected or notable fauna including mammals, birds and invertebrates in accordance with the Chartered Institute for Ecology and Environmental Management's *Guidelines for Preliminary Ecological Appraisal* (2013). Evidence of any current or historical presence of such species was recorded.

3.3 Invasive Species

The site was searched for evidence of invasive plant species, such as Japanese knotweed (*Fallopia japonica*), Himalayan balsam (*Impatiens glandulifera*), giant hogweed (*Heracleum mantegazzianum*), New Zealand pygmyweed (*Crassula helmssii*), horizontal cotoneaster (*Cotoneaster horizontalis*), pontic rhododendron (*Rhododendron ponticum*) and floating pennywort (*Hydrocotyle ranunculoides*) (see Appendix B Table B2 for full list).

3.4 Limitations

The comprehensiveness of any ecological assessment will be limited by the season in which surveys are completed. The updated extended Phase 1 habitat survey was completed in March, within the optimum survey season. The timing of the survey is not considered to represent a limitation.

To determine likely presence or absence of protected species usually requires multiple visits at suitable times of the year. As a result, this survey focuses on assessing the *potential* of the site to support species of note, which are considered to be of principal importance for the conservation of biodiversity with reference to the *National Planning Policy Framework* (NPPF, 2012), especially those given protection under UK or European wildlife legislation.

A 30m buffer along all boundaries of the site could not be surveyed for evidence of badger activity which represents a slight limitation to the extended Phase 1 habitat survey. However, those areas which could not be surveyed were the residential areas to the north of Ham Farm, and west of Park Farm. It is considered unlikely that these residential areas, which are relatively new (construction was completed in 2005) support badger setts.

This report cannot therefore be considered a comprehensive assessment of the ecological interest of the site. However, it does provide an assessment of the ecological interest present on the day of the visit and highlights areas where further survey work may be recommended.

The details of this report will remain valid for a period of two years (until March 2017). Beyond this period, if works have not yet been started, it is recommended that a new review of the ecological conditions is undertaken.

4.0 Survey Results

An extended Phase 1 habitat plan showing the location of key ecological features in included as Figures 1 and 2 in Appendix A.

4.1 Habitats

4.1.1 Plantation Broadleaved Woodland

There is a large area of plantation broadleaved woodland located to the north of the Park Farm area of the site. The woodland was found to be young, comprising immature and semi-mature trees with rough grassland beneath. The woodland was dominated by pedunculate oak (*Quercus robur*) and ash (*Fraxinus excelsior*) with alder (*Alnus glutinosa*), beech (*Fagus sylvatica*), spindle (*Euonymus europaeus*), wayfaring tree (*Viburnum lantana*) and Lombardy poplar (*Populus nigra 'italica'*). Ground flora was dominated by grasses including tufted hair grass (*Deschampsia cespitosa*), Yorkshire fog (*Holcus lanatus*) and cock's foot (*Dactylis glomerata*).

Plate 1. Plantation broadleaved woodland adjacent to northern boundary of proposed development site.

A strip of plantation woodland is located along the northern edge of the Ham Farm site. The woody species included ash, holly (*Ilex aquifolium*), field maple (*Acer campestre*), alder, silver birch (*Betula pendula*) and oak. Semi-improved grassland was present between the trees dominated by perennial rye-grass (*Lolium perenne*), cock's foot and fescues (*Festuca* spp.).

4.1.2 Hedgerows

A large number of hedgerows are present within the boundary of the proposed development site. These form the boundaries of most fields across all three areas of the site**.** The majority of hedgerows on site were species-poor and many were heavily managed. In most cases, hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) were dominant, with occasional elder (*Sambucus nigra*), field maple, dog rose (*Rosa canina*) and hazel (*Corylus avellana*). Ground flora typically included common nettle (*Urtica dioica*), bramble (*Rubus fruticosus agg.*), ivy (*Hedera helix*), lords and ladies (*Arum maculatum*), cleavers (*Galium aparine*) and hogweed (*Heracleum sphondylium*). Mature oak trees were present within many of the hedgerows. Although most are species-poor, seven hedgerows were considered to be species-rich and are detailed in **Table 3** below. Two hedgerows, H5 and H7 were considered likely to be '*Important*' under the Hedgerow Regulations (1997) due to the presence of an average of seven woody species in 30m.

Table 3: Details of species-rich hedgerows within the site.

Hedgerow Ref	Location	Description	Species Present	Other Features
H1 (TN8)	North east corner of Ham Farm area.	Tall (2m) hedgerow, unmanaged, 60m length.	Hawthorn, blackthorn, hazel, dog rose, elder, field maple, elm (*Ulmus* sp.).	Wet ditch running alongside ditch with sedges (*Carex* spp.).
H2 (TN11)	Running east to west in centre of Ham Farm area.	Approximately 2m in height well managed, 260m.	Blackthorn, hawthorn, dog rose, field maple, willow (*Salix* sp.), elm.	Dry ditch.
H3 (TN12)	Running south from western edge of H2.	Tall (3m) and wide (4m), unmanaged, 70m.	Hawthorn, blackthorn, willow, dog rose, elder.	Dry ditch.
H4 (TN13)	Running north to south below H3.	Approximately 2m in height well managed, 170m (**Plate 2**).	Blackthorn, hawthorn, elm, dog rose, elder.	4 oaks (1 per 50m).

Hedgerow Ref	Location	Description	Species Present	Other Features
H5 (TN15)	Running east from southern edge of H4. Southern boundary of Ham Farm site.	Tall (3m), some management, 160m (**Plate 3**).	Blackthorn, hawthorn, elm, elder, willow, dog rose, ash, oak.	Wet ditch.
H6 (TN14)	Running north to south in centre of Ham Farm site. Intersects H5 and H7.	Approximately 2m in height well managed, 300m.	Blackthorn, hawthorn, dog rose, elder, oak, field maple.	N/A.
H7 (TN16)	Running east from southern edge of H6. Southern boundary of Ham Farm site.	Approximately 2m in height, some management, 270m.	Blackthorn, hawthorn, elm, field maple, dog rose, wild privet (*Ligustrum vulgare*), ash.	N/A.

Plate 2: Hedgerow 4.

Plate 3: Hedgerow 5.

4.1.3 Improved Grassland

The site is dominated by improved grassland, which was grazed by horses (Park Farm) and cattle (Ham Farm and Newhouse Farm) at the time of the extended Phase 1 habitat survey. The improved grassland areas are dominated by perennial rye-grass with cock's foot, Yorkshire fog, meadow foxtail (*Alopecurus pratensis*) and fescues. Other species included dandelion (*Taraxacum officinale* agg.), broad leaved dock (*Rumex obtusifolius*), creeping thistle (*Cirsium arvense*), red dead-nettle (*Lamium purpureum*), white clover (*Trifolium repens*), greater plantain (*Plantago major*) and creeping buttercup (*Rannunculus repens*).

Plate 4: Improved grassland within Park Farm area.

Plate 5: Improved grassland within Newhouse Farm area.

4.1.4 Neutral Semi-Improved Grassland

Semi-improved grassland is present in the north east corner of the Ham Farm area, bordered by Hedgerow 1 and at the east extent of Ham Farm north of Pond P10. Species composition was similar to the surrounding improved grassland fields, albeit with a longer sward height. Dominant grass species were perennial rye-grass, cock's foot and fescues with abundant soft rush (*Juncus effusus*).

Further semi-improved grassland was located at the north west corner of the Park Farm area (**Plate 6**), surrounding Pond 1. Dominant grass species included Yorkshire fog, cock's foot and perennial rye-grass with patches of bramble, common nettle and broad-leaved dock. Numerous ash saplings were also present.

Plate 6: Semi-improved grassland within Park Farm area.

4.1.5 Dense Scrub

A small area of dense scrub is located along the eastern boundary of Park Farm, comprising hawthorn, blackthorn and bramble. Rough grassland was also present at the edge of the scrub area comprising cock's foot, Yorkshire fog, common nettle and broad-leaved dock.

4.1.6 Arable

A small area of arable land is located within Park Farm. This small field is managed as a small holding and includes fenced areas for livestock, vegetable patches and poly tunnels.

4.1.7 Mesotrophic Running water

Fern Brook (**Plate 7**) is a tributary of the River Lodden which runs along the northern and eastern boundaries of the Park Farm area. Although the water level was relatively shallow (100-300mm) with a moderate flow at the time of the survey, the brook has deep banks up to 1m in height and 2m wide. In-channel vegetation was sparse and scattered mature willows (*Salix sp.)* were present along the majority of the length of the brook. Riparian vegetation included cock's foot, common nettle, hogweed and bramble.

The River Lodden (**Plate 8**) forms the northern boundary of the Ham Farm and Newhouse Farm areas. It was approximately 3m wide with a moderate flow. The river was deeper than Fern Brook and appeared to be approximately 0.5m deep. Hedgerows are present on the banks along much of its length comprising

blackthorn, dog rose and willow. The riparian vegetation predominately comprises semi-improved grassland with cock's foot, fescues, common nettle, broad-leaved dock, cleavers and bramble.

A ditch with running water (**Plate 9**) is located within the Newhouse Farm area. It is connected to Pond 13 and runs along the boundary between the Ham Farm and Newhouse Farm areas (adjacent to Hedgerow 5). Offshoots run north from Pond 13 to the River Lodden and off site to the south. The water level was shallow (100-300mm) with a moderate flow. The riparian vegetation predominately comprises semi-improved grassland with cock's foot, fescues, common nettle, broad-leaved dock, cleavers and bramble.

Plate 7: Fern Brook.

Plate 8: River Lodden.

Plate 9: Running ditch within Newhouse Farm area.

