

# **Berewood: Phase 2 Infrastructure Biodiversity Report**



**February 2013**

Biodiversity by Design Ltd on  
behalf of Grainger

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## **1.0 INTRODUCTION**

### **1.1 Background and Proposals**

In 2011 Grainger received outline planning permission from Winchester City Council (WCC) and Havant Borough Council (HBC) for a mixed-use development consisting of 2,550 housing units at Newlands (referred to hereafter as Berewood) on the western fringe of Waterlooville in Hampshire. The outline planning application was subject to a full Environmental Impact Assessment (EIA) and also Habitats Regulations Assessment (HRA) screening (N.B. the Competent Authority decided, based on the HRA screening assessment, that a formal Appropriate Assessment would not be required).

Phase 1 of the multi-phase development has received Full Planning Permission and is currently being built. A Reserved Matters Application (RMA) is to be submitted for the Phase 2 residential sometime in 2013, although the principal infrastructure relating to Phase 2, which is the subject of the present document, is to be designed and constructed in advance of this application to facilitate Grainger in packaging and delivering serviced plots for future sale.

These Phase 2 infrastructure proposals are to include:

- The main access junction from London Road (historically referred to as the Milk Lane entrance).
- Road linking the main access junction with Phase 2's primary north-south road – ca. 100m in length.
- The primary north-south link road and accompanying landscape treatment – ca. 550m in length starting near the access junction and finishing near the north-west corner of Marrelsmoor Coppice woodland.

- Secondary roads – spurs only off the primary north-south road only.
- Associated SuDs infrastructure and accompanying landscape treatment for these areas. In total the SuDS features would cover an area ca. 1ha (each would be ca. 0.17ha in size).
- Installation of services/utilities in association with the new road alignments. Utility installation will also continue southward from the point where the Phase 2 primary north-south road construction will finish, extending down the western side of Marrelsmoor Coppice, passing through an existing gap in Highfield Row woodland and then continuing on across a series of small meadows. The services/utilities will follow the same alignment up to a point just north of Purbrook Heath Road. At this point one utility alignment will continue south finishing at Purbrook Heath Road, while the other will divert in an easterly direction finishing in the Site's south-east corner just to the west of the London Road and Ladybridge Road junction.

The locations of the various Phase 2 infrastructure proposals (also referred to as 'the Site' and 'the Development Site' throughout this report) are shown on Figures 1.1 and 1.2.

It has been agreed with the Councils that these infrastructure works will form part of a partial discharge of a Condition Application associated with Condition 6 (i)(c) and 6(ii), which are as follows:

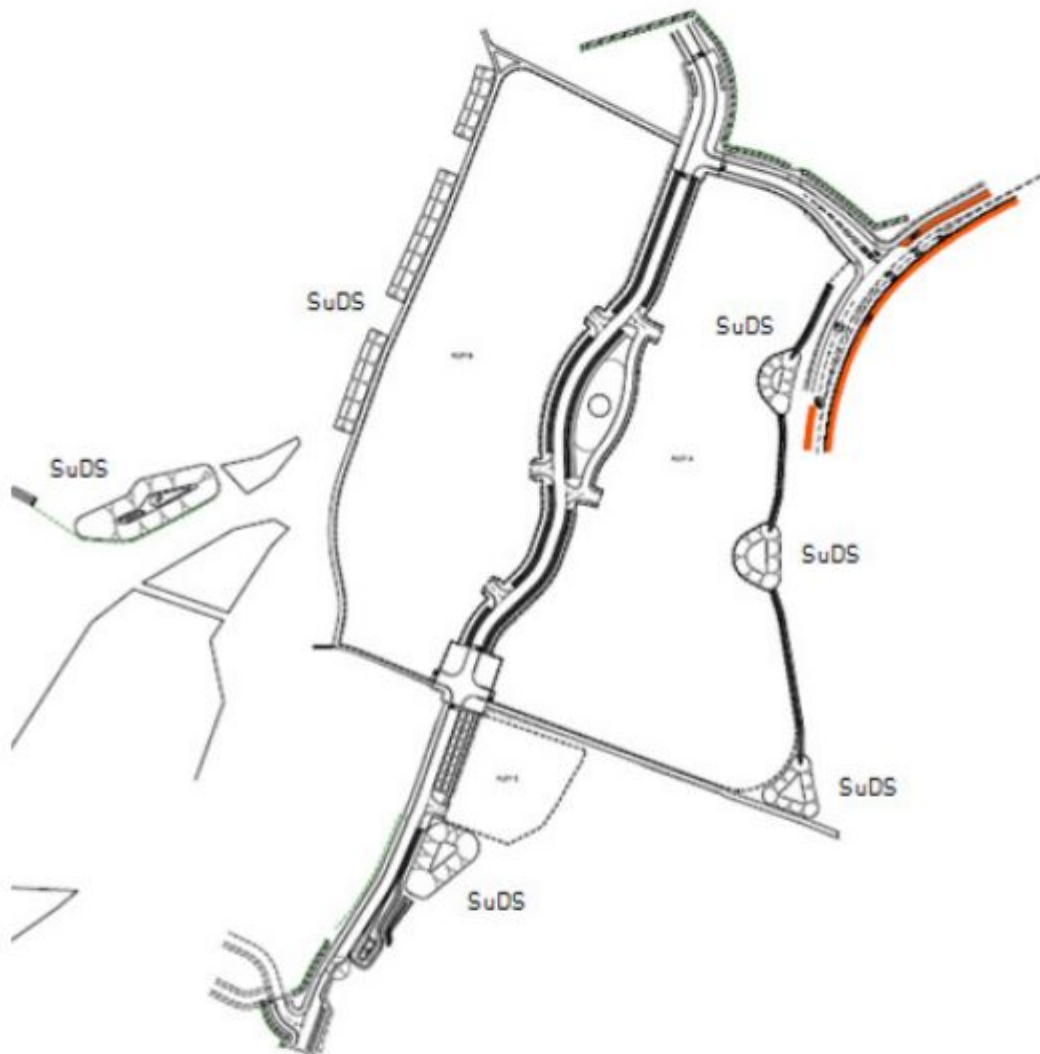
***Condition 6 ii) – other matters***

*a) The layout of the development including the positions and widths of roads, cycle ways, bridleways and footpaths and routes to countryside, including horizontal cross sections and longitudinal sections and details of any associated infrastructure*

*d) The layout, depth and capacity of all foul sewers and surface drainage including SUDS and their means of disposal; and details of*

*any other proposed ancillary drainage works/plant (e.g. pumping station)*

**Figure 1.1** Phase 2 Infrastructure proposals north of Highfield Row woodland



**Figure 1.2** Phase 2 linear infrastructure proposals between Highfield Row woodland and Purbrook Heath Road (N.B. existing woodland and hedgerow breaches made in 2008 are shown in orange)



Various additional pre-commencement conditions will also be applied for in relation to the above infrastructure works. It is not relevant to set these all of these out in the present document. The one exception relates to Condition 19, the requirement for new woodland planting near the cemetery:

*Condition 19 - Details of buffer planting for the cemetery prior to commencement of the cemetery shall be submitted to and improved in writing by the Local Planning Authority*

In addition to the above, the green infrastructure phasing strategy set out in the Environmental Statement also includes the commitment to create the following new woodland areas:

- *Woodland buffer planting - 5m wide dense thorny native shrub planting along northern margins of Highfield Row'.*
- *Woodland planting - planting dense thorny native shrubs [5m wide] around margins of existing woodland – Newlands / Barnfield Row, Marrelsmoor Coppice'.*

The locations of these proposed new woodland areas are shown in Figure 1.3.

Construction works are likely to extend over nine months and are currently scheduled to be undertaken between June 2013 and February 2014 inclusive, although certain habitat clearance works are to be undertaken in Winter 2012/2013 to avoid harming certain sensitive wildlife.

The phasing section in the Environmental Statement, which accompanied the outline planning application, stated that the Phase 2 would also include the first component of the Town Park and the restoration of Newlands Meadow. The details for these various elements of green infrastructure are to be included in the forthcoming Phase 2 Town Park RMA.

**Figure 1.3** Woodland planting commitments



## 1.2 Terms of Reference

In summary this report provides an appraisal of the potential effects of the Phase 2 infrastructure works upon the ecological resources within and in relevant proximity to the Site.

An overview of relevant wildlife legislation and planning policies applicable to the Site is provided in the ES and is not repeated here, although developments in planning policy since the ES are summarised in Appendix 1. An overview of the survey methods employed and the baseline conditions within and surrounding the Site is provided. The potential adverse or beneficial effects that the Development may have during construction and once completed are then identified. Where applicable, appropriate mitigation measures are outlined and residual adverse effects identified.

It is emphasised here, however, that this document does not aim to describe and assess ecological impacts to the same level as a detailed ES. The ES that accompanied the outline planning application has already investigated impacts on relevant habitats, species and taxa in great detail (including for the Phase 2 Site) and in accordance with Institute for Ecology and Environmental Management criteria. The purpose of the present document is provide an update on the ecological status of the Phase 2 Site and its immediate surrounds, where necessary highlighting any fundamental changes and associated mitigation requirements.

It is further highlighted that this report does not seek to assess the ecological impact of the forthcoming Phase 2 residential or Town Park developments, although reference to both is made in outline where relevant.

## 2.0 ASSESSMENT METHODOLOGY

### 2.1 Desk Study

Given that proposals for the wider Berewood site have been developing over a number of years, four separate ecological desk studies have been undertaken, the most recent of which was carried out in October 2012. Local records of protected or notable species and habitats, including Section 41 listed (NERC Act) and local Biodiversity Action Plan Priority habitats and species were requested. Desk study search criteria and the list of consultees are set out in the ES.

### 2.2 Field Surveys

Because of the dynamic nature of wildlife and habitats there has been a need to regularly review existing ecological conditions and consequently ecological survey data also dates back over many years. The status of certain habitats and species has accordingly been updated with new survey data for present assessment where relevant, focussing on the Phase 2 infrastructure site and its surrounds. These surveys have included the following:

- Extended Phase 1 Habitat Survey
- Badger *Meles meles* survey (protected under Protection of Badgers Act 1992)
- Dormouse *Muscardinus avellanarius* survey (protected under Habitats Regulations 1994 [as amended] and Wildlife and Countryside Act 1981 [as amended])
- Bat surveys - activity and potential bat roosts (protected under Habitats Regulations 1994 [as amended] and Wildlife and Countryside Act 1981 [as amended])

- Great Crested Newt *Triturus cristatus* (GCN) survey [protected under Habitats Regulations 1994 [as amended] and Wildlife and Countryside Act 1981 [as amended]]
- Reptile survey [protected under Wildlife and Countryside Act 1981 [as amended]]
- Breeding bird survey [relevant species and assemblages afforded some protection under Natural Environment and Rural Communities [NERC] Act 2006]

Survey protocols are described in detail in Appendix 2.

### **3.0 EXISTING CONDITIONS**

#### **3.1 The wider Berewood site**

The Site is one component of the wider Berewood development. Berewood, which is 209ha in size, is located immediately west of Waterlooville and to the north of Portsmouth in Hampshire. Berewood is bounded as follows:

- A3 (London Road) - eastern boundary.
- Purbrook Heath Road – southern boundary.
- Newlands Lane – western boundary.
- Old Park Farm Stream and Brambles Industrial Estate – northern boundary.

The majority of Berewood consists of fields of arable and pasture bounded by hedgerows and ditches. Generally the western side of Berewood has smaller fields and denser network of hedgerows. Various small locally designated

Ancient woodlands extend in a general north-south alignment through the centre of Berewood.

There are two farm building complexes within the wider Berewood site that act as useful geographical reference points - Plant Farm which has a centre-east position; and Newlands Farm which is positioned approximately half way down the western boundary of Berewood.

### 3.1.1 Designated Sites

There are no Internationally, European or Nationally designated sites within the Site or sufficiently close to be relevant in terms of being potentially vulnerable to any significant adverse effects relating to the Phase 2 infrastructure proposals.

The Phase 2 Site is within 200m of five SINCs. These are:

- Newlands Row and Plant Row - Ancient woodland
- Marrelsmoor Row - Ancient woodland
- Marrelsmoor Coppice - Ancient woodland
- Alsfordmoor Coppice - Ancient woodland
- Newlands Farm Meadow - originally designated for its unimproved grassland, although much of its value has been diminished due to intermittent ploughing over many years

Newlands Row and Plant Row, Marrelsmoor Row, Marrelsmoor Coppice all directly abut the Development proposals. Each of these SINCs is described in detail in the Environmental Statement.

### **3.2 Phase 2 Infrastructure Site – an Overview**

The Phase 2 Infrastructure site is approximately 9ha in size and is located predominantly on arable land in the southern half of the Berewood site. The majority of the Site is bounded to the:

- East by the A3/London Road.
- West by Newlands Row and Marrelsmoor Row woodlands.
- South by Marrelsmoor Coppice.
- North by an arable headland extending from eastern spur of Barnfield Row woodland to the Milk Lane entrance point.

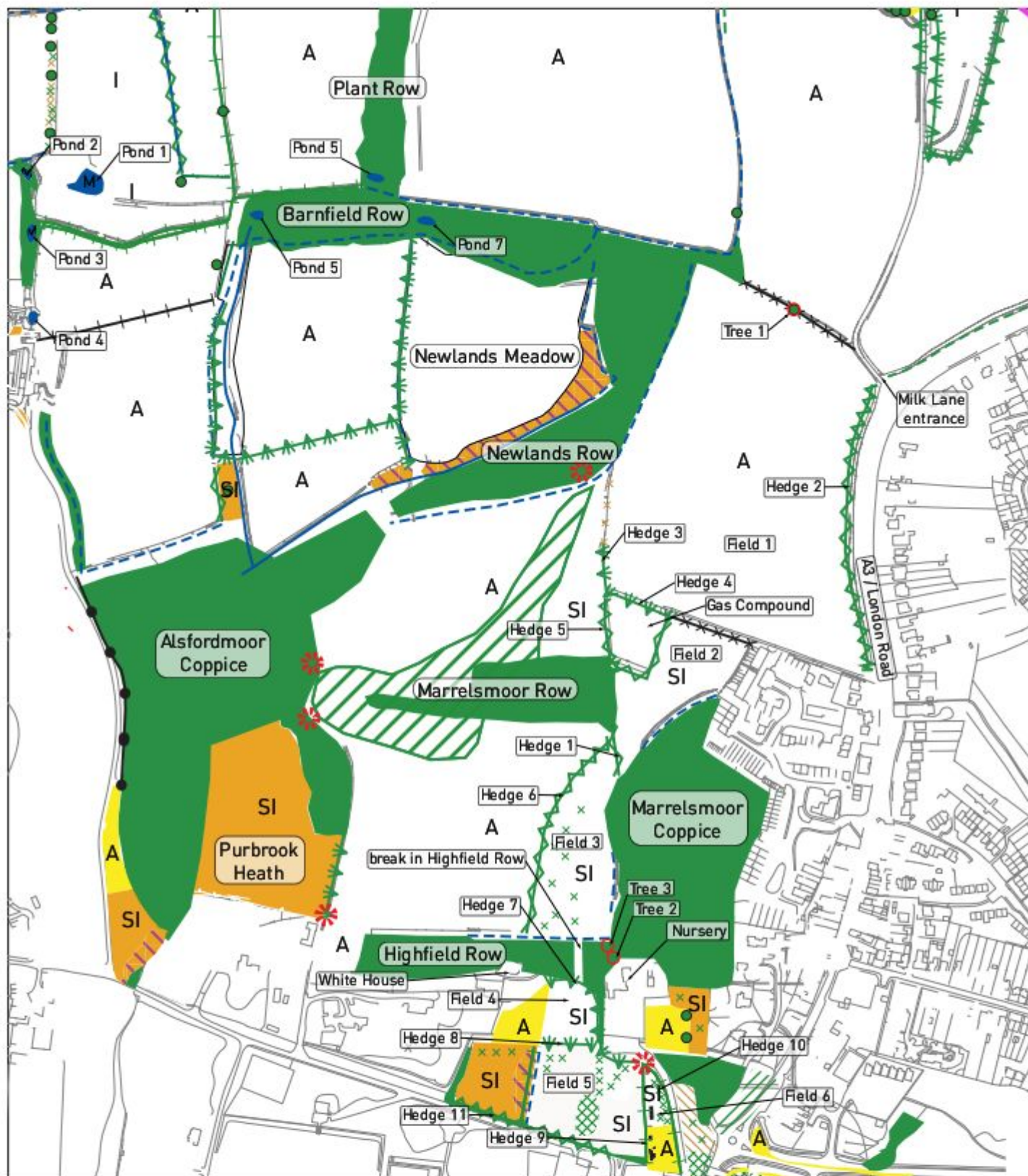
Each of these features is labelled on Figure 3.1 (note also the utilities extending south of Highfield Row).

