

LINDHURST
MANSFIELD

APPENDIX 6.B METHODOLOGIES

1.0 SURVEY METHODOLOGIES

HABITATS

- 1.1 Habitats have been classified using the standard Extended Phase 1 Habitat Survey Methodology (JNCC 2003) during early June 2007 and June 2008. The recommended survey period for Phase 1 Habitat survey lies between May and October. It was considered that sufficient information was collected from the surveys to ensure correct classification of habitats overall. Target notes were recorded for habitats considered of greatest nature conservation interest. Species lists were compiled for representative habitats and compared/supplemented with lists made available through consultation.

Hedgerows

- 1.2 Hedgerows were surveyed initially using the Hedgerow Evaluation and Grading System (HEGS) (Clements and Toft 1993). This method of assessment includes noting down canopy species composition, associated ground flora and climbers, structure of the hedgerow including height, width and gaps, associated features including number and species of mature trees, banks, ditches and grass verges. Each hedgerow is given a grade using HEGS. These grades are used to assign a nature conservation value to each hedgerow as follows:

Grade 1 – High to Very High Value

Grade 2 – Moderately high to high value

Grade 3 – Moderate Value

Grade 4 – Low value

- 1.3 Hedgerows grades of 2 and above are specified as being of nature conservation priority.
- 1.4 The hedgerows were also assessed for their potential ecological value against statutory instrument No: 1160 – The Hedgerow Regulations 1997. This method of assessment has much in common with the HEGS methodology, however uses additional criteria to assess hedgerow importance including historical factors, canopy diversity (species per 100m), diversity of ground flora, including the representation of woodland indicator species. The survey information is then compared to the Hedgerow Regulations Wildlife and Landscape criteria for 'Important' hedgerows.
- 1.5 Any hedgerow which contains at least 80% native canopy species qualifies as a UK BAP priority habitat.

Veteran Trees

- 1.6 Survey methodology is based on the standard methodology as recommended by the Veteran Trees Initiative. Full details are presented at Appendix J.

FAUNA

Badgers

- 1.7 The survey methodology followed that of Harris, Cresswell & Jefferies, 1991 and involved a search for evidence of badger activity as follows:
- Latrines - often located close to setts, at territory boundaries or adjacent to favoured feeding areas
 - Tracks and pathways
 - Hairs caught on rough wood or fencing
 - Setts - including earth mounds, evidence of bedding and runways between setts
 - Other evidence (not necessarily conclusive in isolation) including feeding scrapes, and scratching posts.

Bats

- 1.8 Survey methods follow those recommended by the Bat Conservation Trust's Good Practice Guidelines (2007) and the JNCC's Bat worker's Manual (2003). The exterior and interior of buildings were visually assessed, and emergence and roost surveys undertaken where required. Trees were also visually assessed, and surveyed where required. Transect surveys were undertaken to evaluate use of the site by bats as a whole, and to identify any commuting or foraging corridors. Full details are presented in Appendix E.

Breeding Birds

- 1.9 The survey methodology employed was based on that of territory mapping (Bibby *et al* 1992) as used for the British Trust for Ornithology (BTO) Breeding Bird Survey (BBS). Full details are presented at Appendix 6F.

Crepuscular Birds - Nightjars

- 1.10 The survey was based on the standard methodology described in Gilbert *et al* (1998). Full details are presented at Appendix G.

Winter Birds

- 1.11 The survey methodology employed was broadly based on that as used for the British Trust for Ornithology (BTO) Common Bird Census (CBC). Full details are presented at Appendix H.

Great Crested Newts

- 1.12 Survey methods follow those recommended by Natural England as detailed in the Great Crested Newt Mitigation Guidelines (English Nature, 2001). All surveys were undertaken by FPCR ecologists with the appropriate experience and survey licences from Natural England and during the recommended period. Surveys were completed during the recommended survey period and during suitable weather conditions in 2008 and 2009.

- 1.13 To determine the presence or absence of great crested, four individual survey visits are required on all relevant ponds between mid-March to mid-June, with two of these visits falling mid April to mid-May. Surveys must be carried out in periods of suitable weather conditions (over 5°C night time temperature, little-no wind/rain). To confirm the presence / absence of great crested newts four different survey techniques (egg searching, sweep netting, bottle-trapping and torching) are available with three of these survey methods used on each survey occasion. If during these visits great crested newts are confirmed within a pond, a total of six surveys should be undertaken on the pond before mid-June to establish a population size class assessment. A population class assessment requires that only torching and bottle-trapping are used. No such assessment was required in this instance.

Reptiles

- 1.14 A strategic reptile presence/absence survey was undertaken site in specific locations identified during the Extended Phase 1 survey as providing potential habitat for reptiles. The survey was undertaken between May and July 2007 during suitable weather conditions. The survey was undertaken based on methodology detailed in the Herpetofauna Workers Manual (Gent and Gibson, 1998) and the Froglife Advice Sheet 10 - Reptile Survey (Froglife 1999). Methods involved a search for basking reptiles on/under strategically positioned artificial and naturally occurring refugia. These were positioned in locations that potentially offered the most suitable habitat for common reptiles, i.e. structurally diverse grassland habitats with areas of bare ground/short vegetation and wetland features.