4.1.8 Eutrophic Standing water

Five ponds are located within the boundary of the proposed development site. Pond 1 is located in the north west corner of the Park Farm area. Pond 3 is located within the plantation woodland to the north of this area. Pond 10 is located at the eastern extent of the Ham Farm area with Pond 11 at the western extent. Pond 12 is located to the east of the Newhouse Farm area, near Pond 11. A further 13 ponds are located within 500m of the site in connected habitat. These are described further in relation to great crested newts in Section 4.2.1.

4.1.9 Bare Ground

Bare ground is present within all three areas of the site in the form of hardstanding access tracks. One extends along the southern boundary of the Park Farm area, one runs north to south towards the centre of the Ham Farm area and a further runs along the southern boundary of the Newhouse Farm area and adjacent to Pond 12. An area of bare ground comprising a tarmac car park is located in the southern corner of the Park Farm area associated with the Garden Centre.

4.1.10 Buildings

A single building complex is located in the southern corner of the Park Farm area. This building, a garden centre, is a large commercial building of predominately metal construction with a pitched metal roof. The buildings will be discussed in more detail in the bat section 4.2.3.

4.1.11 Fences

The field boundaries within all three areas of the site are demarcated by barbed wire fences, which are present within most of the hedgerows. Electric fences are present within Newhouse Farm, subdividing the improved grassland fieds.

4.2 Protected and Notable Species

4.2.1 Great Crested Newts

There are a total of 18 ponds located within 500m of the site in connected habitat (see **Table 4**). If great crested newts are breeding within any of these ponds, there is potential for them to utilise terrestrial habitats on site such as hedgerows and woodland. The terrestrial habitat within the development site is limited to hedgerows, semi-improved grassland and plantation woodland and is considered to be of ***moderate potential*** to support great crested newts during their terrestrial phase. See Figure 2, Appendix A for pond locations.

Table 4: Ponds within 500m of site boundary.

Pond/ Ditch Ref	Location	Description	Photograph
P1	North east corner of Park Farm area.	Potential attenuation pond for adjacent development. Heavily shaded and vegetated by dense willow scrub. Very little water.	

Pond/ Ditch Ref	Location	Description	Photograph
P2	West of P1, just outside site.	Large, deep pond. Much of bank overgrown with dense willow and bramble. Little vegetation. Possible waterfowl.	
P3	North of Park Farm area in plantation woodland.	Small pond within glade. Relatively unshaded with emergent macrophytes and good terrestrial habitat.	
P4	90m north of Park Farm area.	Heavily shaded pond within field surrounded by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	

Pond/ Ditch Ref	Location	Description	Photograph
P5	50m north of Park Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	
P6	450m north of Park Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	
P7	450m north of Park Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	
P8	260m north of Park Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no vegetation.	

Pond/ Ditch Ref	Location	Description	Photograph
P9	25m south west of Park Farm area.	Rectangular balancing pond, likely associated with nearby commercial park. Abundant vegetation including rushes and sedges.	
P10	Eastern extent of Ham Farm area.	Surrounded by blackthorn and willow scrub with emergent macrophytes including rushes.	
P11	Western extent of Ham Farm area.	Surrounded by willows. Shaded with no macrophtes.	

Pond/ Ditch Ref	Location	Description	Photograph
P12	East of Newhouse Farm area.	Macropytes including rushes, some wildfowl and good terrestrial habitat.	
P13	160m south west of Newhouse Farm area.	Farm effluent pond, bad water quality, no vegetation.	
P14	290m south of Newhouse Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	
P15	180m south of Ham Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with no aquatic floating or emergent vegetation.	
P16	140m of Ham Farm area.	Heavily shaded pond within field lined by mature trees and scrub. Heavily shaded with little emergent vegetation. Much of surface covered with duckweed (*Lemna minor*).	

Pond/ Ditch Ref	Location	Description	Photograph
P17	50m north of Ham Farm area.	Attenuation pond associated with development at Ham Common. Heavily vegetated with rushes, low water level.	
P18	220m north of Ham Farm area.	Attenuation pond associated with development at Ham Common. Heavily vegetated with rushes, low water level.	

The HSI values for the remaining ponds are provided in **Table 5**. The HSI provides an objective method for assessing the suitability of a pond as habitat for great crested newts (Oldham et al., 2000; Herpetological Conservation Trust, 2008). The system provides an index between 0 and 1, with 0 indicating unsuitable habitat and 1 optimal habitat. Ten characteristics are used to calculate the index score, each representing a factor considered to affect great crested newts. These factors are listed and briefly explained below:

1. *Location*: i.e. where the pond is located in the British Isles. It accommodates large scale habitat features, which affect the distribution of great crested newts within the British Isles, including climate, substrate and altitude. The British Isles is divided into "optimal", "marginal" and "unsuitable" i.e. a low probability of occurrence;

2. *Pond area*: i.e., the water surface area of a pond. Suitability peaks at approximately 800m²;

3. *Pond drying*: how often a particular pond dries out. Ponds which dry out more frequently are less suitable;

4. *Water quality*: an indication of water quality based on the invertebrate diversity present. High invertebrate diversity indicates high water quality and suitability;

5. *Shade*: an estimate of the total shaded perimeter of a pond. Shoreline shade below 60% is optimal;

6. *Fowl*: indication of impact by waterfowl. High waterfowl numbers are generally considered detrimental;

7. *Fish*: indication of fish abundance. High fish numbers are generally considered detrimental;

8. *Pond count*: based on the density of ponds occurring within 1km of a particular pond. Suitability is positively correlated with pond density;

9. *Terrestrial habitat*: based on the availability of suitable habitat in the pond vicinity, e.g. rough grassland, scrub and woodland. For this assessment, the categories provided in the NARRS Survey Pack (Herpetological Conservation Trust, 2008) were used. This differs from the assessment criteria by Oldham et al. (2000), and is based on work by Lee Brady (unpublished).

10. *Macrophytes*: based on an estimate of the percentage cover by emergent and aquatic vegetation. Suitability peaks at between 70% and 80% cover.

Table 5: Habitat Suitability Index of ponds.

Pond Reference	P1	P2	P3	P4	P5	P6	P7
SI1 Field location	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI2 Pond area	0.90	0.85	0.40	0.60	0.50	0.50	0.60
SI3 Pond drying	1.00	0.90	0.90	1.00	1.00	1.00	0.90
SI4 Water quality	0.10	0.67	0.33	0.33	0.33	0.33	0.33
SI5 Shade	0.20	0.60	1.00	0.30	0.20	0.20	0.20
SI6 Fowl	1.00	0.67	0.67	0.67	0.67	0.33	0.67
SI7 Fish	1.00	1.00	0.33	1.00	1.00	1.00	1.00

Pond Reference	P1	P2	P3	P4	P5	P6	P7
SI8 Ponds	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	1.00	0.67	0.33	0.33	0.33	0.33	1.00
SI10 Macrophytes	0.30	0.30	0.50	0.30	0.30	0.30	0.30
HSI SCORE :	**0.59**	**0.73**	**0.58**	**0.57**	**0.54**	**0.51**	**0.61**
Pond Suitability :	**Average**	**Good**	**Below average**	**Below average**	**Below average**	**Below average**	**Average**

Pond Reference	P8	P9	P10	P11	P12	P13	P14
SI1 Field location	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI2 Pond area	0.875	1.00	0.60	0.20	0.89	0.60	1.00
SI3 Pond drying	1.00	0.90	0.90	1.00	0.90	0.90	0.50
SI4 Water quality	0.33	0.67	0.33	0.33	1.00	0.01	0.33
SI5 Shade	0.20	1.00	1.00	1.00	1.00	1.00	1.00
SI6 Fowl	0.67	0.67	0.67	0.67	0.67	1.00	0.67
SI7 Fish	1.00	1.00	1.00	0.67	0.67	1.00	0.33
SI8 Ponds	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	0.67	0.33	0.67	0.33	1.00	0.33	0.33
SI10 Macrophytes	0.30	0.35	0.35	0.30	0.35	0.30	0.33
HSI SCORE :	**0.62**	**0.74**	**0.70**	**0.56**	**0.81**	**0.47**	**0.58**
Pond Suitability :	**Average**	**Good**	**Good**	**Below average**	**Excellent**	**Poor**	**Below average**

Pond Reference	P15	P16	P17	P18
SI1 Field location	1.00	1.00	1.00	1.00
SI2 Pond area	0.94	0.60	1.00	0.90

Pond Reference	P15	P16	P17	P18
SI3 Pond drying	0.50	1.00	0.10	0.10
SI4 Water quality	0.33	0.67	0.67	0.67
SI5 Shade	1.00	1.00	1.00	1.00
SI6 Fowl	0.67	0.67	0.67	0.67
SI7 Fish	0.33	0.33	1.00	1.00
SI8 Ponds	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	0.33	0.33	1.00	1.00
SI10 Macrophytes	0.30	0.30	1.00	1.00
HSI SCORE :	**0.57**	**0.62**	**0.73**	**0.73**
Pond Suitability :	**Below average**	**Average**	**Good**	**Good**

Of the 18 ponds located within 500m that were assessed for their potential suitability for great crested newts, one was of 'excellent' suitability, five were of 'good' suitability, four were of 'average' suitability, seven were of 'below average' suitability and one was of 'poor' suitability for great crested newts. Therefore, the site is considered to be of ***high potential*** to support breeding great crested newts.

4.2.2 Reptiles

The site comprises predominately of habitats that offer little potential for reptiles. The heavily grazed improved grassland fields are unsuitable and many hedgerows have sparse ground flora to provide shelter for reptiles. However, some hedgerows do offer suitability as do the areas of semi-improved grassland and plantation woodland. The ponds within the site potentially provide an additional food source for grass snakes, which predate on amphibians. The site is considered to be of ***moderate potential*** to support reptiles.