### **3.3 Phase I Habitat Survey and Hedgerow Evaluation**

Phase I Habitats within the Phase 2 Site are shown in Figure 3.1 and discussed below.

#### **3.3.1 Arable**

The key component of the Site is a large arable field, ca. 7.2ha in area, between Newlands Row woodland and the A3/London Road (labelled as Field 1 in Figure 3.1). The Site also includes the north-east corner of the arable field between Marrelsmoor Row and Newlands Row (ca. 0.17ha in area). For the EIA covering the wider site, a representative selection of arable fields across Berewood were surveyed checking for the presence of rare arable weeds (survey included fields immediately to the north of the Phase 2 Site). All of the species recorded were relatively common and widespread plants of farmland or disturbed ground.



### 3.3.2 Woodland and plantation

Nearly all adjoining mature woodland areas which bound (but which are outside of) the Site are SINC designated on account of their Ancient woodland. Only one of the Site's woodlands - Highfield Row - is not designated a SINC and is not Ancient in origin.

In addition to these woodlands a relatively large area (ca. 2ha) of new broadleaf woodland has been planted on former arable land around Marrelsmoor Row, the northern most extremity of which will abut the Development's western most SuDS feature. This was planted in 2009 to compensate for some minor woodland and hedgerow loss associated with 2008 linear infrastructure proposals and also to contribute in offsetting of any future minor adverse effects associated with the subsequent wider scheme proposals including those associated with the present project.

### 3.3.3 Scrub

Nearly all the scrub areas are within the various grassy fields described below. There is also a narrow (ca. 3-4m wide) band of Bramble *Rubus fruticosus* agg. scrub and invading Ash *Fraxinus excelsior* seedlings in the south-east corner just to the west of the London Road and Ladybridge Road junction.

### 3.3.4 Hedgerows

Hedgerows that will be affected by the proposals, or are within close proximity to them, are described in Table 3.1. Five hedgerows (Hedges 1, 6, 7, 10 and 11 – see Figure 3.1), will be directly affected by the infrastructure works; two of which (Hedges 1 and 7) are Important with respect to the Hedgerow Regulations. Note that gaps have already been cleared through these two Important hedgerows (and also through Hedges 8 and 9) to facilitate the installation of infrastructure in relation to previous scheme proposals.

**Table 3.1** Hedgerows that would be affected by or are in close proximity to the proposed infrastructure works

| Hedgerow | Important according to Hedgerow Regulations criteria | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hedge 1  | Yes                                                  | Hazel <i>Corylus avellana</i> dominated species-rich hedgerow linking Marrelsmoor Coppice to Marrelsmoor Row at the southern end of the proposals. Other species include Oak (two semi-mature trees), Hawthorn <i>Crataegus monogyna</i> and Bramble. Ca. 55m in length, although a 6m section at the southern extremity was cleared in 2008 in relation to earlier linear infrastructure proposals.                                                                                                                                                                                                                                                    |
| Hedge 2  | No                                                   | Three new SuDS features will directly abut the hedgerow bounding the eastern side of the large arable field. This hedgerow is typically 1.5m wide and 2.5-3m in height. Although this hedgerow is species-rich (including Hawthorn <i>Crataegus monogyna</i> , Elder <i>Sambucus nigra</i> , Hazel, Field Maple <i>Acer campestre</i> , Oak <i>Quercus robur</i> , cherry <i>Prunus</i> sp., Wild Privet <i>Ligustrum vulgare</i> , Blackthorn <i>Prunus spinosa</i> and Holly <i>Ilex aquifolium</i> ) it has been relatively recently planted and so has not established the ecological value for wildlife associated with longer standing hedgerows. |
| Hedge 3  | Yes                                                  | Very short (ca. 25m) and gappy but quite diverse old hedgerow on a bank. It has two mature oaks and various shrub species, including Butcher's-broom <i>Ruscus aculeatus</i> , Elder, Hawthorn, Hazel, Roses <i>Rosa</i> spp. (all species), Spindle <i>Euonymus europaeus</i> . Bramble is also abundant.                                                                                                                                                                                                                                                                                                                                              |
| Hedge 4  | Yes                                                  | This 172m long tall hedge including a number of trees abutting the Purbrook Pressure Reducing Station fence line (on the north, east and west sides). Its age is unclear although it is probably at least 30 years old. It is species-rich and includes Ash <i>Fraxinus excelsior</i> , Beech <i>Fagus sylvatica</i> , Bird Cherry <i>Prunus padus</i> , Blackthorn, Hawthorn, Hazel, Oak, Roses (all species), Wild Cherry <i>Prunus avium</i> , Willow <i>Salix</i> spp. (all species except Osier). It also includes introduced species including cotoneasters and Garden Privet.                                                                    |
| Hedge 5  | Yes                                                  | This 72m long hedgerow is the remains of an old hedge and bank feature. It links with Marrelsmoor Row to the south and the southern end of Hedge 3 to the north. It also extends along the western boundary of the Purbrook Pressure Reducing Station. Species include Ash, Blackthorn, elm <i>Ulmus</i> sp., Field Maple, Hawthorn, Hazel and roses (all species). The ground flora includes Bluebell <i>Hyacinthoides non-scripta</i> and Wood Anemone <i>Anemone nemorosa</i> .                                                                                                                                                                      |
| Hedge 6  | No                                                   | A new species-rich hedgerow has been planted between Highfield Row and the hedgerow linking Marrelsmoor Row and Marrelsmoor Coppice. This was planted in 2009 to compensate for the earlier 6m wide severance of the hedgerow between Marrelsmoor Row and Marrelsmoor Coppice in relation to earlier linear infrastructure works associated with the wider scheme. Due to its young age it is not currently functioning in any meaningful sense as hedgerow habitat.                                                                                                                                                                                    |
| Hedge 7  | Yes                                                  | Species-rich hedge including Hazel, Holly, Hawthorn, Blackthorn, Ash, Sycamore, Oak, willow, Butcher's Broom, Bramble and Ivy. A ca. 6m wide gap has been cleared, directly opposite the gap in                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

| Hedgerow | Important according to Hedgerow Regulations criteria | Description                                                                                                                                                                                                                                                                                                                                                                                           |
|----------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |                                                      | Highfield Row, in relation to previous scheme linear infrastructure proposals. Bramble and tall herbs have grown up within the gap.                                                                                                                                                                                                                                                                   |
| Hedge 8  | Yes                                                  | Species-rich hedge with mature trees including Oak and Ash. Ash prominent, along with Holly and Hawthorn. Spindle, Honeysuckle, Field-rose and Wild Privet also present. The hedge is raised on a bank, with a ditch along one side. Includes a ca. 6m wide gap cleared in relation to previous scheme infrastructure proposals. Bramble, gorse and tall herbs had grown up within the cleared space. |
| Hedge 9  | No                                                   | Non-Important hedge including a 15m wide gap cleared in relation to previous (2008) scheme infrastructure proposals. Species present include Ash, rose sp., Oak, Holly, Hawthorn, Sycamore, Butcher's Broom, Bramble and Ivy.                                                                                                                                                                         |
| Hedge 10 | No                                                   | Non-Important hedge bounding lane including Ash, birch, Hawthorn, Oak, Honeysuckle and Ivy.                                                                                                                                                                                                                                                                                                           |
| Hedge 11 | Yes                                                  | Gappy but species-rich wide hedge including mature trees (Oak and Ash). Other species include willow, Hawthorn, Yew, Holly, rose, privet, and Bramble. Includes a 9.5m wide gap cleared in relation to previous (2008) scheme infrastructure proposals.                                                                                                                                               |

### 3.3.5 Grassland

Grassy areas within the site include the following:

- A wildflower grassland mix has been recently sown beneath the area of broadleaf plantation and includes Oxeye Daisy *Leucanthemum vulgare*, Bird's-foot-trefoil *Lotus corniculatus*, Black Knapweed *Centaurea nigra*, Meadow Buttercup *Ranunculus acris*, Ribwort Plantain *Plantago lanceolata*, Smooth Cat's-ear *Hypochaeris glabra*, Ragged Robin *Lychnis flos-cuculi*, Sweet Vernal Grass *Anthoxanthum odoratum*, Meadow Foxtail *Alopecurus pratensis*, Rough Meadow-grass *Poa trivialis* and Yorkshire Fog *Holcus lanatus*.
- A small species-poor semi-improved meadow ca. 0.65ha in size between the large arable field and the northern boundary of Marrelsmoor Coppice (labelled as Field 2 in Figure 3.1).

- A small area of species-poor semi-improved grassland has developed on previously arable land between Hedge 6 and the western edge of Marrelsmoor Coppice (labelled as Field 3 in Figure 3.1). Various tree seedlings have also established in this area.
- A small species-poor semi-improved meadow immediately south of Highfield Row (labelled as Field 4 in Figure 3.1).
- An area of mostly species-poor semi-improved meadow north of Purbrook Heath Road (labelled as Field 5 in Figure 3.1) dominated by False-oat grass and Yorkshire Fog, although the presence of certain herbs species (including Pepper-saxifrage *Silene acaulis*, Ragged-Robin *Cardamine flos-cuculi* and Greater Bird's-foot-trefoil *Lotus pedunculatus*) indicate that it may have once been a more diverse. Includes substantial patches of young willow and Bramble.
- Small species-poor grassy field including substantial Bramble encroachment.

### 3.3.6 Tall herb vegetation

In the south-east corner of the Site, just to the west of the London Road and Ladybridge Road junction, there is a small area (ca. 8m X 8m) of tall herb vegetation growing over damp/boggy humus-rich soil. Species include abundant Pendulous Sedge and frequent to occasional Great Willowherb, Meadowsweet, Remote Sedge, Common Fleabane, Clustered Dock and Water Figwort. There were also patches of scattered Bramble scrub and invading Ash seedlings.

### 3.3.7 Ponds

No ponds are present within the footprint of the proposed infrastructure, although a number of ponds in the wider area were surveyed due to their potential to support GCNs and other amphibians which could be affected by

the proposals during their terrestrial life stages. These ponds are shown in Figure 3.1 and described in Section 3.4.4 Amphibians.

### **3.4 Fauna**

A full account of HBIC and other consultee records is presented in detail in the ES and so is not repeated here. The most relevant results from this desk study are referred to below alongside the results of the field surveys.

#### **3.4.1 Badgers**

A number of snuffle holes and fresh latrines were recorded within the vicinity of the Site showing that Badgers are currently active although only a single outlier sett only was found in the south-west corner of Marrelsmoor Coppice. This sett had only one entrance which was covered by various debris, suggesting that it had not been used recently, i.e. the sett was considered to be disused.

Surveys undertaken across the wider Berewood site for the ES identified two Main setts, both of which were found on the western side of wider development area more than 0.5km away from the Phase 2 proposals.

#### **3.4.2 Dormouse**

The Dormouse survey covered those woodlands immediately surrounding and in close proximity to the Phase 2 Infrastructure proposals (Plant Row, Barnfield Row, Newlands Row, Alsfordmoor Coppice, Purbrook Heath boundary, Highfield Row, Marrelsmoor Row and Marrelsmoor Coppice) and also the network of hedgerows and scrub between Highfield Row and Purbrook Heath Road.

The present survey found evidence of Dormouse from:

- Newlands Row woodland – adult Dormouse found in tube.

- Marrelsmoor Coppice – one unoccupied nest.
- Purbrook Heath wooded boundary – two unoccupied nests.
- Hedge network between Highfield Row and Purbrook Heath Road – one unoccupied nest.

The location of these records is shown in Figure 3.1. Dormouse records from previous surveys are presented in Table 3.3. Evidence of Dormouse has previously been recorded in all of the woodlands surrounding the Phase 2 Site with the exception of Marrelsmoor Row.

As discussed in the ES these areas and the wider Berewood site probably only support a sink population; that is one that is dependent on continued immigration of Dormice for its long-term survival. Such immigration most likely originates from the large woodland areas west of Newland Lane where previous survey has revealed a seemingly healthy population (as reported in the ES).

**Table 3.3** Dormouse survey records from woodlands close to the Phase 2 Infrastructure proposals

| Date         | Location                                                                            | Evidence                                                   | Conclusion                                                                                                                                            |
|--------------|-------------------------------------------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2007 surveys |                                                                                     |                                                            |                                                                                                                                                       |
|              | Marrelsmoor Coppice                                                                 | Freshly stripped Honeysuckle bark.                         | Dormouse present within Marrelsmoor Coppice using the bark as a component of nest construction                                                        |
|              | Highfield Row                                                                       | Freshly stripped Honeysuckle bark.                         | Dormouse present within Highfield Row using the bark as a component of nest construction                                                              |
|              | Woodland strip north-west of Highfield Row along eastern boundary of Purbrook Heath | Freshly stripped honeysuckle bark and Dormouse-gnawed nut. | Dormouse present in a woodland strip immediately adjacent to the western site boundary and adjacent to the land identified for ecological enhancement |
|              | Alsfordmoor Coppice                                                                 | Freshly stripped Honeysuckle bark.                         | Dormouse present in Alsfordmoor Coppice to the west of the site, adjacent to the land identified for ecological enhancement                           |
|              | Newlands Row –                                                                      | Dormouse-gnawed                                            | Dormouse present within                                                                                                                               |

| Date         | Location            | Evidence                           | Conclusion                                                                                   |
|--------------|---------------------|------------------------------------|----------------------------------------------------------------------------------------------|
|              | eastern corner      | nut.                               | Newlands Row                                                                                 |
|              | Barnfield Row       | Freshly stripped Honeysuckle bark. | Dormouse present within Barnfield Row and using the bark as a component of nest construction |
|              | Plant Row           | Freshly stripped Honeysuckle bark. | Dormouse present within Plant Row and using the bark as a component of nest construction     |
| 2008 surveys |                     |                                    |                                                                                              |
|              | Marrelsmoor Coppice | Freshly stripped Honeysuckle bark. | Dormouse previously detected in this location in 2007                                        |

### 3.4.3 Bats

#### *Potential bat roosts*

All mature trees along the margins of the adjacent woodlands and also all hedgerows within the Site were inspected during the daytime for their potential to support roosting bats. Three trees were identified as warranting further investigation due to:

- Presence of particular features considered to be of value to roosting bats.
- Historic evidence of a bat roost.
- Proximity to the Development proposals

The locations of these three trees are shown in Figure 3.1. Their characteristics, based on the daytime ground level inspections, are described in Table 3.4. In summary, Trees 2 and 3 were provisionally categorised as having high potential value for roosting bats while Tree 1 was assessed as having low potential value. A single Soprano Pipistrelle *Pipistrellus pygmaeus* (probably a lone male or non-breeding female) was also observed emerging from the Tree 3 during an emergence survey in 2008. Despite its low evaluation based on the ground level inspection, Tree 1 was prioritised for

further survey due to an historic record of roosting Common Pipistrelle *Pipistrellus pipistrellus* bats (see below).