Water Vole

- 1.15 Surveys were undertaken using the standard methodologies of Strachan *et al.* (1998, 2nd Edition 2007). This involved identification of evidence of activity including:

- Latrine sites – distinct piles of water vole droppings found near nest sites, at the ranges of territorial boundaries and where the animals enter and leave the water.
- Feeding stations – areas with distinct neat piles of chewed lengths of vegetation along pathways or haul out platforms along the water's edge.
- Burrows – burrow entrances are typically wider than they are high with a diameter between 4-8cm. Generally these burrow entrances are located at the water's edge.
- Lawns – short grazed areas at the entrances to burrows.
- Prints – identifiable prints in soft margins of the watercourse.
- Runways – low tunnels that are pushed through the vegetation and often leading to burrows or feeding stations.

Otter

1.16 The methodology followed that as detailed in the New Rivers and Wildlife Handbook (RSPB, NRA & RSNC, 1994). Due to the unlikely event of actual observation, the survey concentrated on locating field signs indicating otter presence or use. Such field signs include:

- Spraints – characteristic sweet-smelling, black tar-like (where fresh/relatively recent i.e. within a few weeks) or grey crumbly (when old) faecal deposits usually containing fish scales, bones and occasionally invertebrate exoskeleton and bird feathers.
- Footprints – In good substrates prints are typically asymmetrical and show five toes arched around a large pad and, depending on substrate, webbing and claw marks. Poorer, generally coarser substrates do not often enable the identification of otter footprints.

Additional signs of otter presence may occur, although without additional evidence is usually not conclusive proof of current otter presence:

- Feeding remains – Remains of fish etc.
- Slides/haul-outs – Routes into and out of the water, which are usually associated with terrestrial routes such as short cuts around meanders or along traditionally, used otter paths/routes.
- Couches/hovers – above ground resting place. Usually associated with cover such as dense scrub, rushes or reed, flood debris or fallen trees. Many couches are rarely used whilst other more so. Difficult to prove use without radio tracking.
- Holts – below ground resting site usually associated with sprainting. Sometimes used with greater frequency than couches and can be important for breeding (natal holts) where other signs are usually absent. Notoriously difficult to find or prove without radio tracking.

White Clawed Crayfish

Manual Searching

- 1.17 The survey method used followed the manual search described by Peay (2003), which involved selecting and searching five suitable refuge patches within the Foulevil Brook channel, from its confluence with Rainworth Lakes SSSI to Lindhurst cottages. Each of the five sections, which consisted of individual habitat features, such as large individual stones, tree roots and debris piles, was hand searched for the presence of white clawed crayfish.

Trapping

- 1.18 Trapping is used in watercourses/bodies which are too deep or turbid for manual searching. This method was approved by the Environment Agency and was carried out by licensed crayfish workers. Plastic mesh traps with funnel entrances were used and these were baited with scraps of fish. The traps were set one day and inspected and re-baited if necessary the following morning, the removed on the second following morning. A density of 1 trap per 5m of bank in favourable habitat is usually sufficient to detect crayfish, if carried out over several nights. However, even high density populations will not be recorded during periods of low activity, such as winter, during high flows (spate), or when a lot of crayfish are undergoing moulting.

Water Quality

- 1.19 The water quality of the ponds adjacent to the Rainworth Lakes SSSI was monitored using the Biological Methods Working Party (BMWP) methodology, which is a biotic index. Kick sampling is performed for a set period of time (usually 3 minutes), and the families of the invertebrates found are compared to the BMWP scoring table. The total score then allows for an evaluation of water quality from the point of view of organic pollution – a high score is good, a low score is bad. (Hill et al, 2005). Average Score Per Taxon (ASPT) can be calculated from the BMWP scores, and this allows for a more effective comparison between data collected at different times by different surveyors, as it greatly reduce the influence of surveyor effort on the results.
- 1.20 Laboratory (Chemical) analysis of the water was also undertaken to ascertain levels of metals, total petroleum hydrocarbons, total dissolved solids, phosphate, biological and chemical oxygen demand, nitrate nitrogen and total organic carbon in the water at 4 points. These were in Foulevil Brook and in each of the three lakes of the Rainworth Lakes series, west of Blidworth Lane. This data is to act as a baseline for comparisons to be made during and post construction.

2.0 Approaches to Assessment

Nature Conservation Assessment

2.1 Each habitat type has been graded into one of five categories according to the perceived nature conservation value and the presence of any features protected under statute or local policy guidance. An assessment of the nature conservation value of the site was made following the criteria outlined within the Guidelines for Ecological Impact Assessment produced by the Institute of Ecology and Environmental Management (IEEM, 2006). The grading system applied assigns importance within a geographic frame of reference. However, in the case of evaluating the importance of individual species population’s consideration is also given to its distribution and status of the species and to nationally and regionally published guidelines or criteria.