4.2.3 Bats

Roosting bats – Trees

A full bat roost assessment of trees was not completed during the extended Phase 1 habitat survey as it was not known which trees would be impacted by the development proposals. However, a number of mature and semi-mature trees are located within the site boundary along hedgerows, of which 20 were noted as having potential to support roosting bats (TN2, TN3, TN7, TN8, TN10, TN12, TN13, TN15, TN18-TN24), albeit this is not an exhaustive bat roost assessment. The trees on site are therefore considered to have ***high potential*** for roosting bats.

Roosting Bats – Buildings

Only one building was located within the site boundary, the garden centre. The building is a large, metal commercial building. The pitched roof is metal, open to the rafters internally with no roof void. The walls are also of metal construction with no cavities. There are no areas suitable for roosting and as such it is considered to have ***negligible potential*** for roosting bats.

Foraging and commuting bats

The site comprises a matrix of habitats including small areas of woodland, watercourses, fields of improved and semi-improved grassland, hedgerows and ponds, which would provide potentially suitable habitat for foraging and commuting bats. The site is located within the context of a relatively rural landscape, with arable fields interspersed with small blocks of woodland surrounding the site to the east, south and west. Previous surveys in 2011 recorded low levels of activity by common and soprano pipistrelles with occasional passes by *Myotis* species, brown long-eared bat, noctule and serotine. The site is assessed as offering ***moderate potential*** for foraging and commuting bats.

4.2.4 Badgers

A main sett was identified towards the eastern extent of the Park Farm area (TN4), located within a small area of scrub and plantation woodland. Two annex setts were located further to the west along a hedgerow (TN5, TN6). Although these did not exhibit signs of high activity there were clear entrances and it is likely that all are active.

A further main sett was located in the east of the Ham Farm area, adjacent to Pond P10 (TN9). This sett did not show signs of activity with debris present in some entrances. It is likely that this sett is currently inactive.

The grassland, woodland, hedgerow and scrub habitat within the site is considered to offer moderate potential for foraging and commuting badgers, although little evidence of badger was identified at the time of the extended Phase 1 habitat survey

Overall, the hedgerows, woodland and wooded banks within and adjacent to the site are assessed as offering ***high suitability*** as sett-forming habitat. The site has overall been assessed as offering ***moderate potential*** for foraging and commuting badgers.

4.2.5 Otters/Water Voles

The River Lodden had steep banks in places which are suitable for water vole burrows, indeed numerous burrows were observed during the extended Phase 1 habitat survey. In addition, the riparian vegetation offered suitable food resource for water voles. Fern Brook also has high, steep banks suitable for water voles. Potential water vole burrows were identified towards the western extent (TN1). The running ditch within Newhouse Farm had lower banks with less opportunity for water voles, however foraging habitat remained good. A low number of burrows were identified at the northern extent of the ditch where it flows into the River Lodden. The River Lodden and Fern Brook are considered to have ***high potential*** for water voles, the ditch is considered to have ***moderate potential***.

No signs of otter, such as holts or spraints, were identified along the banks of the River Lodden or Fern Brook during the extended Phase 1 habitat survey. However, fallen trees along Fern Brook would provide potentially suitable otter ledges or holts. The River Lodden and Fern Brook are considered to have ***high potential*** for otters, the ditch is considered to have ***low potential***.

4.2.6 Hazel Dormouse

The site offers a variety of habitats suitable for dormice. The plantation woodland in the Park Farm site and the network of hedgerows are suitable for dormice. Although many of the hedgerows are relatively species poor and many were managed, reducing the habitat quality for this species, several were unmanaged and species-rich. There is a high level of connectivity across the site and also a moderate level of connectivity to offsite habitat including broadleaved woodland. The site is assessed as offering ***moderate potential*** to support dormice.

4.2.7 Birds

The woodland, hedgerows, scattered trees and grassland located within the site boundary offer a matrix of habitats that would potentially support a range of breeding bird species. The extended Phase 1 habitat survey was undertaken early in the nesting season and no nesting behaviour was noted. However, a number of common species were recorded including blackbird (*Turdus merula*), robin *(Erithacus rubecula)* and great tit (*Parus major*) were recorded within the site during the survey. In addition, a number of red listed skylark (*Alauda arvensis*) were observed on site. The site is assessed as offering ***high potential*** for a range of breeding bird species.

No trees within the site boundary were assessed as offering potential to support roosting or nesting barn owls. No buildings on site had potential for barn owls however there are numerous agricultural buildings within the vicinity of the site which could provide suitable nesting sites. The grazed improved grassland within the site was considered to be sub-optimal for foraging barn owls, which favour rough grassland with a littoral layer.

The surrounding area is assessed as offering ***moderate potential*** to support nesting barn owls whereas the site itself is considered to be of ***low potential*** for foraging.

The habitats on site, predominately improved grassland with hedgerows, small areas of semi-improved grassland and plantation woodland are likely to provide some foraging habitat for birds over winter. However these are most likely to be common species and the site has little suitability for notable overwintering species, in particular wildfowl and waders. The site is assessed as offering ***low potential*** for over wintering bird species.

4.2.8 Invertebrates

The plantation woodland, hedgerow, scrub, improved grassland and ponds provide a matrix of habitats that may support invertebrate species. It is likely that the invertebrate assemblage on site will consist of common species. The site is assessed as offering ***low potential*** to support notable invertebrates.

The River Lodden, Fern Brook and the running stream offer potential habitat for white-clawed crayfish, with moderate flows, potential refuge areas and food sources. The watercourses are therefore considered to be of ***moderate potential*** for white-clawed crayfish.

4.3 Invasive Species

No invasive species were identified within the site at the time of the extended Phase 1 habitat survey. However, the survey was completed early in the season for identifying invasive species.

5.0 Ecological Impacts and Recommendations

5.1 Statutory and Non-statutory Sites

Statutory Designated Sites

The closest designated site, Fontmell & Melbury Downs SAC, is 7.2km from the development site and is therefore unlikely to be impacted upon as a result of the development. The closest site designated for bats (greater horseshoe and barbastelle, Chilmark Quarries SAC, is 15km from the site and is also unlikely to be impacted. The proposed development will include substantial provision of recreational space.

It is considered that the proposed development will have no negative effect upon these sites or their qualifying features.

Non-Statutory Designated Sites

The data search returned by DERC showed the presence of five non statutory sites within 2km of the site. The closest, Gillingham Secondary School Habitat Restoration Site, is located 0.5km north-west of the site, however this is not subject to recreational pressure. The closest site used for recreation is Kings Court Wood SNCI approximately 1.5km north west of the site. Due to the distance of the SINCs from the proposed development site direct impacts on these designations are not anticipated. Large areas of open space will be incorporated into the proposed development. These open spaces will be designed to provide suitable recreational areas for new residents, preventing additional visitor pressure upon nearby SNCIs. The linking of these new areas of greenspace to existing areas to the north of the River Lodden may also contribute to reducing current use of these sites.

5.2 Habitats

The majority of habitats present on site, improved grassland, semi-improved grassland and plantation woodland are of limited ecological value, although they may provide suitable habitat for great crested newts, reptiles, dormice, birds and bats. The loss of these habitats is likely to result in negative effects predominately as a cumulative effect. The mature trees located in hedgerows and the species-rich

hedgerows are of higher ecological value. It is recommended that woodland, hedgerows, trees, ponds and semi-improved grassland are retained where possible and that further, ecologically valuable grassland habitats are created as part of the development.

Most hedgerows identified within the site are relatively species-poor. Seven were species-rich of which two were considered likely to qualify as 'Important' under the Hedgerow Regulations 1997. All hedgerows qualify as priority habitats under the NERC Act and therefore it is **recommended that hedgerows are retained on site where possible, in particular species-rich hedgerows**. It is also recommended that retained hedgerows are enhanced through infill planting of native hedgerow species and that new native hedgerows are planted at the site where possible. At a minimum, all important hedgerows should be protected during works and should be unaffected by the development. The draft masterplan framework includes the retention of most hedgerows, however many will be cut by access roads. The impact of these intrusions should be minimised and additional hedgerows should be planted as compensation.

The River Lodden, Fern Brook and the running stream are sensitive to potential impacts from the proposed development. It is recommended that the **ecology team is consulted throughout the design stage in order to ensure impacts to these watercourses do not occur.** It is recommended that an **Ecological Mitigation and Management Plan** is produced, which will incorporate measures to prevent impacts to the stream during the construction and operational phases of the development. This will include prevention of pollution for example through materials entering the stream during the construction phase. It is recommended that a **buffer of at least 15m is retained between the development and these watercourses**. The draft masterplan framework for the development reflects this with the watercourses forming the focus of the proposed greenspace. Any construction works within close proximity to the stream should be carried out in accordance with **Environment Agency Pollution Prevention Guidance (PPG) 5**: **Works or maintenance in or near to water.** These works will include the modification of an existing footbridge over the River Lodden, footbridges over the running stream and a main access road crossing the running ditch south of P12.

5.3 Protected and Notable Species

5.3.1 Great Crested Newts

The great crested newt and its habitat are protected under the *Wildlife and Countryside Act 1981* (as amended) and the *Conservation of Habitats and Species Regulations 2010* (as amended) (see Appendix B).

Eighteen ponds are located on or within 500m of the site. All but one were assessed as having below average to excellent potential for great crested newts. Previous records of great crested newts within eight of these ponds were returned from DERC or previous surveys. It is considered that given the flow within Fern Brook this watercourse acts as a barrier to newt dispersal, and as such Ponds P4, P5, P6, P7 and P8 do not require further consideration for potential impacts as a result of the proposed development. A suite of **great crested newt presence/likely absence surveys are recommended for the remaining 12 ponds with below average suitability or higher.**

Great crested newt presence/ likely absence surveys would involve four visits to the waterbodies between **March and mid-June** (weather dependant). At least three survey methods will be employed during each survey visit, such as torching, netting, bottle trapping or egg searching. If great crested newts are recorded at the site, a **further two survey visits** would be recommended in order to calculate population size. Half the surveys must be undertaken during the optimal period, which runs from mid-April to mid-May. Should great crested newts be found during these surveys it is likely that an EPS licence will be required from Natural England along with a detailed mitigation strategy. This strategy should include installation of exclusion fencing, a translocation to remove newts from the construction area and the retention and enhancement of existing habitats including ponds.