More detailed assessment of each of these three trees was then carried out which involved climbing and careful inspection by a qualified tree climber who was supervised at ground-level by a licensed bat worker. The results of the more detailed inspection are presented in Table 3.5. In summary:

- Tree 1. No evidence of bats was found and it was again assessed as having low roosting potential. While in 2006 bats were recorded emerging from this tree, only two bats were observed which were probably males or non-breeding females, both of which tend to be less demanding in terms of their roosting requirements. Note that no roosting bats were identified in this tree following subsequent emergence surveys in 2007 and no evidence of roosting was found during the 2012 activity survey undertaken for the present assessment which commenced around sundown at this particular tree.
- Trees 2 and 3. While the preliminary high potential roosting value assessments for Trees 2 and 3 were reconfirmed following the more detailed inspection, no evidence of roosting bats was found.

**Table 3.4** Results of preliminary daytime tree inspection

| Tree no. | Species | Age    | Close to proposals | Bat previously recorded | Cracks / splits | Holes | Cavities | Loose bark | Dense ivy / epicormic growth | Value of potential roost features |
|----------|---------|--------|--------------------|-------------------------|-----------------|-------|----------|------------|------------------------------|-----------------------------------|
| 1        | Oak     | Mature | ✓                  | ✓                       |                 |       | ✓        |            |                              | Low                               |
| 2        | Ash     | Mature | ✓                  |                         | ✓               | ✓     | ✓        |            | ✓                            | High                              |
| 3        | Oak     | Mature | ✓                  | ✓                       |                 |       |          | ✓          |                              | High                              |

**Table 3.5** Tree climbing inspection results

| Tree no. | Species                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Revised roost potential |
|----------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1        |    | <p>No evidence of bats was found during the inspection of this tree.</p> <p>Two features were initially identified as being of potential interest for bats, although following closer inspection these were found to be of only limited value. The tree condition was found to be vigorous, but included notable sections of deadwood indicating the early stages of decline. On the south side of the tree there was a cut branch stub off the main stem at approximately 3m high that had partially healed. A cavity was found on this feature, but on inspection this was found to be filled with invertebrate frass (refuse and excrement of boring invertebrates) and was deemed to be of negligible potential for roosting bats. The second feature interest was a narrow and shallow fissure caused by natural branch failure on the north side of the main stem, approximately 3mm in diameter. Although small bats could potentially use this feature in the future, there were no hidden areas within the cavity that could provide meaningful shelter from the elements and external noise.</p> | Low (as before)         |
| 2        |   | <p>No evidence of bats was found during the inspection of this tree.</p> <p>This ash tree was found to have a large cavity about 6m high on the east side of the trunk, with additional multiple entry/egress points, and a connected larger cavity lower down the trunk. The cavity included a lot of debris, probably from a former Squirrel drey. The lower feature was formed from a fibre buckling and deterioration and decay to the central core causing the tree to be structurally weak and potentially unstable. The instability was causing it to lean towards an adjacent Beech tree. While no visible evidence of bats was found during the inspection of this tree, the features were considered to be of high potential value for bats.</p>                                                                                                                                                                                                                                                                                                                                                 | High (as before)        |
| 3        |  | <p>No evidence of bats was found during the inspection of this tree.</p> <p>This is a large oak, which was adjacent to Tree 1, included several medium sized cavities (e.g. 15cm diameter) and other smaller cavities (e.g. &lt;5cm diameter) throughout the canopy zone. There were also several areas of flaking bark with voids behind larger than 1cm. There were several dead branches on the south and southwest sides of the tree, indicative of the early stages of decline. There were no obvious signs for the cause of the decay. A large and severed Ivy was attached to the tree which had receded and died.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | High (as before)        |

*Bat foraging / commuting*

A moderate level of bat activity was recorded across the Phase 2 Site. Activity was typified by numerous repeat passes by what was likely to be the same bats foraging in loops. The highest level of activity was found to be along the eastern margin of Newlands Row and extending southwards (from the south-eastern corner of Newlands Row), via a connecting arable headland and remnant hedgebank, to the eastern margins of Marrelsmoor Row. Activity along this corridor consisted mostly of Common Pipistrelle and Soprano Pipistrelle bats.

Other lesser recorded species recorded during survey included Noctule *Nyctalus noctula*, Serotine *Eptesicus serotinus* and myotis species.

None of the concentrations of bat activity were sufficient to indicate the presence of a major roost close by.

#### 3.4.4 GCNs

Six ponds were surveyed, the locations of which are shown in Figure 3.1 (a seventh pond – Pond 5 in Figure 3.1 – was surveyed in previous years although it was found to be dry in 2012). The results of the surveys are presented in Table 3.6, which also includes a summary of the results from previous surveys. Over the course of the long term monitoring of the ponds, GCNs have been recorded in four ponds – Ponds 1, 2, 6 and 7. In the present survey GCNs were only recorded in Ponds 1, 2 and 6. Breeding activity was identified from the present and previous surveys from Pond 1, which also scores very highly on the GCN Habitat Suitability Index (HSI score 0.98). In 2012 the population was classified as being 'Low' in size although previously the pond was identified as having a 'Medium' population.

Although adults were recorded in breeding condition in Ponds 2 and 7 from the present survey, these two ponds (and Pond 6 where GCNs were previously recorded) were considered relatively sub-optimal in terms of suitability for

GCN breeding (in part due to their highly shaded condition) and unlikely without appropriate management to be capable of supporting viable populations (HSI scores were 0.61, 0.54 and 0.67 respectively).

Terrestrial habitat was considered to be generally of a high quality in the vicinity of these four ponds, including a relatively high coverage of woodland and a relatively dense hedgerow network (some of which included notable grassy margins).

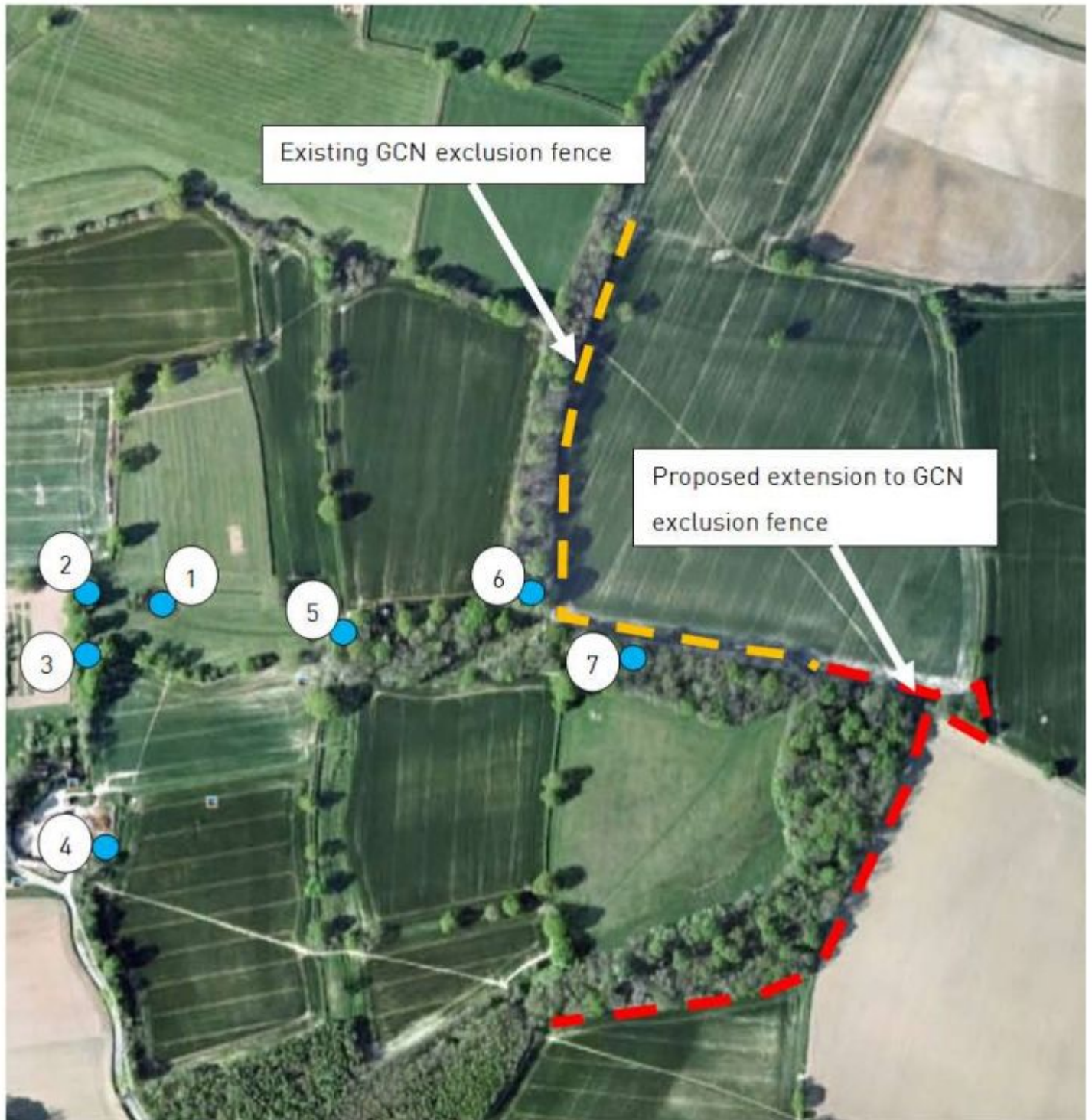
Smooth Newts and Common Frogs were also recorded in Pond 9 during the present survey while Common Frog and Common Toads (protective status – S41) were recorded in Pond 10.

**Table 3.6** Amphibian survey results and pond descriptions (N.B. more detailed descriptions including photos are provided in ES)

| Pond No. (see Figure 3.2) & distance from Phase 2 Infrastructure | Habitat description                                                                                                                                                                                                                                                                                                                                               | Summary amphibian survey results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pond 1 (SU 665087);<br><br>ca. 590m from Site                    | <ul style="list-style-type: none"> <li>• A large permanently wet field pond.</li> <li>• Surrounding field comprising semi-improved grassland bounded on all four sides by intact hedgerows, some with associated ditches.</li> <li>• Good potential for GCNs</li> </ul>                                                                                           | <p><b>Aug 2007 amphibian netting survey results</b></p> <ul style="list-style-type: none"> <li>• 13 GCN larvae.</li> <li>• Smooth and Palmate Newts also present.</li> </ul> <p><b>Spring 2008 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>• On average four GCN adults per visit (13 GCNs caught in total) – bottle trapping</li> <li>• On average five GCN adults per visit (21 observed in total) – torch-light survey</li> <li>• GCN eggs found during three visits</li> <li>• Maximum count of GCNs on a single night (from all six survey visits) using either bottle trapping or torching was 12, indicating.</li> <li>• 'Medium' population size class according to English Nature (2001).</li> <li>• Common Frog and Smooth Newt also present</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>• GCNs recorded on 4 out of 6 visits.</li> <li>• Maximum count 5 GCNs</li> <li>• Mean count 1.5</li> <li>• Smooth Newt and Palmate Newt also recorded</li> </ul> |
| Pond 2 (SU 665087);<br><br>ca. 655m from Site                    | <ul style="list-style-type: none"> <li>• Small pond in a tree-lined hollow within 50m of Pond 1.</li> <li>• Canopy of surrounding trees overshadows much of the pond and abundant woody debris is present within the pond.</li> <li>• The pond is fed by local field runoff and rainfall.</li> <li>• Considered sub-optimal breeding habitat for GCNs.</li> </ul> | <p><b>Spring 2008 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>• Only Smooth Newts recorded.</li> </ul> <p><b>Spring 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>• GCNs recorded on two occasions in bottle traps (max count 2)</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>• Only one GCN recorded in six visits.</li> <li>• 3 Smooth Newts recorded on one occasion.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Pond No. (see Figure 3.2) & distance from Phase 2 Infrastructure | Habitat description                                                                                                                                                                                                                                            | Summary amphibian survey results                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pond 3 (SU 665087);<br>ca. 650m from Site                        | <ul style="list-style-type: none"> <li>Small pond located in a wooded hollow between two fields.</li> <li>The pond is fed by rainfall and local field runoff.</li> <li>Considered to offer sub-optimal breeding habitat conditions for GCN.</li> </ul>         | <p><b>Spring 2008 &amp; 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>No amphibians recorded</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>No GCNs recorded</li> <li>Smooth Newts recorded on each occasion, maximum count 5.</li> </ul> |
| Pond 4 (Newlands Farm, SU 665087);<br>ca. 570m from Site         | <ul style="list-style-type: none"> <li>Considered to offer sub-optimal breeding habitat conditions for GCNs.</li> </ul>                                                                                                                                        | <p><b>Spring 2008 &amp; 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>No amphibians recorded</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>One Smooth Newt only.</li> </ul>                                                              |
| Pond 5 (Barnfield Row; SU 667087);<br>ca. 455m from Site         | <ul style="list-style-type: none"> <li>Considered to offer sub-optimal breeding habitat conditions for GCNs.</li> </ul>                                                                                                                                        | <p><b>Spring 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>No amphibians recorded</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>Dry at time of survey</li> </ul>                                                                         |
| Pond 6 (Plant Row; SU 668087);<br>ca. 335m from Site             | <ul style="list-style-type: none"> <li>Surrounded by trees. It is completely shaded by the canopy and contains abundant woody debris and leaf detritus.</li> <li>This pond is considered to offer sub-optimal breeding habitat conditions for GCNs.</li> </ul> | <p><b>Spring 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>One non-breeding female GCN recorded.</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>Only one GCN recorded in six visits.</li> <li>No other amphibians recorded.</li> </ul>    |
| Pond 7 (Barnfield Row);                                          | <ul style="list-style-type: none"> <li>Surrounded by trees. It is completely shaded by the canopy and contains woody debris and leaf detritus.</li> </ul>                                                                                                      | <p><b>Spring 2008 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>No GCNs recorded.</li> </ul>                                                                                                                                                                                |

| Pond No. (see Figure 3.2) & distance from Phase 2 Infrastructure | Habitat description                                                                                                                                                                                                                                                                       | Summary amphibian survey results                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SU 669087);<br>ca. 240m from Site                                | <p>The surface of the pond is dominated by duckweed (<i>Lemna minor</i>). The pond is fed by local runoff originating from woodland drains and rainfall.</p> <ul style="list-style-type: none"> <li>Considered sub-optimal breeding habitat for GCNs for the following reasons</li> </ul> | <ul style="list-style-type: none"> <li>Smooth Newt</li> </ul> <p><b>Spring 2009 amphibian bottle trapping survey results</b></p> <ul style="list-style-type: none"> <li>Four GCNs recorded in one survey.</li> <li>Smooth Newt and Common Frog</li> </ul> <p><b>Spring 2012</b></p> <ul style="list-style-type: none"> <li>No GCNs recorded.</li> <li>Smooth Newt and Palmate Newt present.</li> </ul> |



### 3.4.5 Reptiles

Two species of reptile were recorded within the Site, Slow-worm (194 records; N.B. a certain level of double counting will have occurred as individuals were not marked) and Common Lizard (one record).

Nearly all of the records (including the one Common Lizard record) were from the margins of Field 2 (the species-poor semi-improved meadow).

A small number of Slow-worms (six records) were also recorded from the network of hedgerow/field margins south of Highfield Row (24 records) and from the margins of Field 3 (six records).

Note that Grass Snake is also present at a variety of locations across Berewood including Newlands Farm Meadow.