Evaluation of Nature Conservation Importance

Level of Value	Examples
International	<ul style="list-style-type: none"> • An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC , Ramsar site, Biogenetic Reserve) or an area which meets the published selection criteria for such designation, irrespective of whether or not it has yet been notified. • A viable area of a habitat type listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of a larger whole. • Any regularly occurring population of an internationally important species, which is threatened or rare in the UK (i.e. it is a UK Red Data Book species or listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP)) or of uncertain conservation status or of global conservation concern in the UK BAP. • A regularly occurring, nationally significant population/number of any internationally important species.

Level of Value	Examples
National	<ul style="list-style-type: none"> • A nationally designated site (SSSI, NNR, Marine Nature Reserve) or a discrete area, which meets the published selection criteria for national designation (e.g. SSSI selection guidelines) irrespective of whether or not it has yet been notified. • A viable area of a priority habitat identified in the UK BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole. • Any regularly occurring population of a nationally important species which is threatened or rare in the region or county (local BAP). • A regularly occurring, regionally or county significant population/number of any nationally important species. • A feature identified as of critical importance in the UK BAP.
Regional	<ul style="list-style-type: none"> • Viable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole. • Viable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile. • Any regularly occurring, locally significant population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation. • A regularly occurring, locally significant number of a regionally important species. • Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur.

Level of Value	Examples
County / Metropolitan	<ul style="list-style-type: none"> • Semi-natural ancient woodland greater than 0.25 ha. • County/Metropolitan sites and other sites which the designating authority has determined meet the published ecological selection criteria for designation, including Local Nature Reserves selected on County / metropolitan ecological criteria (County/Metropolitan sites will often have been identified in local plans). • A viable area of habitat identified in County BAP. • Any regularly occurring, locally significant population of a species which is listed in a County/Metropolitan “red data book” or BAP on account of its regional rarity or localisation. • A regularly occurring, locally significant number of a County/Metropolitan important species.
District / Borough	<ul style="list-style-type: none"> • Semi-natural ancient woodland smaller than 0.25 ha. • Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile. • District sites that meet the published ecological selection criteria for designation, including Local Nature Reserves selected on District/ Borough ecological criteria (District sites, where they exist, will often have been identified in local plans). • Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource. • A diverse and/ or ecologically valuable hedgerow network. • A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation. • A regularly occurring, locally significant number of a District / Borough important species during a critical phase of its life cycle.
Local/Parish	<ul style="list-style-type: none"> • Areas of habitat considered to appreciably enrich the habitat resource within the context of the Parish or neighbourhood (e.g. species-rich hedgerows). • Local Nature Reserves selected on Parish ecological criteria.
Site	<ul style="list-style-type: none"> • Receptor is of value within the immediate context only

Assessment of Effects

Prediction and Characterisation of Ecological Impacts:

- 2.2 Impacts have been assessed in terms of their magnitude, extent, duration, reversibility, timing and frequency, confidence in predictions and whether they are positive or negative. The detail provided below is taken from IEEM EcIA Guidelines 2006.

Confidence in Predictions:

- 2.3 This assesses the likelihood that a change/activity will occur as predicted and also the degree of confidence in the assessment of the impact on ecological structure and function. The following confidence levels have been used:
- Certain (near-certain): probability estimated at 95% chance or higher
 - Probable: probability estimated above 50% but below 95%
 - Unlikely: probability estimated above 5% but less than 50%
 - Extremely unlikely: probability estimated at less than 5%

Positive or Negative:

- 2.4 Will the impact lead to positive or negative changes?

Magnitude:

- 2.5 What is size/amount of the impact, determined on a quantitative basis where possible, such as the total loss of an area of grassland or 50% loss of hedgerows.

Extent:

- 2.6 The extent is the area over which the impact occurs. In some instances magnitude and extent will be synonymous.

Duration:

- 2.7 The time for which the impact is expected to last considered with reference to the timeframe significant to the species/habitats being considered.

Reversibility:

- 2.8 An irreversible (permanent) impact is one from which recovery is not possible within a reasonable timescale and for which there is no reasonable chance of action being taken to reverse it. A reversible (temporary) impact is one for which spontaneous recovery is possible and for which effective mitigation is both possible and an enforceable commitment has been made.

Timing and Frequency:

- 2.9 Changes are considered in terms of timing. Impacts may be licensed/only occur if they coincide with critical life stages or seasons such as the bird breeding season.
- 2.10 The frequency should also be considered, for example, impacts may be much greater if the activity happens on more than one occasion.

Ecological Significance:

- 2.11 Significance can be positive or negative. An ecologically significant impact is defined as an impact (negative or positive) or the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.
- 2.12 Integrity is taken to be the coherence of ecological structure and function, across its whole area that enables it to sustain the habitats and/or the levels of populations of the species present.
- 2.13 Conservation status is taken to be:
- For habitats conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area, and
 - For species, a conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its population within a geographical area.
- 2.14 The value of any feature that will be significantly affected is that used to identify the geographical scale at which the impact is significant. The value relates directly to the consequences in terms of legislation, policy and/or development control at the appropriate level.

Statement of Effects

- 2.15 These have been assessed taking into account the proposed mitigation, compensation and enhancement. The significance is assessed as referred to above following implementation of mitigation.