5.3.2 Reptiles

All species of native reptiles are under the *Wildlife and Countryside Act 1981* (as amended). The sand lizard *Lacerta agilis* and smooth snake *Coroenella austriaca* are further protected under *Conservation of Habitats and Species Regulations 2010* (as amended).

Habitats within the site boundary have been assessed as potentially suitable to support reptiles, with low populations of slow worm, common lizard and grass snake being recorded in 2011. These consist predominately of semi-improved grassland and woodland areas, but also include ponds streams and some

hedgerows. **It is recommended that a suite of reptile presence/likely absence surveys is completed.** This would involve the laying of artificial refugia within areas of suitable habitat and checking the refugia on seven occasions between **March and September** (optimal survey season April, May and September) in suitable weather conditions. Should reptiles be present it is recommended that suitable habitats are retained and protected during works, with exclusion fencing used if necessary to ensure reptiles cannot enter the construction area.

5.3.3 Bats

Roosting bats

All species of British bats and their roosts are fully protected under the *Wildlife & Countryside Act 1981* (as amended) and the *Conservation of Habitats and Species Regulations 2010* (as amended).

It is recommended that mature trees are retained within the proposed development wherever possible. The draft masterplan framework appears to accommodate mature trees, however the construction of roads is likely to fragment commuting associated with these trees. There is also potential for light spill from the development to impact on trees potentially used as roosts. **It is recommended that lighting of the development is designed to ensure unlit habitat corridors are present to allow bats to commute across the site.** These dark corridors should include both hedgerows and watercourses. Should it be considered likely that any trees with bat potential are to be impacted directly or indirectly by the development, i**t is recommended that a bat roost assessment is completed to determine the potential of the trees to support roosting bats**. This can be undertaken at any time of year and will involve a climbed inspection to search for evidence of bats or suitable roost features.

In the new buildings, best practice should be considered and the use of Breathable Roof Membranes (BRM) avoided as these are dangerous to bats. Instead, Type 1F bitumen and hessian under felt should be considered as an alternative. Ongoing research has confirmed that no BRM are bat-friendly and all pose a risk to bats. As the membranes wear over time the fibres in the membrane become loose. Bats become entangled in the fibres and, unable to escape, dehydrate, and starve to death. As well as posing a risk to bats, BRMs are also degraded by bats and the efficiency of the membrane is impaired (i.e. the use of BRMs in situations where bats are present is detrimental to the efficient functioning of the BRM as well as to bats (Waring *et al.,* 2013).

Foraging and Commuting Bats

ODPM 06/2005: Biodiversity and Geological Conservation, the circular that accompanied the now redundant Planning Policy Statement 9 (PPS9) but which itself is still valid, requests that mitigating for impacts caused by developments to foraging and commuting routes should be considered when determining planning applications.

It is recommended that bat activity surveys are completed across the site. In accordance with the Bat Conservation Trust (BCT) Guidelines 2012, for 'large' sites (over 15 hectares) with 'moderate' habitat quality it is **recommended that one bat activity survey is completed per month from April to September**, with one survey comprising a dusk and pre-dawn survey. Due to the size of the site, it is recommended that four separate transect routes are surveyed on each occasion. Should lesser horseshoe bats be recorded, given the record returned 2.5km from the site, it may be necessary to increase this survey effort. In addition to this, **an automated bat detector should be left at two locations along each transect site for five consecutive nights each month from April to September.**

It is recommended that the **lighting across the development footprint is sensitively designed with bats in mind**, so that valuable foraging and commuting areas are retained and existing/new roost sites are not impacted by ambient light. As an enhancement measure, it is recommended that **planting of native shrubs and trees**, including the planting of new hedgerows, is undertaken as part of the landscaping at the site. Other enhancements could include bat boxes being installed on mature trees around the site in order to provide additional roosting opportunities for bats.

5.3.4 Badger

Badger and their setts are protected under the *Protection of Badgers Act 1992*, and the NPPF (see Appendix B) stipulates that considering their welfare and mitigating for damage to their habitat are material considerations when considering planning applications.

Four badger setts were identified within the site. According to the draft masterplan framework, it may be possible to avoid impacts to badger through the retention of these setts. **It is recommended that a badger survey is undertaken in order to map the extents and classify the status of all setts**. It is recommended that all setts are retained and that no construction works take place within 30m. It is also recommended that measures are taken to prevent impacts to the badger setts as a result of recreational

pressure. This would include diverting new footpaths away from these badger setts and providing screening through planting of species such as elder, blackthorn and hawthorn.

Setts should be retained wherever possible within their existing habitats. It is recommended that dark habitat corridors are retained throughout the site in order to allow badgers to continue to use the wider site for foraging and commuting. In particular these corridors should connect the setts with suitable retained habitats on site and in the wider area. It is also recommended that native planting, including new hedgerow planting and infill planting of gappy hedgerows is carried out to enhance the site for badgers.

5.3.5 Hazel dormouse

Dormice are fully protected under the *Wildlife & Countryside Act 1981* (as amended) and the *Conservation of Habitats and Species Regulations 2010* (as amended) (see Appendix B).

The site has been assessed as offering moderate potential to support dormice due to the presence of suitable habitats for dormice within the site boundary and connectivity to habitats offsite. As there is potential for this species to be present, **it is recommended that a dormouse presence/likely absence survey is completed.** This would involve installation of dormouse nest tubes within suitable habitat within the site and checking the tubes once per month in order to achieve a survey effort value of 20, considered to be a reasonable survey effort based on the index of probability scoring system, (Bright *et al.*, 2006). The points value varies throughout the year as nest tubes are most likely to be occupied during May and August/September.

Table 1: Index of probability of finding dormice present in nest tubes in any one month

Month	Index of probability
April	1
May	4
June	2
July	2
August	5

September	7
October	2
November	2

5.3.6 Otter and water vole

The otter is protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended), annexes IIa and IVa of the EC Habitats Directive, Appendix 1 of CITES (Conservation of International Trade in Endangered Species), Appendix 2 of the BERN Convention (Conservation of European Wildlife and Natural Habitats) and Schedule 2 of the *Conservation of Habitats and Species Regulations* 2010 (as amended).

The water vole receives full protection through its inclusion on Schedule 5 of the *Wildlife and Countryside Act (WCA) 1981* (as amended) Section 9.

The River Lodden and Fern Brook were assessed as offering high potential to support otter and water vole, with the ditch offering moderate potential. According to the draft masterplan framework, these will be retained with a significant buffer of 30-100m from the development. South of Pond P12 an access road will run across both ditch sections. Works are also proposed to an existing footbridge north of the Ham Farm site which crosses the River Lodden. **If bridge works are considered to have potential to impact upon water vole or otter, if works will be completed within 10m of the river or brook of if there will be increased recreational pressure on the woodland and riparian habitats, it is recommended that an otter and water vole survey is completed.** This would involve one visit to the site between April and September.

5.3.7 Birds

All nesting birds are protected from disturbance whilst nesting by the *Wildlife and Countryside Act 1981* (as amended) (see Appendix B).

The site comprises a matrix of habitats, including woodland, hedgerows, grassland, watercourses and ponds, which would be highly suitable for a range of breeding bird species. **It is recommended that a suite of breeding bird surveys is undertaken at the site** in order to assess the impact of the

proposed development on breeding birds. This would involve four visits to the site between mid March and June.

If barn owls are nesting within any of the buildings in the vicinity of the site, there is potential for them to be disturbed as a result of construction activities at the site. **It is recommended that an inspection of agricultural buildings within 150m is completed to search for evidence of barn owls.** This can be completed at any time of year. If nesting barn owls are identified, then measures will need to be taken to avoid works within 150m disturbing them during the breeding season.

There are only a small number of records of bird species within 2km of the site which may relate to overwintering birds including fieldfare and redwing. The site is unlikely to support notable populations of overwintering birds such as wildfowl and waders and no surveys for overwintering birds are proposed.

The breeding bird surveys will inform the detailed mitigation of the development on these species. It is also recommended that **any removal of vegetation is undertaken outside nesting bird season, which runs from March to September inclusive**. If this is not possible, then a thorough check for nesting birds should be made prior to site clearance. If any active nests are found they must remain in situ until all the young have fledged with an appropriate buffer zone around depending on the species involved.

As an enhancement measure, it is recommended that bird boxes, and potentially barn owl boxes, are installed throughout the site as part of the development proposals. It is also recommended that grassland within the greenspace is managed for ground-nesting bird species such as skylark. Details of suitable bird boxes can be found in Appendix E.

5.3.8 Invertebrates

A number of invertebrate species are protected under the *Wildlife and Countryside Act 1981* (as amended) and the *Conservation of Habitats and Species Regulations 2010* (as amended).

The site provides a matrix of habitats that would offer suitability for a range of common invertebrate species, however the site is considered to hold little value for protected or notable invertebrates. At present it is considered that surveys for terrestrial or aquatic invertebrates are not required. However if plans are altered and aquatic habitats are to be impacted it may be necessary to carry out surveys for aquatic invertebrates.

As an enhancement measure, it is recommended that habitats at the site are enhanced for invertebrates through planting of native species and incorporating insect boxes throughout the new development. It is also recommended that dead wood is retained on site, which would benefit species such as stag beetles (*Lucanus cervus*).