### 3.4.6 Breeding Birds

The results of the present breeding bird survey are presented in Tables 3.7 and 3.8. The conservation status of each species is also provided – Section 41 (S41) NERC Act; British Trust for Ornithology (BTO) Red List (RL) and BTO Amber List (AL); Hampshire Biodiversity Action Plan species (HBAP). Twenty-two species were recorded breeding during the survey although most of these were recorded within the woodlands adjacent to the Site and within among the hedgerows and scrub at the southern end of the Site between Highfield Row and Purbrook Heath Road.

The first breeding bird surveys at Berewood were undertaken in 2003 and 2005. Most notable with respect to the Phase 2 Site were the specialist woodland (and mature hedgerow/scrub) species that were recorded, which included Bulfinch (S41; AL; HBAP), Cuckoo *Cuculus canorus* (S41; R), Lesser Spotted Woodpecker *Dendrocopos minor* (S41; RL), Spotted Flycatcher *Muscicapa striata* (S41; RL; HBAP), Marsh Tit *Poecile palustris* (S41; R) Willow Tit *Poecile montanus* (S41; RL), and Willow Warbler *Phylloscopus trochilus*

[AL; while Willow Warbler is not S41 listed, it has also been highlighted due recent declines across much of England]. The presence of such an assemblage of woodland/scrub nesting birds was relatively notable and seemed generally indicative of good breeding bird habitat.

In 2009 the woodlands were resurveyed to update the previous findings and inform the ES. Three notable woodland species recorded in 2003/2005 surveys – Lesser Spotted Woodpecker, Spotted Flycatcher and Willow Tit – were not recorded in 2009. These species, as well as Willow Warbler, were also not found during the present [2012] survey. While in present survey Bulfinch and Marsh Tit were recorded, breeding was not confirmed in either case. Cuckoo was recorded in Marrelsmoor Coppice well away from the present proposals. The seeming loss and decline of woodland specialists from Berewood's woodlands reflects wider trends and may not indicate a substantial change in Berewood's habitat quality over recent years.

In terms of birds of conservation concern which inhabit open farmland conditions Linnet (S41; RL; HBAP), Reed Bunting (S41; RL; HBAP), Skylark (S41; RL; HBAP) and Yellowhammer (S41; RL; HBAP) have been previously recorded within the wider Berewood site. During the present survey only Skylark was recorded, although breeding was not confirmed (Skylark was heard singing over The Site on one occasion only).

**Table 3.7** Breeding bird survey results

| Species       | Scientific name               | Protective / conservation status | Number of breeding pairs |
|---------------|-------------------------------|----------------------------------|--------------------------|
| Blackbird     | <i>Turdus merula</i>          |                                  | 14                       |
| Blackcap      | <i>Sylvia atricapilla</i>     |                                  | 14                       |
| Blue Tit      | <i>Cyanistes caeruleus</i>    |                                  | 14                       |
| Chaffinch     | <i>Fringilla coelebs</i>      |                                  | 5                        |
| Chiffchaff    | <i>Phylloscopus collybita</i> |                                  | 11                       |
| Collared Dove | <i>Streptopelia decaocto</i>  |                                  | 2                        |
| Cuckoo        | <i>Cuculus canorus</i>        | Section 41; Red List             |                          |

| Species                  | Scientific name                | Protective / conservation status | Number of breeding pairs |
|--------------------------|--------------------------------|----------------------------------|--------------------------|
| Dunnoek                  | <i>Prunella modularis</i>      | Section 41; Amber List           | 1                        |
| Goldcrest                | <i>Regulus regulus</i>         |                                  | 1                        |
| Great Tit                | <i>Parus major</i>             |                                  | 5                        |
| Great Spotted Woodpecker | <i>Dendrocopos major</i>       |                                  | 5                        |
| Green Woodpecker         | <i>Picus viridis</i>           |                                  | 1                        |
| Jay                      | <i>Garrulus glandarius</i>     |                                  | 2                        |
| Kestrel                  | <i>Falco tinnunculus</i>       | Amber List                       | 1                        |
| Long-tailed Tit          | <i>Aegithalos caudatus</i>     |                                  | 3                        |
| Magpie                   | <i>Pica pica</i>               |                                  | 2                        |
| Nuthatch                 | <i>Sitta europaea</i>          |                                  | 1                        |
| Robin                    | <i>Erithacus rubecula</i>      |                                  | 18                       |
| Song Thrush              | <i>Turdus philomelos</i>       | Section 41; Red List             | 4                        |
| Stock Dove               | <i>Columba oenas</i>           | Amber List                       | 3                        |
| Whitethroat              | <i>Sylvia communis</i>         | Amber List                       | 6                        |
| Wood Pigeon              | <i>Columba palumbus</i>        |                                  | 9                        |
| Wren                     | <i>Troglodytes troglodytes</i> |                                  | 28                       |

**Table 3.8** Additional bird records where breeding was not confirmed

| Species            | Scientific name              | Protective / conservation status |
|--------------------|------------------------------|----------------------------------|
| Bulfinch           | <i>Pyrrhula pyrrhula</i>     | Amber List                       |
| Coal Tit           | <i>Periparus ater</i>        |                                  |
| Collared Dove      | <i>Streptopelia decaocto</i> |                                  |
| Garden Warbler     | <i>Sylvia borin</i>          |                                  |
| Goldfinch          | <i>Carduelis carduelis</i>   |                                  |
| Greenfinch         | <i>Carduelis chloris</i>     |                                  |
| Green Woodpecker   | <i>Picus viridis</i>         | Amber List                       |
| Lesser Whitethroat | <i>Sylvia curruca</i>        |                                  |
| Marsh Tit          | <i>Poecile palustris</i>     | Section 41; Red List             |
| Pheasant           | <i>Phasianus colchicus</i>   |                                  |
| Skylark            | <i>Alauda arvensis</i>       | Section 41; Red List             |

### 3.4.7 Invertebrates

The adjacent woodlands have been found to be of note for invertebrates, particularly for the Coleoptera and arachnids, (key features include mature trees, glades, woodland edge, fallen and standing deadwood, and poorly drained areas). The Phase 2 Site, however, is predominantly being constructed within an area of arable monoculture (sown with Oil-seed Rape), of only limited interest in terms of invertebrates. The Oil-seed Rape crop however does support a reasonable biomass of invertebrates which can be utilised by various bird species (Burton *et al.* 1996).

## 4.0 IMPACT ASSESSMENT (HYPOTHETICAL UNMITIGATED SCHEME)

### 4.1 Potentially Relevant Biophysical Changes

A description of the Development proposals is provided in Section 1. The main biophysical changes associated with the proposed development that have potential to affect ecological resources positively or negatively in the area are related to construction - habitat removal during site clearance and increased movement and general background noise of machinery and men during construction.

Potential operational effects, which might include changes in lighting levels, increased levels of disturbance due to increased human presence etc., are mostly only going to manifest themselves once the Phase 2 housing and Town Park developments are operational which will both be subject to separate RMAs. The most significant operational effects of the present scheme are likely to be positive and resulting from new habitat creation discussed below.

As discussed in the Introduction nearly all the impacts which are described have been assessed previously in detail the ES and so are only assessed here in relative outline.

## 4.2 Habitats and Flora

Impacts on habitats and flora are described in Table 4.1 below. In summary the Phase 2 Infrastructure works will impact predominantly on arable habitat (Field 1), small areas of poor semi-improved grassland (Fields 2, 3, 4, 5 and 6), which are generally of limited botanical interest. The surrounding Ancient woodlands will not be directly affected by the proposals.

Some minor hedgerow and scrub loss will also occur, mostly at the southern end of the proposals (see also Figure 4.1). Hedgerow loss will be limited, as most of the hedgerow gaps (and also the corridor required through Highfield Row woodland) required for the Phase 2 linear infrastructure, have already been cleared in relation to earlier 2008 linear infrastructure proposals.

While infrastructure was never installed following the 2008 habitat clearances due to scheme delay and design changes, a large area of new woodland (ca. 2ha in size) was planted around the margins of Marrelsmoor Coppice in compensation for these small losses (see Section 3.3.2). This new area of woodland should (as was made clear at the time of planting) also be viewed as representing compensation for additional minor habitat tree/shrub losses in relation to the present Phase 2 project and subsequent phases of development.

Nonetheless this woodland creation does not preclude additional habitat being created, as the intention has always been to create additional woodland to offset future recreational attrition of woodland habitat, and to go beyond mere compensation to achieve a substantial '*net gain*' for biodiversity. Consequently the key impact of the Phase 2 proposals from a habitat perspective is likely to be very positive, including the following areas of new habitat creation:

- ca. 1ha of new SuDS habitat (see Figure 1.1 above and landscape drawings for a more detailed graphical representation and indication of the precise area covered).
- ca. 0.1ha of new woodland (linking Highfield Row with Purbrook Heath Meadow's eastern wooded boundary) (check landscape drawings for a more precise area estimate). Note that 0.05ha will be planted with more mature specimens than would normally occur, to reflect the fact that Hedge 6, which was planted in 2009, is being removed (and will not be replaced until a definitive boundary is identified for the forthcoming cemetery along which it will be planted). This will avoid any delay in the availability of newly created habitat for Dormice.
- ca. 0.12ha of new woodland along northern fringe of Highfield Row (check landscape drawings for a more precise area estimate).
- ca. 0.18ha of new woodland along western and northern fringe of Marrelsmoor Coppice (check landscape drawings for a more precise area estimate).
- ca. 0.25ha of new woodland along the eastern and southern fringe of Newlands Row (check landscape drawings for a more precise area estimate).
- ca. 0.18ha of new woodland along northern fringe of Barnfield Row (check landscape drawings for a more precise area estimate).

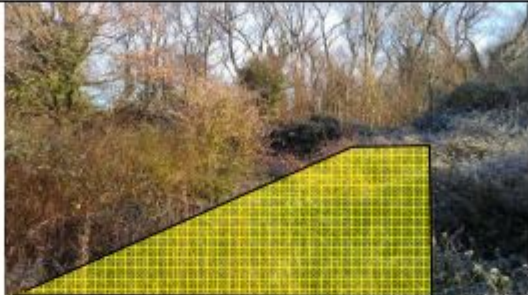
The woodland habitat creation described in the above bullet-points in total should amount to ca. 0.83ha. Note that this woodland creation is additional to the 2ha of new woodland which has already been planted around Marrelsmoor Coppice.

Note also that each phase of the Berewood development should be viewed in the context of the wider proposals which, as clearly described in the ES, should result in a substantial net gain for biodiversity.

**Table 4.1** Construction and operation impacts (both positive and adverse)

| Habitat           | Construction Impact                                                                                                                                                                                                                                                                                         | Operational Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Photo                                                                                                                                                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Woodland<br>SINCs | <p><b>Adverse Impacts</b><br/>There would be no habitat loss within any of the local woodland SINCs associated with the Phase 2 works.</p> <p>If best practice construction protocols are not followed tree roots could be adversely affected by trenching or stockpiling etc. along the woodland edge.</p> | <p><b>Positive Impacts</b></p> <p>Significant new woodland habitat creation as described above. The proposed palette is set out in Table 4.2.</p> <p>Note that where new SuDS extend into these woodland buffer areas, these will be planted along their woodland margins with shrub species tolerant of damp conditions (see Table 4.3). Soils within the SuDS will for the most part be mostly damp rather than waterlogged, i.e. they will not include permanent standing water. Maintenance will be minimal and should not impact on planted trees / shrubs.</p> <p>The SuDS are intended to be attractive and biodiverse features and so their inclusion within the woodland buffer zone is considered compatible with, rather than contrary to, the conservation/landscape objectives of this particular area. The landscape drawings provide a cross-section to illustrate the arrangement of the proposed woodland edge zone, including tree root protection distances.</p> <p><b>Adverse Impacts</b><br/>The woodlands would be mostly unaffected by the proposals once completed.</p> <p>The woodlands could be affected to some degree by recreational disturbance, lighting and traffic associated with the forthcoming Phase 2 Housing RMA. Recreational impacts have already been assessed in detail within the ES however; note that woodland buffer planting, as well as substantial woodland creation elsewhere across Berewood, should offset these impacts.</p> |  <p>The adjacent woodland will not be directly affected proposals. The image above is of the western side of Newlands Row (Phase 2 development is to be on the eastern side)</p> |

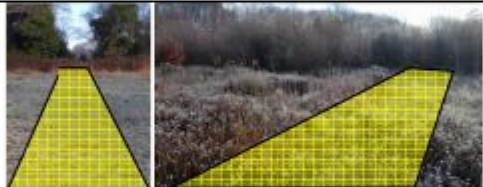
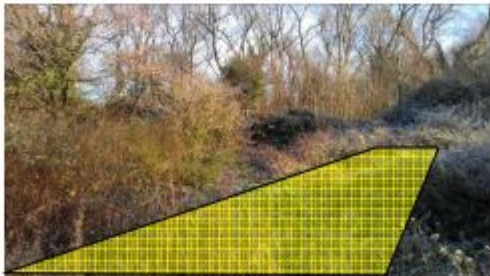
| Habitat       | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Operational Impact                                                                                                                                                                                                                                                                                 | Photo                                                                                                                                                                                                                                                                                                                                        |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Highfield Row | <p><b>Adverse Impacts</b><br/>Highfield Row is the only area of woodland abutting the proposals which is not designated as a SINC. A narrow ca. 8m wide gap was cleared through Highfield Row woodland in 2008 in relation to previous linear infrastructure proposals. Installation of the new services/utilities will make use of this gap so that no additional woodland needs to be cleared. A small amount of scrub re-growth (mostly Bramble) will need to be cleared within the gap.</p> <p>N.B. 2ha of new woodland has already been created around Marrelsmoor Coppice to compensate for, <i>inter alia</i>, the previous breach of Highfield Row.</p> | <p><b>Positive Impacts</b><br/>Significant new woodland habitat creation as described above.</p> <p><b>Adverse Impacts</b><br/>The woodland would be unaffected by the proposals once operational. See above regarding potential recreational impacts associated with the Phase 2 Housing RMA.</p> |  <p>Existing break in Highfield Row through which utilities will be installed; photo to left taken from southern side and photo to right taken from northern side [photo to right also shows in foreground the existing break in Hedge 7 [see below]]</p> |
| Scrub habitat | <p><b>Adverse Impacts</b></p> <ul style="list-style-type: none"> <li>An 8m wide corridor will need to be cleared through the narrow band of willow scrub (ca. 3-4m wide) in Field 5.</li> <li>A similar amount of Bramble will need to be cleared in Field 6.</li> <li>A narrow section of Bramble scrub (ca. 4m wide) will need to be cleared from the western side of the boggy tall herb vegetation in the south-eastern corner of the Site.</li> </ul>                                                                                                                                                                                                      | <p><b>Positive Impacts</b><br/>The loss of shrub habitat will be more than compensated for by new woodland creation [see above].</p> <p><b>Adverse Impacts</b><br/>Not applicable</p>                                                                                                              |  <p>8m wide corridor to be cleared through narrow band of willow scrub in Field 5</p>                                                                                                                                                                    |