Given the presence of signal crayfish, it is extremely unlikely that the River Lodden or connected watercourses (Fern Brook and running ditch) support white-clawed crayfish due to the competition and disease factors associated with signal crayfish. No further surveys are recommended.

5.4 Invasive Species

The *Wildlife and Countryside Act 1981* (as amended) recognises several invasive plant species list in Schedule 9 of the Act (see Appendix B, Table B2).

No invasive species were recorded during the extended Phase 1 habitat survey. However, the survey was completed early in the season for identifying invasive species. **It is therefore recommended that the invasive species survey is updated during the course of other protected species surveys to be conducted at the site.**

6.0 Summary of Recommendations

6.1 Recommendations for Avoidance:

- It is recommended that the ecology team is consulted throughout the design stage in order to ensure impacts to the riverine habitats do not occur.
- It is recommended that an Ecological Mitigation and Management Plan is produced, which will incorporate measures to prevent impacts to the stream during the construction and operational phases of the development. This will include, preventing materials entering the stream during the construction phase.
- It is recommended that a buffer of at least 10m is retained between the watercourses and any proposed development. Any construction works within 10m of the stream should be carried out in accordance with Environment Agency Pollution Prevention Guidance (PPG) 5: Works or maintenance in or near to water. Likewise, all ponds on site should be retained with a 10m buffer to prevent potential pollution incidents.
- It is recommended that hedgerows are retained on site where possible, including all important hedgerows and where possible species-rich hedgerows, and reinforced with native species of local provenance.
- It is recommended that any removal of vegetation is undertaken outside nesting bird season, which runs from March to September inclusive. If this is not possible, then a thorough check for nesting birds should be made prior to site clearance. If any active nests are found they must remain *in situ* until all the young have fledged, with an appropriate buffer zone according to the species involved.
- It is recommended that a 'bat sensitive' lighting scheme is designed to direct lighting away from areas of retained habitat to provide dark corridors for commuting bats within and around the final development.
- It is recommended that the use of Breathable Roof Membranes is avoided within new buildings to prevent impacts to bats.

6.2 Recommendations for Further Survey:

- **Great crested newts:** Great crested newt presence/ likely absence surveys are recommended for all potentially suitable waterbodes on and within 500m of the site, followed by population surveys where presence is confirmed.
- **Reptiles:** It is recommended that reptile presence/likely absence surveys are carried out on suitable habitat within the site between March and September (optimal months April, May and September).
- **Roosting bats:** If trees with bat potential are to be directly or indirectly impacted by the development it is recommended that a climbed bat assessment is completed.
- **Bat activity:** Bat activity surveys are recommended once a month from April to September. It is recommended that remote bat detectors are also left at two locations along each transect for five consecutive months (April to September). Should lesser horseshoes be recorded it may be necessary to increase the number of surveys to two per month.
- **Dormice:** Dormouse presence/likely absence surveys are recommended for the site. Dormouse nest tubes to be installed within potentially suitable habitat around the site and checked on a monthly basis to achieve 20 survey points.
- **Badger:** It is recommended that a badger survey is completed, including land within 30m of the development boundary.
- **Otter and water vole:** If bridge works have potential to impact upon water voles or otters, and/or works are proposed within 10m of the stream or the woodland and riparian habitats will be subject to increased recreational pressure, it is recommended that an otter and water vole survey is completed between April and September.
- **Breeding birds:** It is recommended that breeding bird surveys are completed at the site. This will involve four visits to the site between April and June.
- **Barn owls:** It is recommended that internal inspections of suitable buildings within 150m are completed in order to search for evidence of barn owls. This can be completed at any time of year.
- **Invasive species:** It is recommended that the invasive species survey is updated alongside other protected species surveys.

6.3 Recommendations for Enhancement:

- It is recommended that native planting of local provenance is incorporated into the landscaping as part of the development proposals. This includes enhancement of retained hedgerows through infill planting of native hedgerow species and planting new native hedgerows at the site where possible. This should aim to provide a network of green corridors allowing movement of wildlife through the site to adjacent off-site habitats.
- Further planting should take place to create rough grassland and scrub adjacent to retained ponds to improve terrestrial habitat for great crested newts. This should include additional hedgerow planting to improve connectivity between ponds.
- Roads within the development should avoid using gulley pots as these trap amphibians including great crested newts.
- Management of the plantation woodland should take place to increase the structural diversity and create a more semi-natural woodland habitat. This could include the creation of woodland glades.
- Buffers adjacent to watercourses should be planted and managed to increase the diversity of riparian vegetation, and introduce marginal and aquatic species.
- Recommendations are made to provide additional nesting/roosting and feeding opportunities for birds, bats and invertebrates within the final design. Further details of enhancements can be seen in Appendices D and E and will be provided within protected species survey reports.
- It is also recommended that dead wood is retained on site, which would benefit invertebrate species such as stag beetles (*Lucanus cervus*).

7.0 References

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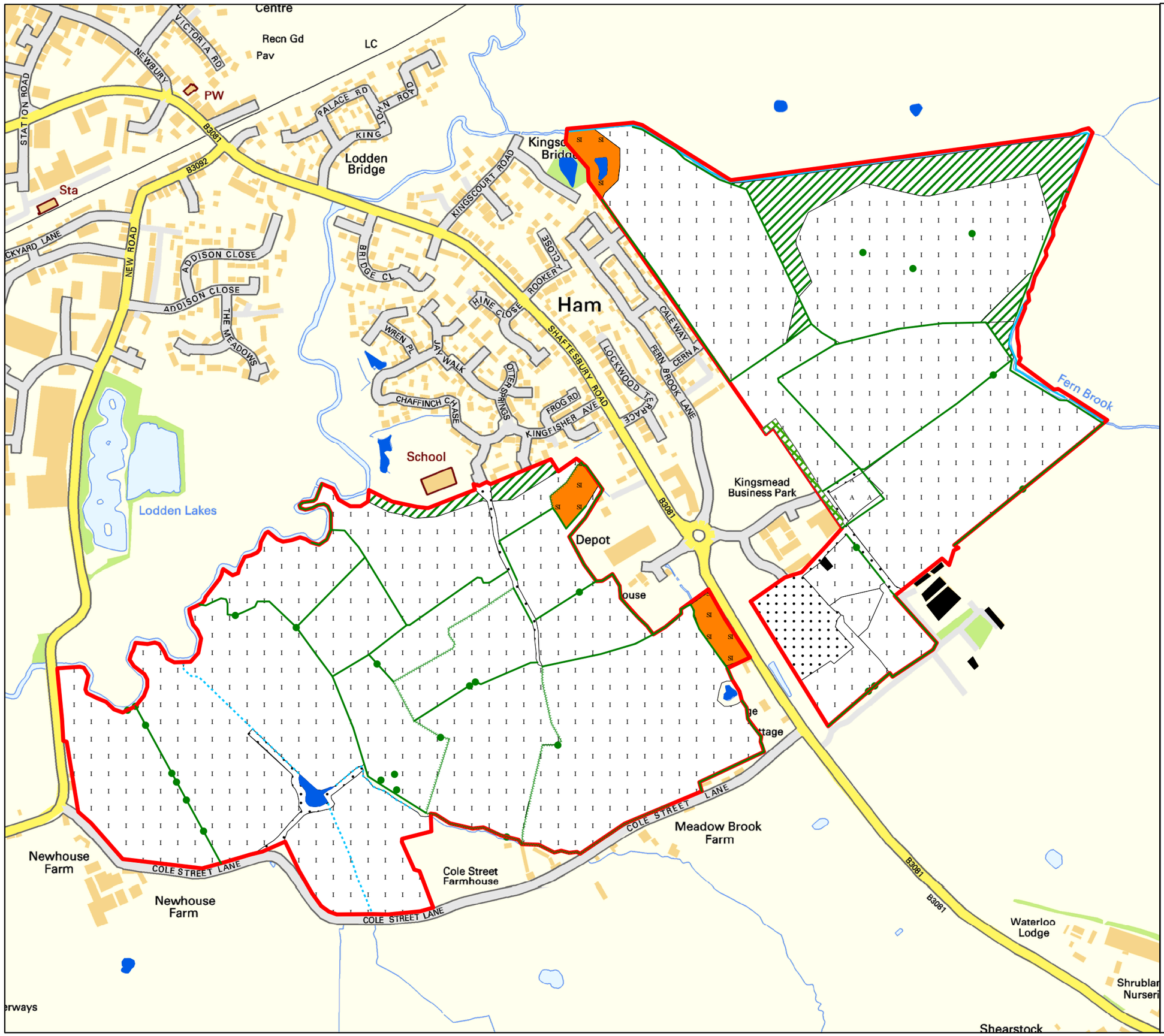
Appendix A - Figures



N

Legend

- Species Rich Hedge
- Intact Hedge
- Scrub
- Ponds
- Running Water
- SI — Semi-Improved Grassland
- A — Arable
- Bare Ground
- Building
- I — Improved Grassland
- Plantation Woodland

0 62.5 125 250 Metres

The Pavillion, 1st Floor
Botleigh Grange Office Campus
Hedge End
Southampton
Hants
SO30 2AF

Tel: 02382 022800
Fax: 02382 022889
email: ecology@wyg.com

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Phase 1 Habitat Plan

	Drawn by: Date:	Checked By: Date:	Approved By: Date:
	MW 16/04/16	DW 12/05/16	TC 14/05/16

Project No:	Office	Type	Drawing No.	Revision
A092344	45	94	Figure 1	

Appendix B – Biodiversity and Environmental Legislation, Conventions & Threatened Lists

Introduction

The UK has ratified a number of Conventions and implemented legislation pertaining to the protection of biodiversity and habtiats, either independently or as member state of the European Union. These are defined and summarised below.