| Habitat   | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                               | Operational Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Photo                                                                                                                                                                     |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  <p>8m wide corridor to be cleared through narrow band of Bramble scrub in Field 6</p> |
| Arable    | <p><b>Adverse Impacts</b></p> <p>Although the Phase 2 infrastructure works would only cover a relatively small part of the arable field, given that the associated house construction will commence shortly afterwards (which is to be assessed in a separate RMA), it is unlikely that the field would be farmed again. As discussed, however, no rare arable weeds have been found at Berewood and so no significant impact is anticipated.</p> | <p><b>Positive Impacts</b></p> <p>The new substantial SuDS features to be constructed around the margins of the existing arable field are expected to notably enhance local habitat structure and diversity, providing opportunities for various fauna adapted to riparian/aquatic conditions. Planting guidance and rationale for plant selection is provided in the separate document <i>Berewood: River Restoration Ecological Performance Specification to inform Detailed Landscape Design</i>. Note that wetlands can develop notable ecological interest much quicker than other habitat types. The SuDS palette is presented in Table 4.4.</p> <p><b>Adverse Impacts</b><br/>Not applicable</p> |  <p>Arable land covers the majority of the Development area</p>                        |
| Hedgerows | <p><b>Adverse Impacts</b></p> <ul style="list-style-type: none"> <li><u>Hedge 1</u>. The species-rich hedge connecting Marrelsmoor Row and Marrelsmoor Coppice hedge was previously breached (6m wide gap) in 2008 in relation to the installation of services for earlier scheme infrastructure proposals. The gap in this hedgerow would need to be widened so</li> </ul>                                                                       | <p><b>Positive Impacts</b></p> <p>The hedgerow section losses described opposite will be more than offset by:</p> <ul style="list-style-type: none"> <li>New proposed woodland planting described above.</li> <li>Replanting of Hedge 6 along the anticipated eastern boundary of the forthcoming cemetery. This however can only be carried out in Phase 4 (ca. two</li> </ul>                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                           |

| Habitat | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Operational Impact                                                                                                                                                                                                                       | Photo                                                                                                                                                                                                                                                        |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <p>that the primary north-south link road can be installed. Clearance here will be kept to a minimum here through creation of a priority passing point although an additional 11m of hedgerow (including two young Oak trees) will need to be cleared due to the angle at which it will be bisected by the road. The original breaching of this hedgerow was assessed as part of the ES.</p> <ul style="list-style-type: none"> <li><b>Hedge 6.</b> Construction of the primary north-south link road, installation of associated utilities, and the construction of a spur extending off the link road to provide access to the proposed cemetery, will result in significant sections of the newly planted hedgerow – Hedge 6 (linking Highfield Row to Marrelsmoor Row) – being lost. Given the scale of the loss it has been decided to remove this hedge entirely and replant it along the anticipated eastern boundary of the forthcoming cemetery.</li> <li><b>Hedge 7.</b> Proposed utilities to be installed through this hedgerow will make use of existing 6m wide gap cleared in 2008 in relation to previous proposals. The gap will need to be widened very slightly which will involve the removal of the Hawthorn tree on the eastern side of the existing breach. Bramble re-growth will also need to be cleared.</li> <li><b>Hedge 8.</b> No further clearance through this hedge should be required to facilitate installation of the proposed utilities between Highfield Row and Purbrook Heath Road as a 15m wide gap was cleared in 2008 in relation to previous linear infrastructure proposals.</li> <li><b>Hedge 9.</b> No further clearance through this hedge should be required to facilitate</li> </ul> | <p>years time) when the definitive boundary of the cemetery is known.</p> <ul style="list-style-type: none"> <li>Recently planted woodland (2ha) around Marrelsmoor Coppice.</li> </ul> <p><b>Adverse Impacts</b><br/>Not applicable</p> |  <p>Existing 6m clearance in Hedge 1 undertaken in 2008</p> <p>Existing 6m wide clearance in Hedge 1 (red arrow) and proposed additional 11m clearance (yellow arrow)</p> |

| Habitat | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Operational Impact | Photo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         | <p>installation of the proposed utilities between Highfield Row and Purbrook Heath Road as a 10m wide gap was cleared in 2008 in relation to previous proposals.</p> <ul style="list-style-type: none"> <li>• <u>Hedge 10</u>. A 7m wide gap will need to be cleared through this species-poor hedge to facilitate the installation of utilities. Note that proposals to eventually clear this particular hedge in its entirety were set out in the ES.</li> <li>• <u>Hedge 11</u>. The existing gap created in 2008 will be mostly sufficient to allow installation of the utilities although the Ash tree on the western side of the break will also need to be felled.</li> </ul> <p>It should be noted that 2ha of new woodland have already been created around Marrelsmoor Coppice to offset the habitat losses associated with previous (uncompleted) infrastructure works. This habitat creation remains relevant as compensation in relation to anticipated habitat losses associated with the existing infrastructure proposals.</p> |                    |  <p>Hedge 6 - newly planted hedge of limited current value</p>  <p>Existing 6m wide gap in Hedge 7 through which utilities will be installed (existing gap through Highfield Row also visible in background); gap will need to be widened slightly which will involve the removal of the hawthorn tree on right-hand side (shown by yellow arrow)</p> |

| Habitat | Construction Impact | Operational Impact | Photo                                                                                                                                                                                                                                                |
|---------|---------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|         |                     |                    |  <p>Existing 15m wide gap in Hedge 8 through which utilities will be installed (existing breaks through Highfield Row and Hedge 7 also visible in background)</p> |
|         |                     |                    |  <p>Existing 10m wide gap in Hedge 9 through which utilities will be installed (Hedge 10 visible in background beyond Bramble)</p>                                |
|         |                     |                    |  <p>A 7m wide gap will be required in Hedge 10 through which</p>                                                                                                |

| Habitat   | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Operational Impact                                                                                                                                                                                                                                                                                                                                                                                               | Photo                                                                                                                                                                                                                                                                                                                                                                              |
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|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                  | <p>utilities will be installed</p>  <p>Existing gap in Hedge 11 (red arrow) through which utilities will be installed will need to be widened slightly (yellow arrow) which will involve the removal of an Ash tree on the western edge of the breach</p>                                       |
| Grassland | <p><b>Adverse Impacts</b></p> <p>The construction of the primary north-south link road, installation of utilities and new SuDS feature will result in:</p> <ul style="list-style-type: none"> <li><b>Field 2.</b> Loss of much of this species-poor semi-improved meadow between the arable field and northern boundary of Marrelsmoor Coppice. Given the small size of this particular meadow, much of the remaining area outside of the direct development footprint may also be damaged by construction activity. Once works are completed any remnant meadow patches will not be expected to remain for long as the forthcoming Phase 2 Housing will also extend into this area. Note that the loss of this species-poor meadow will be more than compensated for by new substantial wildflower habitat creation across the wider scheme, in particular in the two proposed Community Nature Reserves (N.B. works are due to commence on River Wallington</li> </ul> | <p><b>Positive Impacts</b></p> <p>A substantial area of new species-rich riparian grassland and herb vegetation will be created within the new SuDS features (see below).</p> <p>Note also that wildflower grassland is to be established in linear public realm areas around the margins of the Phase 2 housing as set out in the Environmental Statement.</p> <p><b>Adverse Impacts</b><br/>Not applicable</p> |  <p>8m wide corridors will need to be cleared through Fields 4 (left) and 5 (right); an 8m wide path will also need to be cleared through the band of willow scrub in Field 5 (visible in background)</p>  |

| Habitat | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Operational Impact | Photo                                                            |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------|
|         | <p>community Nature Reserve in July 2013) .</p> <ul style="list-style-type: none"> <li>• <u>Field 3.</u> The linear area of the species-poor semi-improved grassland of limited ecological interest, which has recently established between Marrelsmoor Coppice and the Hedge 6, will also be mostly lost due to the construction of the primary north-south link road, installation of associated utilities, and the construction of a spur extending off the link road to provide access to the proposed cemetery. While a similar sward may be expected to quickly re-establish once the works are complete, it is likely to only survive in the short term as in a later phase of the wider Berewood project further road and housing construction is planned in this small area.</li> <li>• <u>Field 4.</u> A narrow 8m wide corridor will be cleared through this species-poor meadow to install utilities. A similar species-poor community should re-establish once the utilities are installed.</li> <li>• <u>Field 5.</u> A narrow 8m wide corridor will be cleared through this species-poor meadow to install utilities. A similar species-poor community should re-establish once the utilities are installed. Note that, as assessed in the ES, this meadow will be lost in its entirety following subsequent phases of the Development.</li> <li>• <u>Field 6.</u> A narrow 8m wide corridor will be cleared through this species-poor meadow to install utilities. A similar species-poor community should re-establish once the utilities are installed. Note however that, as set out in the ES, this meadow will eventually be lost in its entirety</li> </ul> |                    | <p>8m wide corridors will need to be cleared through Field 6</p> |

| Habitat              | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                           | Operational Impact                                                                                                                                                                                                           | Photo                                                                                                                                                                                                                                                                                                                      |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Tall herb vegetation | <p><b>Adverse Impacts</b></p> <ul style="list-style-type: none"> <li>A 7m wide corridor will need to be cleared through the small patch of boggy tall herb vegetation just to the west of the London Road and Ladybridge Road junction.</li> <li>It is expected that the alignment of the utilities will necessitate the removal of a willow tree on the eastern side of the tall herb vegetation.</li> </ul> | <p><b>Positive Impacts</b></p> <p>A substantial area of new species-rich riparian grassland and herb vegetation covering ca. 1ha will be created within the new SuDS features positioned around the margins of the Site.</p> |  <p>Small patch of boggy tall herb habitat</p>  <p>Willow to be removed</p> <p>Willow tree to be felled London Road and Ladybridge Road junction</p> |

**Figure 4.1** Existing and proposed gaps in hedgerow and shrub vegetation along alignment of Phase 2 utilities



**Table 4.2** Palette for new woodland (based on NVC woodland W10) to be established linking Highfield row to Purbrook Heath boundary

| Species           | Scientific name           |
|-------------------|---------------------------|
| Crab Apple        | <i>Malus sylvestris</i>   |
| Dogwood           | <i>Cornus sanguinea</i>   |
| Hawthorn          | <i>Crataegus monogyna</i> |
| Hazel             | <i>Corylus avellana</i>   |
| Holly             | <i>Ilex aquifolium</i>    |
| Hornbeam          | <i>Carpinus betulus</i>   |
| Pedunculate Oak   | <i>Quercus robur</i>      |
| Silver Birch      | <i>Betula pendula</i>     |
| Wild Service-tree | <i>Sorbus torminalis</i>  |
| Yew               | <i>Taxus baccata</i>      |

**Table 4.3** Palette for woodland planting in areas where SuDS and the 5m wide woodland buffer zone coincide (N.B. while some of these species are characteristic of dry woodland conditions they also are all tolerant of water-logging and indeed are listed as such in WWT's Wetlands, Industry and Wildlife Manual; most of these species are present in the W7 woodland type, which is the wet woodland characteristic of the local area)

| Species         | Scientific name           |
|-----------------|---------------------------|
| Alder           | <i>Alnus glutinosa</i>    |
| Alder Buckthorn | <i>Frangula alnus</i>     |
| Blackthorn      | <i>Prunus spinosa</i>     |
| Downy Birch     | <i>Betula pubescens</i>   |
| Hawthorn        | <i>Crataegus monogyna</i> |
| Hazel           | <i>Corylus avellana</i>   |
| Hornbeam        | <i>Carpinus betulus</i>   |
| Pedunculate Oak | <i>Quercus robur</i>      |

**Table 4.4** Proposed species for SuDS (N.B. this the species content of two commercially available seed mixes from Emorsgate Seeds, EM8 wet grassland mixture and EP1 pond edge mixture)

| Common Name                 | Scientific Name                       |
|-----------------------------|---------------------------------------|
| Betony                      | <i>Betonica (Stachys) officinalis</i> |
| Common Bent                 | <i>Agrostis capillaris</i>            |
| Common Fleabane             | <i>Pulicaria dysenterica</i>          |
| Common Knapweed             | <i>Centaurea nigra</i>                |
| Common Meadow-rue           | <i>Thalictrum flavum</i>              |
| Common Sorrel               | <i>Rumex acetosa</i>                  |
| Cowslip                     | <i>Primula veris</i>                  |
| Crested Dog's-tail          | <i>Cynosurus cristatus</i>            |
| Devil's-bit Scabious        | <i>Succisa pratensis</i>              |
| Great Burnet                | <i>Sanguisorba officinalis</i>        |
| Greater Bird's-foot-trefoil | <i>Lotus pedunculatus</i>             |
| Gypsywort                   | <i>Lycopus europaeus</i>              |
| Lady's Bedstraw             | <i>Galium verum</i>                   |
| Meadow Buttercup            | <i>Ranunculus acris</i>               |
| Meadow Foxtail              | <i>Alopecurus pratensis</i>           |
| Meadowsweet                 | <i>Filipendula ulmaria</i>            |
| Oxeye Daisy                 | <i>Leucanthemum vulgare</i>           |
| Pepper Saxifrage            | <i>Silaum silaus</i>                  |
| Ragged-robin                | <i>Silene flos-cuculi</i>             |
| Red Fescue                  | <i>Festuca rubra</i>                  |
| Ribwort Plantain            | <i>Plantago lanceolata</i>            |
| Selfheal                    | <i>Prunella vulgaris</i>              |
| Sneezewort                  | <i>Achillea ptarmica</i>              |

| Common Name                   | Scientific Name                |
|-------------------------------|--------------------------------|
| Square-stalked St John's-wort | <i>Hypericum tetrapterum</i>   |
| Sweet Vernal-grass            | <i>Anthoxanthum odoratum</i>   |
| Tufted Hair-grass             | <i>Deschampsia cespitosa</i>   |
| Tufted Vetch                  | <i>Vicia cracca</i>            |
| Water Avens                   | <i>Geum rivale</i>             |
| Water Figwort                 | <i>Scrophularia auriculata</i> |
| Wild Angelica                 | <i>Angelica sylvestris</i>     |
| Yarrow                        | <i>Achillea millefolium</i>    |
| Yellow Iris                   | <i>Iris pseudacorus</i>        |
| Yellow-rattle                 | <i>Rhinanthus minor</i>        |

### 4.3 Fauna

Potential impacts with respect to fauna are discussed in Table 4.5. In summary, the habitats that are being predominantly affected by the proposals are mostly of only limited interest for noteworthy fauna in the local area. There is a small possibility that Dormice and GCNs could be affected by unmitigated working practices but relatively minor measures set out in the next section should reduce the risk to these species to a negligible level.

Three trees have been identified as having features which might support roosting bats, although based on detailed tree-climbing inspections no bats are currently thought to be utilising these trees. It is possible, however, that a small number of lone males and non-breeding females could potentially utilise these tree and indeed individual bats were previously recorded from two of these. In the unlikely event that construction displaces individual bats which might be present at the time of works (but which were not found to be present at the time of survey), these are likely to readily find alternative roosts in the adjoining woodlands.

Breeding woodland birds may experience some disturbance in select locations if works are undertaken in spring although the substantial woodland creation proposals, including the buffering of those woodlands adjacent to the Phase 2 area, will be expected over the longer term to offset these effects. Note that 2ha of new woodland was planted in 2009 largely in anticipation of future scheme impacts on fauna such as the development of the Phase 2 Site.

**Table 4.5** Qualitative assessment of impacts on fauna

| Species or taxa | Construction Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Operational Impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dormouse        | <p><b>Adverse impacts</b><br/>Scrub and hedgerow habitat potentially utilised by Dormice that would be affected is as follows:</p> <ul style="list-style-type: none"> <li><u>Hedge 1.</u> This hedge has already been breached (6m wide gap removed under Natural England licence) to allow for the installation of services related to previous 2008 proposals. The gap in this hedgerow will be widened further (by 11m) to allow access for the primary north-south link road. It should be noted that the severance of this hedgerow was assessed as part of the ES and that the existing habitat break (and any minor enlargement) has been more than compensated for through the creation of 2ha of new woodland surrounding Marrelsmoor Row, the intention of which is to reconnect Marrelsmoor Row to the surrounding woodland via Alsfordmoor Coppice (while also providing additional habitat). Despite the efforts to retain connectivity to Marrelsmoor Row it should be noted that Dormice have never been recorded in this particular woodland despite considerable survey effort over a number of years.</li> <li><u>Highfield Row.</u> A narrow gap was previously cleared (under Natural England licence) through Highfield Row woodland in relation to earlier (2008) linear infrastructure proposals. The canopies on either side of the break were subsequently stretched across the resulting gap and tied together to facilitate Dormouse movement. No additional trees would need to be cleared to enable services to be installed in relation to the present proposals, although the canopies may need to temporarily untied (for five days only) to facilitate machinery access. No impact on Dormice of any substance is anticipated from this very temporary break in arboreal connectivity providing no Dormice are nesting specifically in the affected overhanging canopy - which is considered highly unlikely. If works are undertaken in winter there would be no temporary habitat breach or risk of harm to any individual animal, as</li> </ul> | <p><b>Positive impacts</b><br/>As described above ca. 0.83ha of new woodland will be planted as part of the proposals. Further to this 2ha of new woodland has already been planted in relation to previous habitat clearance works (N.B. these cleared areas will also be utilised for the present proposals).</p> <p>This new habitat creation should result in substantial net gain in Dormouse habitat (ca. 0.83ha gain [2.83ha gain including the 2009 woodland planting]; ca. 0.014ha loss).</p> <p><b>Adverse impacts</b><br/>There should be no negative operational impacts associated with the Phase 2 infrastructure proposals.</p> <p>Once the housing is completed recreational pressures may adversely impact on the woodlands, although this was assessed as part of the ES and was taken into account in relation to previous habitat creation, present habitat creation proposals, and habitat creation proposals that have been set out for future phases of the Berewood development.</p> |

| Species or taxa | Construction impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Operational impact |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                 | <p>Dormice would be hibernating elsewhere.</p> <ul style="list-style-type: none"> <li> <p><u>Hedge 6.</u> As this 270m long hedge has only been recently planted (in 2009) it is not currently functioning as meaningful habitat in terms of Dormice (see photo in Table 4.1). Although a new replacement hedgerow will eventually be planted just to the west along the eastern boundary of the forthcoming cemetery, this alignment is not currently known and so this replacement hedge does not form part of the present proposals. It is important to highlight, however, that substantial new recent woodland planting (2ha), as described above, is to function as the key point of connection between Marrelsmoor Row and surrounding woodland (via Alsfordmoor Coppice).</p> </li> <li> <p><u>Hedge 7.</u> No further loss (apart from the removal of a Hawthorn tree on the eastern side of the breach) as installation of utilities would be through the existing gap.</p> </li> <li> <p><u>Hedge 8.</u> No further loss; installation of utilities would be through the existing gap previously created under Natural England licence.</p> </li> <li> <p><u>Hedge 9.</u> No further loss; installation of utilities would be through the existing gap previously created under Natural England licence.</p> </li> <li> <p><u>Hedge 10.</u> The clearance of a 6m wide gap through this species-poor hedge to facilitate the installation of utilities should not impact on the local Dormouse population. Were it to be assumed that Dormice would be reluctant to cross this future narrow breach point (which anyway should rapidly gap-up with Bramble), it should be noted that the short section of remaining hedge (ca. 50m in length) on the southern side of the proposed break, terminates at Purbrook Heath Road next to the junction with the A3, i.e. this hedge is not considered important in terms of facilitating Dormouse dispersal. Note also that proposals to eventually clear the remainder of this particular hedge were set</p> </li> </ul> |                    |

| Species or taxa | Construction impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Operational impact |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                 | <p>out in the ES.</p> <ul style="list-style-type: none"> <li>• <u>Hedge 11.</u> The removal of an Ash tree on the western side of the breach should not significantly affect the movement of Dormice or habitat availability.</li> <li>• <u>Scrub.</u> As discussed above three narrow sections of scrub would be affected by the proposals. These are in Fields 5 and 6 and also on the western side of boggy tall herb vegetation in the south-eastern corner of the Site.</li> </ul> <p>In summary, the proposals will result in the loss of ca. 20m of mature hedgerow (Hedges 1, 7, 10 and 11) and an area of scrub ca. 0.01ha (assuming hedgerow habitat is on average 2m wide overall habitat loss would be 0.014ha). If the hedge sections are insensitively cleared between April and November inclusive, active Dormice may be harmed and/or killed. If the hedge sections are cleared between November and April inclusive, and the ground works are also undertaken, then hibernating Dormice may be harmed and/or killed. Given the very small amount of habitat clearance proposed and the fact that Dormice naturally occur at very low densities (and are thought to be particularly sparsely distributed at Berewood), the risk of either Dormouse injury or fatality resulting from an unmitigated scheme is considered to be very low.</p> |                    |

| Species or taxa             | Construction impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Operational impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bats (roosting)             | <p><b>Adverse impacts</b></p> <p>The three trees that were all climbed and carefully inspected will be retained under the current proposals. No evidence of bats was found in any of these trees and so no disturbance impact is anticipated.</p> <p>In the unlikely event that one or two lone males or non-breeding females take up residence in one or more of these trees when construction commences and are subsequently temporarily displaced by construction disturbance, they are unlikely to suffer significant perturbation as multiple trees exist locally with similar or better roosting features.</p> <p>Two trees will be felled under the proposals – an Ash tree in Hedge 11 and a willow tree near the London Road and Ladybridge Road junction (see Table 4.1). Both trees were assessed by a licensed bat worker who concluded that neither were suitable for roosting bats.</p> | <p><b>Positive impacts</b></p> <p>The creation of substantial new SuDS features around the woodland margins are likely to notably enhance foraging opportunities within a short space of time (as wetland habitat typically rapidly establishes itself). Enhanced foraging opportunities are likely to strengthen the viability of local bat roosts.</p> <p><b>Adverse impacts</b></p> <p>None.</p> <p>The subsequent Phase 2 Housing RMA and associated lighting could, if unmitigated, potentially disturb local bats although such impacts have already been assessed as part of the ES and have been taken into account in present habitat creation proposals and those planned for future phases.</p>                                       |
| Bats (foraging / commuting) | <p>Very short hedge sections would be removed from Hedges 1, 7, 10 and 11 for the construction of various infrastructure (see above). Given the small length of breaches and general low level of bat activity impacts are not likely to be significant.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <p><b>Positive impacts</b></p> <p>The creation of areas of new interconnected SuDS, wildflower grassland, and new woodland creation should result in a net gain for bats in terms of available foraging/commuting habitat. New wetland habitat in particular can quickly become colonised by vegetation and invertebrates and so should soon attract local bats.</p> <p><b>Adverse impacts</b></p> <p>No post-development adverse impacts are anticipated although the subsequent housing development and associated traffic will, as described in the ES, result in some level of disturbance. Note that the Phase 2 housing will be subject to a separate RMA.</p> <p>The impact of lighting is also to be assessed as part of the Phase 2</p> |

| Species or taxa | Construction impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Operational impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| GCNs            | <p><b>Adverse impacts</b></p> <p>None of the existing ponds in the wider Berewood site would be lost under the scheme design. Although the known GCN breeding pond is over 0.5km to the west of the proposals, GCNs have been recorded (a probable non-breeding population in Pond 7) within ca. 250m of the proposed new SuDS features on the eastern side of Newlands Row, and ca. 350m from the primary north-south link road. There is therefore the possibility that a very small number of GCNs could range as far as the Development Site and that without appropriate mitigation a few GCN fatalities could occur during construction, e.g. during clearance of field boundary habitat necessary to facilitate works. GCNs fatalities could also occur should fields currently under pasture and arable production be left unmanaged and become colonised by grasses and ruderals (thus providing potential refuge/foraging opportunities for GCNs) prior to works commencing. Finally, GCNs fatalities could occur should they colonise construction areas, e.g. taking refuge beneath material stockpiles or in wet trenches etc.</p> <p>As discussed, the number of GCNs that could potentially be affected would be very small. This is because:</p> <ul style="list-style-type: none"> <li>• GCNs are likely to fan out from their breeding pond in multiple directions and thus the density of terrestrial GCNs decreases rapidly with distance from their breeding site.</li> <li>• The Development Site, which consists almost entirely of arable farmland, is considered to afford few opportunities for shelter and foraging (although construction works might temporarily enhance conditions in select locations).</li> <li>• There is no optimal terrestrial habitat to the east of the Development Site which might be attracting an eastward migration of GCNs; to the east of the arable field is the busy A3/London Road and beyond that Waterlooville / Purbrook.</li> </ul> | <p><b>Positive impacts</b></p> <p>The key operational impact of the proposals is likely to be positive as GCNs are may utilise and perhaps even breed, depending on water levels, within the new SuDS ponds (in area ca. 1ha combined) that are proposed.</p> <p><b>Adverse impacts</b></p> <p>Should maintenance of the SuDS be undertaken at insensitive times, e.g. during the breeding season, GCN fatalities could result. While this would adversely affect the Conservation Status of a theoretically expanded population, it would be unlikely to result in a net loss of GCNs based on the status quo.</p> <p>The loss arable land due to the construction of the new Phase 2 housing north-south link road and SuDS features would not significantly impact on the terrestrial habits of the local GCN population. GCN terrestrial activity is likely to be primarily focused within the adjacent damp woodland areas and Newlands Meadow. Even the complete loss of the arable field, following completion of the subsequent housing, is unlikely to significantly impact on GCNs.</p> <p>GCN habitat would not be significantly fragmented by the proposals for the reasons set out opposite.</p> <p>If the inlets and outlets of the storm tank beneath SuDS are not carefully designed GCNs could find their way into these and become trapped.</p> |

| Species or taxa | Construction impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Operational impact                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| Reptiles        | <p><b>Adverse impacts</b></p> <p>Reasonable numbers of reptile were found to be present along the margins between the woodland and adjoining fields. If unmitigated small numbers of reptile fatalities could occur during construction, e.g. during clearance of field boundary and meadow habitat.</p> <p>Reptile fatalities could also occur should fields currently under arable production be left unmanaged and thereby become colonised by grasses and ruderals (thus providing potential refuge/foraging opportunities for reptiles) prior to works commencing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p><b>Positive impacts</b></p> <p>The creation of six new SuDS features covering ca. 1ha in area (as well as other substantial areas of new aquatic / terrestrial habitat associated with the wider scheme proposals – see ES) should notably enhance habitat for reptiles.</p> <p><b>Adverse impacts</b></p> <p>The loss of mostly arable habitat will not affect the reptile population. Field boundary habitat will be replaced by the SuDS features as well as other semi-natural space associated with the housing public realm (see forthcoming Phase 2 Housing RMA).</p> <p>Fragmentation is unlikely to be a problem (even taking into account the forthcoming housing) as The Site is bounded to the east by the A3/London Road and beyond that is residential landuse.</p>                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Breeding birds  | <p><b>Adverse impacts</b></p> <p>The Site primarily consists of arable farmland (Oil-seed Rape) offering only limited opportunities for feeding and nesting birds. Although two Whitethroat pairs were thought to be nesting in the crop, no crop will be present when construction is due to commence.</p> <p>It can be assumed that the importance of construction disturbance on breeding birds in the adjoining woodland will vary considerably dependent on programme of operations, use of heavy plant, presence of site operators and the regularity of noise and dust generation. If works are undertaken in spring breeding activity may be temporarily suppressed in select locations in the adjacent woodlands (Newlands Row and Marrelsmoor Coppice). The primary north-south link road construction may also result in some disturbance to birds nesting in the north-west corner of Marrelsmoor Coppice. Overall this temporary disturbance to a few select locations is unlikely to significantly impact long term on the local woodland bird populations. Note that construction disturbance was previously assessed in ES.</p> | <p><b>Positive impacts</b></p> <p>Rapid gains could potentially include the attraction of breeding species such as Reed Warbler <i>Acrocephalus scirpaceus</i> and maybe even Reed Bunting, to the new SuDS. Breeding Whitethroat may be retained within the Phase 2 Site if they can be attracted to new shrub habitat being proposed around the woodland margins of the SuDS.</p> <p><b>Adverse impacts</b></p> <p>Although the road and SuDS construction will only result in a partial loss of the Oil-seed Rape field, it seems unlikely that a crop would be re-sown in the remaining area before the subsequent house construction begins. Whitethroat habitat would therefore be lost (note however that only two Whitethroat pairs were identified).</p> <p>The loss of the crop would also represent a loss of feeding resource for certain bird species; the rape itself and the many invertebrates that the crop supports are eaten in the breeding season (Burton <i>et al.</i> 1996). The creation of the new SuDS features (covering ca. 1ha) would probably quickly offset the limited loss of bird breeding/feeding habitat, as new wetland/riparian planting typically establishes rapidly.</p> |

| Species or taxa | Construction impact                                                                                                                                                                                                                                                         | Operational impact                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 |                                                                                                                                                                                                                                                                             | <p>The subsequent housing development and associated lighting and traffic will result in disturbance to birds in the adjacent woodland areas, although woodland buffer planting (to be described in the Town Park Reserved Matters Application) should reduce the effects. Note that these impacts were assessed as part of the ES and that the housing will be subject to a separate RMA.</p>                                                                          |
| Invertebrates   | <p><b>Adverse impacts</b><br/>Terrestrial invertebrate populations of most interest within the wider Berewood site were associated with the Site's woodlands and wetland features, neither of which would be directly affected by the Phase 2 infrastructure proposals.</p> | <p><b>Positive impacts</b><br/>The creation of the new SuDS might be expected to improve the structural and botanical diversity of the Site's aquatic/riparian environments, which in turn would be expected to improve the diversity of the Site's invertebrate population.</p> <p><b>Adverse impacts</b><br/>Loss and displacement of invertebrates would be limited therefore to mostly common species associated with the Oil-seed Rape crop and field margins.</p> |

## **5.0 MITIGATION**

Mitigation measures are set out in Table 5.1. Please note that the Construction Environmental Management Plan (CEMP) also makes reference to the Site's key ecological receptors and the need to refer to the Project Ecologist and relevant mitigation strategies (as set out here and also in the forthcoming European Protected Species Dormouse Mitigation Licence) with respect to the proposed habitat clearances. It should also be noted that long term habitat management / maintenance proposals will be set out in the forthcoming site-wide management plan document required under the Section 106 agreement.

In summary, the surrounding woodlands will not be directly affected as tree root protection zones will be conspicuously fenced off. Potential construction impacts on Dormice, GCNs and reptiles will be avoided through undertaking precautionary checks prior to works commencing, installation of exclusion fencing (to protect the woodland and prevent colonisation of the working area by GCNs), and by vegetative management undertaken in the appropriate season.