Lists of theatened, endagered and extinct species are also provided, together with a summary explanation of each.

Bern Convention (1982)

The *Convention on the Conservation of European Wildlife and Natural Habitats* (the *Bern Convention*) was adopted in Bern, Switzerland in 1979, and was ratified in 1982. Its aims are to protect wild plants and animals and their habitats listed in Appendices 1 and 2 of the of the Convention, and regulate the exploitation of speices listed in Appendix 3. The regulation imposes legal obligations on participating countires to protect over 500 plant species and more than 1000 animals.

To meet its obligations imposed by the Convention, the European Community adopted the *EC Birds Directiv*e (1979) and the *EC Habitats Directive* (1992 – see below). Since the Lisbon Treaty, in force since 1st December 2009, European legislation has been adopted by the European Union.

Biodiversity 2020

Biodiversity 2020: A strategy for England's wildlife and ecosystem services replaces the previous UK Biodiversity action Plan and sets national targets to be achieved. The intent of the UKBAP, however, is much broader than the protection and enhancement of less common species, and is meant to embrace the wider countryside as a whole.

The priority species and habitats considered under Biodiversity 2020 are those detailed under Section 41 of the NERC Act (as detailed below).

Local Biodiversity Action Plans (LBAP) identify habitat and species conservation priorities at a local level (typically at the County level), and are usually drawn up by a consortium of local Government organisations and conservation charities. Although no-longer accountable at a national level many are still managed and implemented at a local level.

Birds Directive (BD)

The *EC Directive on the Conservation of Wild Birds* (791409/EEC) or '*Birds Directive*' was introduced to achieve favourable conservation status of all wild bird species across their distribution range. In this context, the most important provision is the identification and classification of Special Protection Areas (SPAs) for rare or vulnerable species listed in Annex 1 of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance.

Birds of Conservation Concern (BoCC)

This is a review of the status of all birds occuring regularly in the United Kingdom. It is regularly updated and is prepared by leading bird conservation organisations, including the British Trust for Ornithology (BTO), Joint Nature Conservation Committee (JNCC) and The Royal Society for the Protection of Birds (RSPB).

The latest report was produced in 2009 (Eaton *et al,* 2009) and identified 52 red list species, 126 amber species, and 68 green species. The criteria are complex, but generally:

- Red list species are those that have shown a decline of the breeding population, non-breeding population or breeding range of more than 50% in the last 25 years.
- Amber list species are those that have shown a decline of the breeding population, non-breeding population or breeding range of between 25% and 50% in the last 25 years. Species that have a UK breeding population of less than 300 or a non-breeding population of less than 900 individuals are also included, together with those whose 50% of the population is localasied in 10 sites or fewer and those whose 20% of the European population is found in the UK.
- Green list species are all regularly occurring species that do not qualify under any of the red or amber criteria are green listed

Bonn Convention

The Convention on the Conservation of Migratory Species of Wild Animals or '*Bonn Convention*' was adopted in Bonn, Germany in 1979 and came into force in 1985. Participating states agree to work together to preserve migratory species and their habitats by providing strict protection to species listed in Appendix I of the Convention. It also establishes agreements for the conservation and management of migratory species listed in Appendix II.

In the UK, the requirements of the convention are implemented via the *Wildlfie & Countryside Act 1981* (as amended), *Widlife (Northern Ireland) Order 1985*, *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985* and the *Countryside and Rights of Way Act 2000* (CRoW).

Global IUCN Red List

The International Union for Conservation of Nature (IUCN) Threatended Species was devised to provide a list of those species that are most at risk of becoming extinct globally. It provides taxonomic, conservation status and distribution information about threatened taxa around the globe.

The system catalogues threatened species into groups of varying levels of threat, which are: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CE), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Conern (LC), Data Deficient (DD), Not Evaluated (NE). Criteria for designation into each of the catgories is complex, and consider several principles.

Habitats Directive

The *Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Fora*, or the '*Habitats Directive*', is a European Union directive adopted in 1992 in response to the Bern Convention. Its aims are to protect approximately 220 habitats and 1,000 species listed in its several Annexes.

In the UK, the *Habitats Directive* is transposed into national law via the *Conservation of Habitats and Species (Amendment) Regulations 2012* in England, Scotland and Wales, and via the *Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended)* in Northern Ireland.

Protection of Badgers Act 1992 (PBA 1992)

The main legislation protecting badgers in England and Wales is the *Protection of Badgers Act 1992* (the 1992 Act). Under the 1992 Act it is an offence to: wilfully kill, injure, take or attempt to kill, injure or take a badger; dig for a badger; interfere with a badger sett by, damaging a sett or any part thereof, destroying a sett, obstructing access to a sett, causing a dog to enter a sett or disturbing a badger while occupying a sett.

The 1992 Act defines a badger sett as: "any structure or place which displays signs indicating current use by a badger"

National Planning Policy Framework (2012)

Following the publication of the National Planning Policy Framework (NPPF) in March 2012, *Planning Policy Statement 9* (PPS9)*: Biodiversity and Geological Conservation (*2005) has been withdrawn. However, *ODPM 06/2005: Biodiversity and Geological Conservation – Statutory Obligations and their impact within the Planning System* (the guidance document that accompanied PPS9) has not been withdrawn and, where more detailed guidance is required than is given within the NPPF, local planning authorities will continue to rely on ODPM 06/2005.

This guidance requires local planning authorities to take account of the conservation of protected species when determining planning applications and makes the presence of a protected species a material consideration when assessing a development proposal that, if carried out, would be likely to result in harm to the species or its habitat.

In the case of European Protected Species such as bats, planning policy emphasises that strict statutory provisions apply (including the *Conservation of Habitats and Species (Amendment) Regulations 2012*), to which a planning authority must have due regard.

Where developments requiring planning permission are likely to impact upon protected species it is necessary that protected species surveys are undertaken and submitted to meet the requirements of paragraph 98 of ODPM Circular 06/2005 which states that:

'*The presence of a protected species is a material consideration when a planning authority is considering a development proposal that, if carried out, would be likely to result in harm to the species or its habitat*.'

General guidance within the body of the NPPF which are also potentially relevant to the possible presence of bats at the site includes the following statements:

"The planning system should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, geological conservation interests and soils;*
- *recognising the wider benefits of ecosystem services;*
- *minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures"*

"Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity sites or landscape areas will be judged."

"When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity by applying the following principles:

- *if significant harm resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;"*

Natural Environment and Rural Communities Act 2006

Section 41 (S41) of this Act requires the Secretary of State to publish a list (in consultation with Natural England) of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies including local and regional authorities, in implementing their duty under Section 40 of the *Natural Environment and rural Communities (NERC) Act 2006*, to have regard to the conservation of biodiversity in England, when carrying out their normal (e.g. planning) functions. The S41 list includes 65 habitats of principal importance and 1,150 species of principal importance.

The Conservation of Habitats and Species Regulations 2010 (as amended)

The *Conservation of Habitats and Species Regulations 2010* came into force in 2010 and were updated on 16th August 2012 to ensure the various provisions of Directive 92/43/EC ('the Habitats Directive') are transposed in a clear manner.

Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species (listed in Annexes I or II of the Habitats Directive respectively) to the European Commission. These sites, if ratified by the European Commission, are then designated as Special Protection Areas (SPAs) within six years. The 2012 amendments include that public bodies help preserve, maintain and re-establish habitats for wild birds.

The Regulations also make it an offence to deliberately capture, kill, disturb or trade in the animals listed in Schedule 2, or pick, uproot, destroy, or trade in the plants listed in Schedule 5 (see Table B1).

Table B1 Schedules of the Conservation of Habitats and Species (Amendment) Regulations 2012

Schedule 2 – European Protected Species of Animals		Schedule 5 – European Protected Species of Plant	
Common name	**Scientific name**	**Common name**	**Scientific name**
Horseshoe bats	Rhinolophidae - all species	Dock, Shore	*Rumex rupestris*
Common bats	Vespertilionidae - all species	Killarney Fern	*Trichomanes speciosum*
Wild Cat	*Felis silvestris*	Early Gentian	*Gentianella anglica*
Dolphins, porpoises and whales	Cetacea – all species	Lady's-slipper	*Cypripedium calceolus*
Dormouse	*Muscardinus avellanarius*	Creeping Marshwort	*Apium repens*
Pool Frog	*Rana lessonae*	Slender Naiad	*Najas flexilis*
Sand Lizard	*Lacerta agilis*	Fen Orchid	*Liparis loeselii*
Fisher's Estuarine Moth	*Gortyna borelii lunata*	Plantain, Floating-leaved water	*Luronium natans*
Newt, Great Crested	*Triturus cristatus*	Yellow Marsh Saxifrage	*Saxifraga hirculus*
Otter	*Lutra lutra*		
Lesser Whirlpool Ram's-horn Snail	*Anisus vorticulus*		
Smooth Snake	*Coronella austriaca*		
Sturgeon	*Acipenser sturio*		
Natterjack Toad	*Bufo calamita*		
Marine Turtles	*Caretta caretta*, *Chelonia mydas*, *Lepidochelys kempii*, *Eretmochelys imbricata*, *Dermochelys coriacea*		

The Hedgerow Regulations 1997

The *Hedgerow Regulations 1997* were made under Section 97 of the *Environment Act 1995* and came into force in 1997. They introduced new arrangements for local planning authorities in England and Wales to protect important hedgerows in the countryside, by controlling their removal through a system of notification.

Important hedgerows are defined by complex assessment criteria, which draw on biodiversity features, historical context and the landscape value of the hedgerow.

Wildlife and Countryside Act 1981 (as amended)

This is the principal mechanism for the legislative protection of wildlife in the UK. This legislation is the chief means by which the '*Bern Convention*' and the *Birds Directive* are implemented in the UK. Since it was first introduced, the Act has been amended several times.