**Table 5.1** Mitigation and compensation

| Ecological Receptor                | Proposed Mitigation / Compensation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <b>Habitats</b>                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Valued Ancient and other woodlands | The latest best practice working protocols - British Standard Trees in Relation to Design, Demolition and Construction - will be followed when undertaking works adjacent to the Ancient Woodlands, in particular ensuring there are appropriate offsets to protect tree roots (N.B. it is also understood that stockpiling of spoil directly adjacent to woodland and hedgerows can also cause harm trees and shrubs). Root exclusion zones would be conspicuously marked with high-visibility exclusion fencing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Hedgerows                          | The latest best practice working protocols - British Standard Trees in Relation to Design, Demolition and Construction - will be followed when undertaking works adjacent to hedgerows, in particular ensuring there are appropriate offsets to protect tree roots.<br><br>Relatively minor hedgerow section losses will be more than compensated for through the creation of ca. 0.83ha of new woodland habitat. Note also that 2ha has already been created as described above.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Species</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Badger                             | The only Badger sett found near the proposed works (ca. 30-40m distance) was a disused outlier. No mitigation is therefore required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Dormice                            | <p>Various measures would be undertaken to protect the local Dormouse population.</p> <ul style="list-style-type: none"> <li>• Conspicuous exclusion fencing would be installed to ensure the adjacent Ancient woodlands are not accidentally damaged.</li> <li>• To facilitate machinery access during the installation of services through the existing gap in Highfield Row, the overhanging canopy, which was tied together when previous works cleared a path through this woodland, would be temporarily untied. As soon as works are completed the canopy would be re-tied. The current aim is to undertake these particular works in winter when Dormice are hibernating and so wouldn't be utilising this linkage. Even were works to be undertaken when Dormice are active they are unlikely to take longer than five days and so no significant impact is envisaged. Note that conspicuous exclusion fencing would also be erected either side of the existing break in Highfield Row to ensure there is no additional encroachment. There is therefore no need to install a Dormouse bridge at this point at this stage of the project. The extension of the southern access road at a later phase of the development through Highfield Row may necessitate some additional tree clearance and thus widening of the existing breach in Highfield Row. This additional clearance may make it impossible to maintain direct canopy connectivity across the breach. If this is the case then this would be the trigger for the Dormouse bridge installation.</li> <li>• Wherever hedgerow and scrub is being cleared the typical two-stage approach to Dormouse mitigation would be undertaken: <ol style="list-style-type: none"> <li>1. Coppicing in winter when Dormice are hibernating.</li> <li>2. Commencement of works in May - by which time Dormice would have emerged from hibernation and have moved into adjacent cover).</li> </ol> </li> <li>• As described above new habitat creation around the woodland margins will far exceed the small amount of habitat loss that will occur.</li> <li>• A Dormouse licence will probably need to be obtained from Natural England prior to carrying out works. Note that an EPS licence</li> </ul> |

| Ecological Receptor | Proposed Mitigation / Compensation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                     | <p>can only be granted if a development proposal is able to meet the following three tests:</p> <ol style="list-style-type: none"> <li>1. The consented operation must be for 'preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'.</li> <li>2. There must be 'no satisfactory alternative'.</li> <li>3. The action authorised 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.</li> </ol> <p>The present document has been mostly concerned with explaining how the third test will be satisfied. It should be noted that Natural England, in granting two previous Dormouse mitigation licences and in not objecting to the outline planning application, has already accepted that the wider scheme is being undertaken for 'imperative reasons of overriding public interest' and that there is 'no satisfactory alternative'. Note also that, subject to relevant planning conditions being partially discharged, Natural England has also stated that these tests have been met with respect to a draft licence application submitted for the present proposals.</p>                                                                                                                                                                     |
| Bats                | <p>Exclusion fencing will be installed around the woodland margins to protect trees and shrubs from accidental damage during works. This protection will also help minimise disturbance to any bats roosting nearby.</p> <p>The negative impact of lighting on bats is well known. To minimise such impacts the following guidance will be followed:</p> <ul style="list-style-type: none"> <li>• Wherever possible woodlands, hedgerows and water features would not be illuminated to avoid disruption to commuting bats and other wildlife. It is not possible however to avoid installing lampposts adjacent to Marrelsmoor Coppice due to Highways Authority street lighting spacing requirements. For this reason where the primary north-south link road passes directly adjacent to the north-west corner of Marrelsmoor Coppice all lighting columns will be installed on the woodland side of the road only to minimise light spillage on the woodland edge. The lamp heads of these lampposts will also be fitted with 75mm baffles to minimise backlighting.</li> <li>• Baffles will also be fitted to two lampposts adjacent to the SuDS feature immediately to north of Marrelsmoor Coppice.</li> <li>• Lux levels and the period of 'lit time' will be set as low as guidelines permit. It should be recognised that whilst most older street lights indiscriminately light much larger areas than is needed, modern street lighting causes significantly less indiscriminate light spillage.</li> </ul> |
| Breeding birds      | <p>Breeding bird casualties would be avoided by the clearance of the short hedgerow sections and scrub outside of the bird breeding season, which is typically from March to August inclusive.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Reptiles            | <p>Reasonable numbers of Slow-worm were recorded along the margins of Field 2. As a precaution, vegetative management would be undertaken to displace any amphibians and reptiles present into adjacent suitable habitat. Vegetative management would involve keeping vegetation mown to soil level to remove potential cover/foraging habitat. Vegetative management would start on the eastern side of the meadow and then work in a westerly direction. The aim will be to displace reptiles toward the young plantation habitat around the Marrelsmoor Coppice (at its closest point only 10m away), the ground layer of which consists of tussocky grassland favoured by reptiles. Given the young age of this tussocky grassland (the plantation was established in 2009) it is unlikely to have established a noteworthy reptile population that would be disrupted by the new influx. Given the young age of the plantation the underlying grassland is likely to</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Ecological Receptor | Proposed Mitigation / Compensation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                     | <p>remain suitable for many years to come and indeed is likely to improve for a certain time as the shrub habitat matures as begins to form clumps. If works are to commence over winter then the vegetation will need to be cut short in autumn to prevent any reptiles hibernating on Site.</p> <p>South of Highfield Row, where smaller numbers of Slow-worm were recorded around the margins of Fields 4, 5 and 6, the vegetation would also be mown to ground level along the proposed utility alignments prior to works commencing. Any reptiles present would be displaced into the remaining undisturbed ground.</p> <p>The minor loss of field edge habitat would be compensated for by the creation of the six new SuDS features which in total would cover ca. 1 ha.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| GCNs                | <p>GCN exclusion fencing was installed several years ago along the northern margins of Barnfield Row and along most of the eastern side of Plant Row to prevent GCNs dispersing across the eastern side of the Site where they were previously found to be absent on negative survey findings from more than one year of survey.</p> <p>Although the nearest GCN breeding pond is over 500m from the Phase 2 Infrastructure Site, GCNs have been recorded as close as ca. 250m from The Site (in Pond 7 although no GCNs were recorded from this pond from the 2012 survey). To avoid the possibility that small number of GCNs might migrate/disperse across the Site during construction, which might then potentially become injured or killed by works, the existing GCN exclusion fencing will be extended so that it bounds the entire length of Barnfield Row and the southern and eastern margins of Newlands Row (see Figure 4.1). Where narrow gaps need to be created for SuDS outfalls a short section of pipe would be installed at the fenceline crossing point including a one-way flap to prevent GCN access to the Phase 2 site.</p> <p>A European Protected Species (EPS) GCN licence would not be required for the extension of the exclusion fencing as there is no risk that by inhibiting the movement of GCNs across the Phase 2 Infrastructure site any significant disturbance to GCNs would be caused. This is because there are no ponds or good quality terrestrial habitat to the east of The Site's large arable field that would become isolated from the local GCN population by the installation of the fence; east of the arable field is the A3/London Road and beyond that a residential area (N.B. the European Commission has advised that 'trivial' disturbance should not be considered as disturbance under Article 12 of the Habitats Directive).</p> <p>With respect to the drainage design and SuDS features:</p> <ul style="list-style-type: none"> <li>• All inlets to underground storm tanks beneath swales and SuDS ponds will include gravel filter. GCNs will not be able to fall into the tanks through open drains.</li> <li>• In the unlikely event that a GCN did somehow find its way into a storm tank, it should be noted that water will gravity feeds from these via an outfall into the next water SuDS feature. The outfall will include a non-return flap preventing access by GCNs.</li> <li>• The number of traditional gullies on the principal infrastructure will be kept to a minimum by the use of roadside swales. The only</li> </ul> |

| Ecological Receptor | Proposed Mitigation / Compensation                                                                                                                                                                                                                                                       |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | traditional drain features that will be included as part of the Phase 2 Infrastructure will be along the primary north-south link road. Once the Phase 2 scheme is operational GCNs would need to pass through housing to reach these or else arrive at them via the local road network. |

## **6.0 RESIDUAL IMPACT ASSESSMENT**

Most construction impacts on fauna would be avoided due to implementation of various mitigation measures. In particular the risk of Dormouse, Great Crested Newt and reptiles would be reduced to negligible level. Habitat creation measures, in particular the creation of six new SuDS features and the planting of 0.83ha of new woodland should result in a net gain for biodiversity.

## 7.0 CONCLUSIONS

The majority of the Phase 2 Infrastructure site is of limited ecological interest consisting of arable land and species-poor grassland. Of most interest within the Site was the presence of:

- Dormice utilising hedgerows, scrub and surrounding woodland.
- Small number of GCNs using shaded ponds in Barnfield Row (note however that the nearest viable breeding population is >0.5km away).
- Common reptiles (mostly Slow-worms but also including small numbers of Common Lizard) inhabiting field margins

The Phase 2 Infrastructure works will impact predominantly on arable habitat and a small area of species-poor semi-improved grassland, both of which are of little ecological interest. The surrounding woodlands will not be directly affected as tree root protection zones will be conspicuously fenced off.

Potential construction impacts on Dormice, GCNs and reptiles will be avoided through undertaking precautionary checks, installation of exclusion fencing (to protect the woodland and prevent colonisation of the working area by GCNs), and vegetative management.

The overall operational impact is assessed to be very positive, resulting from the creation of two notable areas of new habitat – six new SuDS features covering ca. 1ha; and ca. 0.8ha of new woodland. This new habitat creation is predicted to benefit a range of locally present species including Dormice, bats, GCNs, reptiles and breeding birds.

## 8.0 REFERENCES

Bright, P., Morris, P. & Mitchell-Jones, T. (2006). *The Dormouse Conservation Handbook*. English Nature, Peterborough.

Burton, N.H.K. Watts, P.N., Crick H.Q.P. & Carter N. (1996). *The effects of pre-harvesting operations on birds nesting in Oilseed Rape Brassica napus* BTO Research Report No. 171. BTO .

Garland, L. & Woods, M. (2005). Dormice on road verges. *Ecology and Environmental Management In Practice*, **48**, 1-6.

Natural England (2011). *Interim Natural England Advice Note - Dormouse Surveys for Mitigation Licensing: Best Practice and Common Misconceptions*. Natural England, Peterborough.

## **APPENDIX 1: PLANNING LAW AND POLICY RELATING TO BIODIVERSITY – RECENT CHANGES SUMMARISED OVERVIEW – 2010 TO 2012**

Since the publication of the ES for Newlands in 2010 a great quantity of policy and guidance has been published that is relevant to biodiversity and the implementation of landscape design more generally. In essence this major canon of material relates to the maximisation of the ecosystem services of green infrastructure in scheme planning and design to provide multiple benefits including mitigating and adapting to the effects of climate change. Key national policy documents include:

- The 2011 England National Biodiversity Strategy Biodiversity (2020): A Strategy for England's Wildlife and Ecosystem Services.
- Government White Paper on the Environment 2011: The Natural Choice; Securing the Value of Nature.
- The National Ecosystem Assessment 2011 – Understanding Natures Value to Society

There is a commitment in the National Biodiversity Strategy to implement the Aichi goals and targets agreed by the UK at the Nagoya 2010 meeting of the parties to the Convention on Biological Diversity. Of particular relevance is Aichi target 14:

*'By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.'*

Another key relevant Aichi Target relates to countering the spread of invasive alien species such as, in the case of Berewood, Himalayan Balsam (present along Purbrook Stream a short distance to the south of Berewood).

Further guidance on expectation and policy with respect to the functionalities expected of green infrastructure is set out in e.g.

- CABI (2010). Community Green. Using Local Spaces to Tackle Inequality and Improve Health.
- CIRIA (2010). Large Species Trees in Urban Landscapes - a Design and Management Guide.
- Planning & Climate Change Coalition November (2010). Planning for Climate Change – Guidance and Model Policies for Local Authorities

### **National Planning Policy Framework 2012**

The new National Planning Policy Framework establishes a presumption in favour of SUSTAINABLE development except in case of Natura 2000 sites. For development to be sustainable latest policy suggests at least no-net loss of ecological resources.

It prescribes that developments should seek to minimise impacts on biodiversity and provide 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 pressure

The NPPF stipulates that:

- All developments should consider climate change and biodiversity.
- 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.

- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted.
- Opportunities to incorporate biodiversity in and around developments should be encouraged.
- Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the Development in that location clearly outweigh the loss.

Under the NPPF Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (ODPM & DEFRA 2005) still applies. The key policy on biodiversity that this adds to the planning canon relevant to Phase 2 is as follows:

*The potential effects of a development, on habitats or species listed as priorities in the UK Biodiversity Action Plan (BAP), and by Local Biodiversity Partnerships, together with policies in the England Biodiversity Strategy, are capable of being a material consideration in the preparation of regional spatial strategies and local development documents and the making of planning decisions'.*

The government sets out this minimum guidance in the NPPF but has also specified that other endorsed guidance by expert groups will be significant material consideration in planning conditions. The key example of this relevant to biodiversity to date include:

- TCPA (2012) Planning for a Healthy Environment : Good Practice Guidance for Green Infrastructure and Biodiversity.

- Planning and Climate Change Coalition (PCCC 2012). Planning for Climate Change: Guidance for Local Authorities.

A key policy from the above is to:

*‘..plan green infrastructure in order to optimise its many benefits and, as part of wider green infrastructure networks, in order to support local biodiversity and healthy living environments, including through providing urban cooling, local flood risk management, carbon sequestration and local access to shady outdoor space...’*

PCCC 2012 also recommends that the effect of developing a site on the capacity of biodiversity to adapt to likely changes in the climate needs to be assessed.

The TCPA has also emphasised in its 2012 briefing note in relation to draft guidance to the implementation of the Flood and Water Management Act (2010) that there is a:

*‘ need for policy-makers and practitioners to recognise and, where practical, to integrate the use of SuDS for wider roles and benefits – including tackling climate change impacts, helping to improve health and well-being, and providing opportunities for improving local amenities,...’*

Key relevant guidance in Planning for a Healthy Environment: Good Practice Guidance for Green Infrastructure and Biodiversity includes the following key guidance which the government considers highly material to planning decisions:

- *‘Designing for biodiversity in the built environment*
- *The built environment should aim to be permeable to wildlife and to incorporate design which helps to sustain and increase particular species. Such measures will also play a significant role in helping*

*people and wildlife to adapt to climate change. There are many approaches that can be included in the detailed design of development, whether residential or business, to help achieve permeability – for example sustainable drainage schemes (SuDS) and living roofs and walls.*

- *While small and often low-cost design changes can make buildings suitable for bats, birds and invertebrates, some design features (for example living roofs or rooftop permaculture farms) will require early consideration of building form and structure (especially roof loadings) so that habitat requirements can be accommodated from the outset.*
- *.....Information on how the detailed design of buildings and structures can maximise the ecological value of a site is available in Biodiversity and the Built Environment (UK Green Building Council 2009).....In order to ensure that development integrates and enhances biodiversity within urban environments, planning conditions could require both extensions to existing properties and all new developments to provide sites for species that nest or roost in the built environment. It is important to note that provision for species should be guided by what is locally appropriate.....'*

TCPA (2012) also strongly recommends the early and continued involvement of local people in the long-term management of stewardship of biodiverse urban green infrastructure.

## APPENDIX 2: SURVEY PROTOCOLS

| Survey                          | Date                 | Surveyor                                                                                                                                | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| Extended Phase 1 Habitat survey | May 2012 & July 2007 | Dr Lincoln Garland CEnv MIEEM – update Original survey – Elizabeth Johns MIEEM & Sharon Pilkington MIEEM (Wiltshire Botanical Recorder) | <ul style="list-style-type: none"> <li>Extended Phase I Habitat survey was undertaken to identify the location, extent and distribution of habitats.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Hedgerow survey                 | June 2009            | Sharon Pilkington MIEEM (Wiltshire Botanical Recorder).                                                                                 | <ul style="list-style-type: none"> <li>A hedgerow survey was undertaken by Sharon Pilkington MIEEM (Wiltshire Botanical Recorder) to identify 'important' hedgerows in accordance with criteria set out in the Hedgerow Regulations 1997.</li> <li>Firstly the length of each hedge surveyed was measured. Where the hedge was 30m or less in length it was surveyed in its entirety. Where hedges were between 30-100m a central 30m section was surveyed. Where the hedge was between 100-200m in length it was divided in two and the central 30m of each section was surveyed. Where the hedge was over 200m divide it was divided into three sections etc.</li> <li>It was usually possible to survey each hedge from one side except in the cases of the highest and thickest hedgerows.</li> <li>All woody species were recorded in each survey section (see Schedule 3 of the Hedgerow Regulations). This is the most important criteria determining whether a hedge will meet the 'important' criteria Regulations is the number of woody species. A hedgerow may qualify as Important if it includes either (a) at least 7 woody species; (b) at least 6 woody species, and has associated with it at least 3 other qualifying features (listed below); (c) at least 6 woody species, including one of the following – Black-poplar tree (<i>Populus nigra</i> ssp <i>betulifolia</i>), Large-leaved Lime (<i>Tilia platyphyllos</i>), Small-leaved lime (<i>Tilia cordata</i>) or Wild service-tree (<i>Sorbus torminalis</i>); or (d) at least five woody species, and has associated with it at least 4 other qualifying features.</li> <li>Qualifying features include (refer to Hedgerow Regulations for the precise definition for each qualifying feature): <ul style="list-style-type: none"> <li>A bank or wall which supports the hedgerow along at least one half of its length.</li> <li>Gaps which in aggregate do not exceed 10% of the length of the hedgerow.</li> <li>Where the length of the hedgerow does not exceed 50 metres, at least one standard tree.</li> <li>Where the length of the hedgerow exceeds 50 metres but does not exceed 100 metres, at least 2 standard trees.</li> <li>Where the length of the hedgerow exceeds 100 metres, such number of standard trees (within any part of its length) as would when averaged over its total length amount to at least one for each 50 metres.</li> <li>At least 3 woodland herb species (see Schedule 2 of the Regulations) within one metre, in any direction, of the outermost edges of the hedgerow.</li> <li>Aditch along at least one half of the length of the hedgerow.</li> <li>The minimum prescribed number of hedgerow connections.</li> </ul> </li> </ul> |

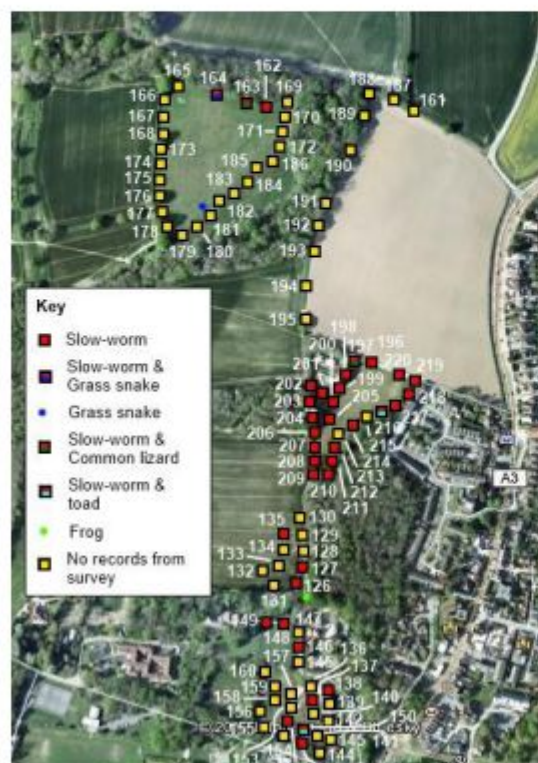
| Survey                    | Date                                                              | Surveyor                                                        | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Badger                    | 5 <sup>th</sup> and 6 <sup>th</sup> July 2012                     | Colin Bonfield<br>MIEEM                                         | <ul style="list-style-type: none"> <li>Involved searching for Badger setts, hairs, tracks, feeding signs and latrines within 50m of the Phase 2 housing proposals.</li> <li>Each sett found was classified as main, annexe, subsidiary or outlier and the activity status of each hole within each sett was also assessed. Conclusion as to whether a sett was active has been made by taking into account recent guidance from Natural England (2009, Guidance on Current Use in the Definition of a Badger Sett). Sett entrances were considered to be not active if the following signs (or combinations of signs were noticed). <ul style="list-style-type: none"> <li>Cobwebs across or inside the entrance;</li> <li>Collapsed entrance;</li> <li>Debris in the sett entrance;</li> <li>Dense vegetation growing;</li> <li>Absence of fresh signs.</li> <li>Significant evidence of sett collapse, infilling (with debris or mature vegetation).</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Dormouse                  | Tubes set in Jun; monthly checks visits between July and November | John Poland<br>MIEEM CEnv and<br>Victoria Russell<br>MIEEM CEnv | <ul style="list-style-type: none"> <li>All woodlands surrounding the Phase 2 Site were surveyed for Dormice.</li> <li>Survey involved: <ul style="list-style-type: none"> <li>Dormouse nest tube survey - 115 Dormouse tubes were erected in suitable habitat (at 20m intervals and at least 1.5m in height) in June; 3 tubes in Plant Row, 10 tubes in Barnfield Row, 17 tubes in Newlands Row, 13 tubes in Alsfordmoor Coppice, 10 tubes in Highfield Row, 20 tubes in Marrelsmoor Coppice, and 18 tubes in hedgerows between Highfield Row and Purbrook Heath Road. The locations are shown in Figure A3.1.</li> <li>Tubes were checked once in August, September, October and November.</li> <li>Comprehensive search effort should score 20 points based on the survey criteria set out in The Dormouse Conservation Handbook. While survey between July and November would normally only score 16 points, given that the number of tubes employed was more than double that usually recommended to determine presence (which is 50), the search score can at least be doubled (providing the recommended tube density is not exceeded and additional tubes are positioned in suitable habitat) and so more than exceeds the recommended effort. Further to this, the idea of the scoring system is to ensure sufficient effort is put in to determine presence / absence and as explained in the results section, presence of Dormouse was reconfirmed following the September visit.</li> <li>Nut search - check for characteristically gnawed Dormouse nuts under any heavily fruiting Hazel found.</li> </ul> </li> <li>Previous Dormouse surveys carried out by Biodiversity by Design across the wider Berewood development site for the Environmental Statement were also used to inform the present assessment.</li> </ul> |
| Bats - tree roost surveys | 19th September 2012                                               | Matt Johns MIEEM<br>CEnv and Colin Bonfield MIEEM               | <p>All mature trees along the margins of Newlands Row, Marrelsmoor Coppice and Highfield Row which abut the Phase 2 Infrastructure proposals were inspected by an experienced bat ecologist. Of these three trees were identified as being of particular concern given these particular features considered to be of value to bats and their proximity to the proposals. These three trees are shown on Figure 3.1. An experienced bat ecologist and holder of a current Natural England Science and Education licence for bats together with a qualified tree climber inspected the elevated features of these three trees. The three trees were ascended using a climbing harness with a static dimbing rope, and the various features on the trees were accessed using a standard branch walking and ascension techniques. Other supporting equipment included close focusing binoculars, a 1,000,000 candlepower torch, VideoOptics 'Videostick' endoscope, a small maglite torch and mirrors. The presence of features considered suitable for roosting bats (i.e. cracks, fissures, holes etc) were recorded. The surveys took into account standard guidance provided by the Bat Conservation Trust (2012 ), English Nature (2004 ) and Joint Nature Conservation Committee (2004 ). The presence of roosting bats was assessed following criteria adapted from those identified by the BCT (BCT, 2012):</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |

| Survey                 | Date | Surveyor                                          | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------|------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                        |      |                                                   | <ul style="list-style-type: none"> <li>• Natural holes – checking for scratches around entry point.</li> <li>• Woodpecker holes – checking for staining around entry point.</li> <li>• Cracks/splits in major limbs – checking for bat droppings in/around/below entry point</li> <li>• Loose bark – checking for audible sound.</li> <li>• Dense, thick-stemmed ivy – checking for flies around entry point.</li> <li>• Hollows/cavities – checking for distinctive smell</li> <li>• Dense epicormic growth – checking for smoothing of surfaces around entry point.</li> <li>• Bird and bat boxes – checking for bat droppings.</li> </ul> <p>However, the absence of these field signs cannot be treated as conclusive evidence that bats are not present and so wherever possible an internal assessment of suitable features was carried out using an endoscope. Note also that the specific character of the potential roost feature was also used to help confirm its suitability for bats, e.g. whether the cavity was shallow or deep, vulnerable to rain ingress or occupied by other animals. Finally, the professional judgement of the surveyor was used to confirm the status of the feature/tree to support roosting bats and whether further survey is required (e.g. bat emergence/re-entry survey).</p> <p>Previous bat surveys carried out by Biodiversity by Design across the wider Berewood development site for the Environmental Statement were also used to inform the present assessment.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Bats –activity surveys |      | Matt Johns MIEEM<br>CEnv and Colin Bonfield MIEEM | <ul style="list-style-type: none"> <li>• Bat activity surveys are defined as: non-invasive surveys undertaken with hand-held bat detectors by surveyors observing and recording bats in the field, and automated surveys, in which bat detectors are deployed to operate unattended. The aims of such surveys are to help inform an assessment of the effects of a development on any bat populations in the area. The specific aims of the activity surveys are to determine: <ul style="list-style-type: none"> <li>◦ Which bat species are using the site.</li> <li>◦ The levels of activity for each species using the site.</li> <li>◦ How each bat species are using the site temporally and spatially.</li> <li>◦ For what purpose the bats are using the site, i.e. foraging, roosting, commuting etc.</li> </ul> </li> <li>• The surveys took into account standard guidance provided by the Bat Conservation Trust (2012), English Nature (2004) and Joint Nature Conservation Committee (2004). The activity surveys undertaken combined transect surveys, which involved surveyors on foot carrying bat detectors along a linear route through the Site recording any observed bat activity; and automated surveys where a bat detector was left at the Site (see Figure A2.3) recording over a number of nights, thus increasing the sampling time of the surveys overall. The survey transect (which included nearby Newlands Meadow in relation to separate proposals for restoring this area) is shown in Figure A3.2 and Figure A3.3.</li> <li>• The survey team included two experienced bat surveyors on all surveys, and each surveyor had a frequency division (Anabat SD1 or 2, or EM3) bat detector to record total bat passes within a particular time period along the transect or time expansion (Pettersson D240 or EM3). Both surveyors also had Edirol recording devices to aid the observation and identification of the bats where necessary. The bat detector recordings were analysed using Analook or Batsound as applicable to confirm the identification of the bats observed during the surveys.</li> <li>• Surveys commenced 15 minutes before dusk and continued two hours after dusk.</li> <li>• The automated surveys were undertaken using an Anabat SD2 bat detector located in several fixed positions that offered either good habitat for bats and therefore reflected optimum conditions for these animals, or were associated with a sensitive part of the site in relation to the proposals or a combination of both. The monitoring equipment switched itself on 30 minutes before dusk and switched</li> </ul> |

| Survey              | Date                                                                                                                                              | Surveyor                                                        | Detail                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     |                                                                                                                                                   |                                                                 | off 30 minutes after dawn.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Great Crested Newts | May - 18/19, 21/22, 26/27, Jun - 02/03, 18/19/ & 25/26                                                                                            | John Poland<br>MIEEM CEnv and<br>Victoria Russell<br>MIEEM CEnv | <ul style="list-style-type: none"> <li>Seven ponds were identified within ca. 500m of the proposals. Pond locations are shown in Figure 3.2.</li> <li>Four survey visits were required to determine presence / absence. Two additional checks were undertaken where GCNs were found to determine population sizes.</li> <li>Three different techniques were employed during each visit including bottle trapping, torch-lighting and egg searches.</li> <li>Various GCN surveys were also carried out by Biodiversity by Design across the wider Berewood development site for the Environmental Statement and are currently being undertaken in relation to other components of the wider development; the results of these surveys have also been used to inform the present assessment.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Reptiles            | 15 <sup>th</sup> Jul, 5 <sup>th</sup> & 25 <sup>th</sup> Aug, 4 <sup>th</sup> , 16 <sup>th</sup> , 22 <sup>nd</sup> and 28 <sup>th</sup> Sep 2012 | John Poland<br>MIEEM CEnv and<br>Victoria Russell<br>MIEEM CEnv | <ul style="list-style-type: none"> <li>The original survey of the wider Berewood Site was strategic in nature (appropriate for outline planning) and so did not provide a detailed account (with respect to abundance and distribution) of the reptiles present in all components of the Berewood site. For this reason further detailed survey effort was undertaken in relation to the Phase 2 proposals.</li> <li>110 survey mats were positioned in May 2012 along boundary habitat (see Figure A3.4).</li> <li>These were given a few weeks to 'bed-in' and then were surveyed in appropriate weather conditions on seven separate occasions in keeping with best practice protocols.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Breeding Birds      | 14 <sup>th</sup> , 15 <sup>th</sup> , 19 <sup>th</sup> , 29 <sup>th</sup> and 30 <sup>th</sup> May 2012                                           | Dr Lincoln Garland<br>CEnv MIEEM                                | <ul style="list-style-type: none"> <li>Five morning visits were undertaken in keeping with standard EIA practice (Hill et al., 2005). All visits were carried out in May. Although one or two visits would ideally have been undertaken earlier in the spring, given: that the habitats of key interest - the woodlands - would not be directly affected by the proposals; a lot of existing information is already known about breeding birds in the Phase 2 area and also the wider site; and that the project should achieve a net gain for woodland birds (given the substantial area of new woodland that is to be created) and biodiversity in a broader sense, the level of survey effort was considered proportionate.</li> <li>The survey route, shown in Figure A3.5, was varied to ensure each particular area was surveyed at a different time during each visit.</li> <li>Each survey was also undertaken in one visit to minimise the risk of double counting.</li> <li>All birds seen/heard from the study area boundary, but which were outside of the study area, were also recorded.</li> <li>During each visit the location and behaviour (in particular song - whether territorial song, alarm/contact call) was recorded.</li> <li>Every effort was made to ensure that each individual was recorded only once, e.g. recording instances where two individuals were seen or heard singing simultaneously as this helps in the interpretation of clusters of records and so assisted in the definition of territory boundaries. At least two song registrations from separate visits are usually required to identify a cluster and hence a territory. However, as survey was being undertaken at the end of spring, and hence many birds had finished singing (or particular species were singing much less frequently), it was decided that where clusters of observations (in particular of family parties) and of birds making contact calls were noted for a particular species, a breeding record could be assigned for that location. This approach was taken primarily with respect to Great Tit, Blue Tit, Long Tailed Tit and Great Spotted Woodpecker, all of which typically sing (or drum in the case of Great Spotted Woodpecker) more frequently in early and mid spring.</li> </ul> |

[illegible]

**Figure A2.4** Reptile survey points & records



**Figure A2.5** Breeding-bird survey transects



**DOCUMENT CONTROL**

**JOB NAME:** BEREWOOD  
**CLIENT:** GRAINGER  
**REPORT TITLE:** BEREWOOD: PHASE 2 INFRASTRUCTURE BIODIVERSITY  
REPORT  
**STATUS:** FINAL

|                     |                    |                 |                                                                                       |
|---------------------|--------------------|-----------------|---------------------------------------------------------------------------------------|
| <b>PREPARED BY:</b> | <b>PRINT NAME</b>  | <b>POSITION</b> | <b>SIGNATURE</b>                                                                      |
|                     | Dr Lincoln Garland | Associate       |    |
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| <b>CHECKED BY:</b>  | <b>PRINT NAME</b>  | <b>POSITION</b> | <b>SIGNATURE</b>                                                                      |
|                     | Oliver Prudden     | Director        |   |
|                     |                    |                 |                                                                                       |
| <b>APPROVED BY:</b> | <b>PRINT NAME</b>  | <b>POSITION</b> | <b>SIGNATURE</b>                                                                      |
|                     | Oliver Prudden     | Director        |  |
|                     |                    |                 |                                                                                       |

**REVISIONS:**

| Rev No. | Comments                          | Date    |
|---------|-----------------------------------|---------|
| 0       | For Client Review and Approval    | 4-12-12 |
| 1       | Draft for local authority comment | 6-12-12 |
| 2       | Final                             | 27-2-13 |

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