The Act makes it an offence to (with exception to species listed in Schedule 2) intentionally:

- kill, injure, or take any wild bird,
- take, damage or destroy the nest of any wild bird while that nest is in use, or
- take or destroy an egg of any wild bird.

In addition, the Act makes it an offence (subject to exceptions) to:

- intentionally or recklessly kill, injure or take any wild animal listed on Schedule 5,
- interfere with places used for shelter or protection, or intentionally disturbing animals occupying such places.
- The Act also prohibits certain methods of killing, injuring, or taking wild animals

Finally, the Act also makes it an offence (subject to exceptions) to:

- intentionally pick, uproot or destroy any wild plant listed in Schedule 8, or any seed or spore attached to any such wild plant,
- unless an authorised person, intentionally uproot any wild plant not included in Schedule 8,
- sell, offer or expose for sale, or possess (for the purposes of trade), any live or dead wild plant included in Schedule 8, or any part of, or anything derived from, such a plant.

Following all amendments to the Act, Schedule 5 'Animals which are Protected' contains a total of 154 species of animal, including several mammals, reptiles, amphibians, fish and invertebrates. Schedule 8 'Plants which

are Protected' of the Act, contains 185 species, including higher plants, bryophytes and fungi and lichens. A comprehensive and up-to-date list of these species can be obtained from the JNCC website.

Part 14 of the Act makes unlawful to plant or otherwise case to grow in the wild any plant which is listed in Part II of Schedule 9.

Table B2 provides a comprehensive list of plant species listed in this schedule. It is recommended that plant material of these species is disposed of as bio-hazardous waste, and these plants should not be used in planting schemes.

Table B2 Invasive plant species listed in Schedule 9 of the *Wildlife & Countryside Act 1981* (as amended)

Common name	Scientific name
Perfoliate alexanders	*Smyrnium perfoliatum*
Red algae	*Grateloupia luxurians*
Variagated yellow archangel	*Lamiastrum galeobdolon* subsp. *argentatum*
Yellow azalea	*Rhododendron luteum*
Himalayan balsam	*Impatiens glandulifera*
Cotoneaster	*Cotoneaster horizontalis*
Entire-leaved cotoneaster	*Cotoneaster integrifolius*
Himalayan cotoneaster	*Cotoneaster simonsii*
Hollyberry cotoneaster	*Cotoneaster bullatus*
Small-leaved cotoneaster	*Cotoneaster microphyllus*
False Virginia creeper	*Parthenocissus inserta*
Virginia creeper	*Parthenocissus quinquefolia*
Purple dewplant	*Disphyma crassifolium*
Fanwort or Carolina water-shield	*Cabomba caroliniana*
Water fern	*Azolla filiculoides*
Hottentot fig	*Carpobrotus edulis*
Three-cornered garlic	*Allium triquetrum*
Giant hogweed	*Heracleum mantegazzianum*
Water hyacinth	*Eichhornia crassipes*
Giant kelp	*Macrocystis* spp.

Common name	Scientific name
Giant knotweed	*Fallopia sachalinensis*
Hybrid knotweed	*Fallopia japonica* × *Fallopia sachalinensis*
Japanese knotweed	*Fallopia japonica*
Few-flowered garlic	*Allium paradoxum*
Water lettuce	*Pistia stratiotes*
Parrot's-feather	*Myriophyllum aquaticum*
Floating pennywort	*Hydrocotyle ranunculoides*
Duck potato	*Sagittaria latifolia*
Floating water primrose	*Ludwigia peploides*
Water primrose	*Ludwigia grandiflora*
Water primrose	*Ludwigia uruguayensis*
Pontic rhododendron	*Rhododendron ponticum*
Rhododendron	*Rhododendron ponticum* × *Rhododendron maximum*
Giant rhubarb	*Gunnera tinctoria*
Japanese rose	*Rosa rugosa*
Giant salvinia	*Salvinia molesta*
Green seafingers	*Codium fragile*
Californian red seaweed	*Pikea californica*
Hooked asparagus seaweed	*Asparagopsis armata*
Japanese seaweed	*Sargassum muticum*
Laver seaweeds (except native species)	*Porphyra* spp
Australian swamp stonecrop or New Zealand pygmyweed	*Crassula helmsii*
Wakame	*Undaria pinnatifida*
Curly waterweed	*Lagarosiphon major*
Waterweeds	*Elodea* spp.

Appendix C – Data Search Results

Appendix D – Wildlife Boxes

Introduction

The information in this appendix relates to bat and bird boxes that can be easily incorporated into building and landscape plans. The information provided is not exhaustive and provides examples of some of the types of boxes available.

Including bat and bird boxes throughout the development site has a number of benefits:

- Any roosting or resting places lost as a result of the work will be replaced;
- The ecological value of the site will be enhanced;
- Priority species within the UK and local Biodiversity Action Plans (BAPs) will be encouraged.

Bats

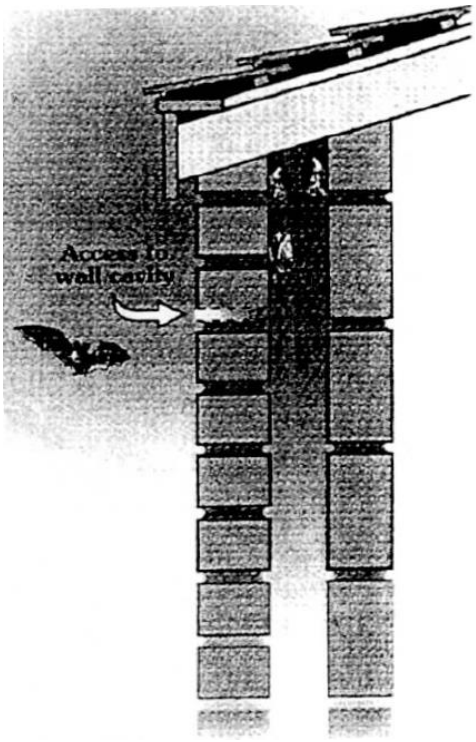
For Buildings

The inclusion of a variety of bat bricks, tubes and boxes for buildings is recommended to encourage a diversity of bat species. Bat bricks and tubes require no maintenance.

Bat Access and Roost Bricks

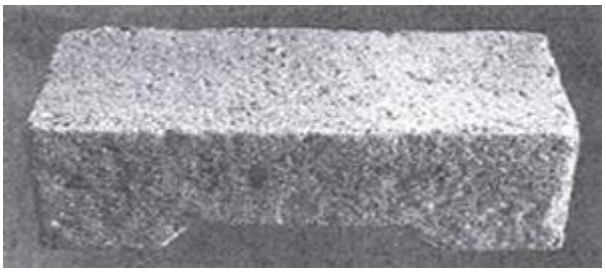
Source: Marshalls Clay Products (approved by the Bat conservation Trust)

'… Marshall Clay Products have been producing a Bat Access Brick specially designed to help the country's badly depleted bat population by provided access to wall cavities or roof spaces where most bat colonies tend to be (see diagram). In recent years bats have been declining at an alarming rate. Nearly all colonies tend to be on the outside of houses, in wall cavities, under slates, flashing or tiles, et c. … Contrary to popular opinion, bats do not make pests and do absolutely no damage to buildings or roof timbers, indeed many people encourage bat colonies in their area because of the large number of insect pests, woodworm, et c. which they eat. Most colonises will use a house for only a few weeks in summer before dispersing in autumn.'



A Bat Brick should ideally be placed as high as possible at the gable apex or close to the soffit.

Marshalls Clay Products - Quarry Lane, Howley Park, Woodkirk, Dewsbury, West Yorkshire, WF12 7JJ – Tel: (01132) 203535, Fax: (01132) 203555.



Marshall's Bat Access Brick, which is now also available in stone.

Bat Tube

Brick bat tubes are designed for buildings, or underneath bridges, arches or tunnels, where conditions are relatively humid. They are particularly useful for new buildings or bridges to attract bats, or to provide new roost sites where existing buildings with bats are being renovated.

This long box can be installed within brick masonry, beneath plasterwork or wood panelling, or incorporated into concrete structures such as factory buildings or bridges. Inside it contains a woodcrete surface, a roughened wood board, and a metal mesh, providing a choice of roosting areas depending on the weather conditions and the bats' habits. This box is maintenance-free as the entrance slit is at the bottom.

No painting required, but if painting is necessary a natural breathable paint should be used.

Width: 20cm; Height: 47.5cm; Depth: 12.5cm; Entrance Width: 15cm; Entrance Depth: 2cm; Weight: 13kg

Bat Box

This type of box is made of woodcrete and is expected to last approximately 25 years. It has a narrow crevice-like internal space to attract Pipistrelle and Noctule bats. Woodcrete (75% wood sawdust, concrete and clay mixture).

Width: 27cm; Height: 43cm; Weight: 8.3kg.

For Trees

Woodcrete boxes have the highest rates of occupation of all box types. The 75% wood sawdust, concrete and clay mixture allows natural respiration, stable temperature, and durability. They are long lasting (approx. 25 years) and are rot- and predator-proof. Hang from a tree branch near the trunk, or fix to a trunk with the supplied 'tree-friendly' aluminium nail. Attractive to smaller British bats.

Material: Woodcrete (75% wood sawdust, concrete and clay mixture); Diameter: 16cm; Height: 33cm; Weight: 4kg.

Bird Boxes

A variety of bird box designs could be installed throughout the development site to attract a diversity of species. Open fronted boxes will attract species such as robins, pied wagtails and spotted flycatchers, while boxes with entrance holes will attract tits, wrens and tree sparrows. Roost pockets will be used by roosting birds over the winter and by smaller species, such as wrens, for nesting in the spring.

Open Fronted Boxes

This box is attractive to robins, pied wagtails, spotted flycatcher, wrens and black redstarts and is best sited on the walls of buildings with the entrance on one side.

These woodcrete boxes are designed to mimic natural nest sites and provide a stable environment for chick rearing and winter roosting. They can be expected to last 25 years or more without maintenance.

Boxes with Entrance Holes

This box is attractive to smaller birds such as tits, wrens and tree sparrows. Sparrow terraces are also available.

Insect Boxes

As with the bat and bird boxes, a variety of insect boxes is recommended to encourage a diversity of species.

Wooden Insect House

A general insect habitat for beneficial insects in summer and, later in the year, over wintering ladybirds and lacewings. Locate in a sheltered place near nectar or pollen plants or by a pond.

Durable and strong construction in acacia, oak or larch with no maintenance necessary. Dimensions: 22 × 13.5 × 13.5cm.

Woodcrete Insect House

An insect nest made from long-lasting, insulating, woodcrete, with holes of different sizes providing homes for a variety of beneficial insects such as bees and solitary wasps.

Dimensions: 14 × 8 × 26cm; Weight: 3.65kg

Insect House with Inspection Tubes

This nesting and hibernation box for insects has a woodcrete exterior with a wooden front panel which can be removed for observation. Through the transparent tubes you can see the usually hidden lifecycle of many solitary types of bees and hymenoptera including egg-laying, development of larvae and sealing of brood chambers.

Typical inhabitants are wild bees and thread-waisted wasps. All the species attracted to this box are harmless non-aggressive pollinating insects. Dimensions: 33 × 21 × 51 cm; Weight: 7.1kg.

Appendix E – Wildlife-friendly Planting

Table E1 Shrub species of native origin or generally thought to be beneficial to wildlife

(Source: *'Gardening with wildlife in mind'*, Natural England, 2008)

Common name	Scientific name
Hazel	*Corylus avellana*
Elder	*Sambucus nigra*
Goat willow	*Salix caprea*
Hawthorn	*Crataegus monogyna*
Dog rose	*Rosa canina*
Butterfly bush	*Buddleia davidii*
Guelder rose	*Viburnum opulus*
Gorse	*Ulex europaeus*
Broom	*Cytisus scoparius*
Wayfaring tree	*Viburnum lantana*
Shrubby cinquefoil	*Potentilla fruticosa*
Raspberry	*Rubus idaeus*
Alder buckthorn	*Frangula alnus*
Wild privet	*Ligustrum vulgare*
Barberry	*Berberis × stenophylla*
Barberry	*Berberis vulgaris*
Bell heather	*Erica cinerea*
Bilberry	*Vaccinium myrtillus*
Black currant	*Ribes nigrum*
Blackthorn	*Prunus spinosa*
Buckthorn	*Rhamnus catharticus*
Butcher's-broom	*Ruscus aculeatus*
Cherry laurel	*Prunus laurocerasus*
Cowberry	*Vaccinium vitis-idaea*
Cross-leaved heath	*Erica tetralix*
New Zealand holly	*Olearia macrodonta*
Daphne	*Daphne odora*
Dogwood	*Cornus sanguinea*
Field rose	*Rosa arvensis*
Firethorn	*Pyracanthus angustifolia*
Flowering Currant	*Ribes sanguineum*
Gooseberry	*Ribes uva-crispa*
Hebe 'Midsummer Beauty'	*Hebe species*
Himalayan honeysuckle	*Leycesteria formosa*
Holly	*Ilex aquifolium*
Japanese quince	*Chaenomeles japonica*
Lilac	*Syringa vulgaris*
Mexican orange	*Choisya ternata*
Mezereon	*Daphne mezereum*
Midland Hawthorn	*Crataegus laevigata*
Oregon Grape	*Mahonia aquifolium*
Osier	*Salix viminalis*

Common name	Scientific name
Portugal laurel	*Prunus lusitanica*
Privet	*Lustrum ovalifolium*
Purple Willow	*Salix purpurea*
Snowy Mespilus	*Amelanchier canadensis, Amelanchier lamarckii*
Spindle	*Euonymus europaeus*
Spurge laurel	*Daphne laureola*
Sweet briar	*Rosa rubiginosa*

Table E2 Tree species of native origin or generally thought to be beneficial to wildlife

(Source: '*Gardening with wildlife in mind'*, Natural England, 2008)

Common name	Scientific name
Pedunculate oak	*Quercus robur*
Ash	*Fraxinus excelsior*
Wych elms	*Ulmus glabra*
Whitebeam	*Sorbus aria agg.*
Rowan	*Sorbus aucuparia*
Aspen	*Populus tremula*
Apple	*Malus domestica*
Bird cherry	*Prunus pardus*
Common alder	*Alnus glutinosa*
Crab apple	*Malus sylvestris*
Crack willow	*Salix fragilis*
Downy birch	*Betula pubescens*
Field maple	*Acer campestre*
Hornbeam	*Carpinus betulus*
Juniper	*Juniperus communis*
Large-leaved lime	*Tilia platyphyllos*
Small-leaved lime	*Tilia cordata*
Pear	*Pyrus communis*
Scots pine	*Pinus sylvestris*
Sessile oak	*Quercus petraea*
Silver birch	*Betula pendula*
Sweet chestnut	*Castanea sativa*
Wild cherry	*Prunus avium*
Wild service-tree	*Sorbus torminalis*
Yew	*Taxus baccata*

Table E3 Gardening for bats

Aim at having flowers in bloom throughout the year, including both annuals and herbaceous perennials. Below are some suggestions, but this is not an exhaustive list. Flowering times are approximate, varying dependent on region. Regular dead-heading extends flowering period in many flowers.

A=annual, HA= hardy, annual, HHA=half-hardy annual, P=perennial, W=wild flower.

Flowers for borders			
St. John's Wort	*Hypericum*	P	March
Marigolds	*Calendula*	H/A	March-October
Aubrietia	*Aubrietia deltoidea*	P	March-June
Honesty	*Lunaria rediviva*	HB	March
Forget-me-not	*Myosotis* sp.	A/P	March-May
Elephant ears	*Bergenia*	P	April
Wallflowers	*Erysimum*	B	April-June
Cranesbills	*Geranium sp.*	P	May-September
Yarrow	*Achillea*	P	May-
Poppies	*Papaver* sp.	A	May- July
Dames violet	*Hesperis matronalis*	P	May-August
Red Valerian	*Centranthus rubber*	P	May-Sept
Poached egg plant	*Limnanthes*	HA	June-August
Knapweed	*Centaurea nigra*	P	June-September
Phacelia		HA	June-September
Ox-eye daisy	*Leucanthemum vulgare*	P	June-August
Evening primrose	*Oenothera biennis*	B	June-September
Candytuft	*Iberis umbellate*	HA	June-September
Sweet William	*Dianthus barbatus*	B	June-July
Blanket flowers	*Gaillardia*	P	June -
Verbena	*Verbena bonariensis*	HHA	June-October
Scabious	*Knautia arvensis*	P	July-August
Night-scented stock	*Mattiola bicornia*	HA	July-August
Pincushion flower	*Scabious* sp.	A/P	July-September
Cherry pie	*Heliotrope*	HHA	July-October
Mexican aster	*Cosmos* sp.	A/P	July-October
Cone flower	*Rudbeckia sp.*	A/P	August-November
Mallow	*Lavateria sp.*	P	August-October

Michaelmas daisy	*Aster* sp.	P	August-September
Ice plant 'Pink lady'	*Sedum spectabile*	P	September
Herbs – both leaves and flowers are fragrant			
Fennel	*Foeniculum vulgare*		July-September
Bergamont	*Monarda didyma*		June-September
Sweet Cicely	*Myrrhis odorata*		April-June
Hyssop	*Hyssopus officinalis*		July-September
Feverfew	*Tanacetum parthenium*		June-September
Borage	*Borago officinalis*		May-September
Rosemary	*Rosmarinus officinalis*		March-May
Lemon balm	*Melissa officinalis*		
Coriander	*Coprianrum sativum*		June-August
Lavenders	*Lavendula* sp.		
Marjoram	*Origanum* sp.		
Trees, shrubs and climbers important to insects			
Oak	*Quercus* sp.		large gardens only
Silver birch	*Betula pendula*		
Common alder	*Alnus glutinosa*		Suitable for coppicing
Hazel	*Corylus avellana*		Suitable for coppicing
Elder	*Sambucus nigra*		Small
Goat willow	*Salix caprea*		Suitable for coppicing
Hawthorn	*Crataegus monogyna*		Suitable for coppicing
Honeysuckle	*Lonicera* sp.		Grow a variety for succession
Dog rose	*Rosa canina*		Climber
Bramble	*Rubus fruticosus*		Climber
Ivy	*Hedera helix*		Climber
Buddleia	*Buddleija davidii*		Shrub
Guelder rose	*Vibernum opulus*		Shrub
Gorse	Ulex *sp.*		Shrub
Plants for pond edges and marshy areas			
Purple loosestrife	*Lytrhum salicaria*	W	June-August
Meadow sweet	*Filipendula ulmaria*	W	June-September
Lady's smock	*Cardamine pratensis*	W	April-June
Water mint	*Mentha aquatica*	W	July-September
Angelica	*Angelica sylvestris*	W	July-September
Hemp agrimony	*Eupatorium cannabinum*	W	March-May

Marsh marigold	*Caltha palustris*	W	June-September
Creeping Jenny	*Lysimachia nummularium*	W	May-August
Fringed water lily	*Nymphoides peltata*	W	June-September
Water forget-me-not	*Myosotis scorpioides*	W	June-September

Allow part lawns to grow long in summer and cut in autumn, removing the clippings. Avoid using fertilisers. Compost heaps are food producers of insects too.

(Source: *'Gardening for bats'*, Bat Conservation Trust, 2004)