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## Executive Summary

1. TEP was commissioned by the Welsh Assembly Government to undertake an ecological assessment of a site off A5104 in North Wales. The purpose is to report on ecological constraints and opportunities that influence the local plan in terms of future development of the site.
2. A number of surveys were undertaken during 2018, including phase 1 habitat survey, desktop assessment, hedgerow assessment, national vegetation classification (NVC) of woodlands on site, arboricultural survey, great crested newt survey, daytime and nocturnal activity bats surveys, breeding bird survey, water vole survey and otter, badger, reptile and invertebrate assessment.
3. Japanese knotweed and rhododendron are present on site. It is an offence to allow these species to spread, therefore an invasive species management plan detailing removal and control methods will be required.
4. English bluebell are present on site. If future development works impact upon bluebell then they will require translocation to other areas of the site. The translocation will involve digging up the bluebell in turves during the winter period and translocating them to a retained area of woodland on site.
5. A detailed woodland NVC survey was conducted in May 2018 and detailed results are reported at Appendix C. The survey found that although some areas were particularly diverse, the match to recognised NVC communities was low.
6. Where possible, detailed design should seek to retain all native hedgerows in the final design. Mitigation measures should be implemented to protect retained hedgerows within and adjacent to the Site from construction activities, including dust, airborne debris and run-off.
7. Where hedgerow retention is not possible, priority for retention should be placed upon the important and species-rich hedgerows, and on hedgerows which provide an important connectivity function. Where hedgerow loss cannot be avoided, losses should be mitigated or compensated for through new hedge planting. New planting and gap-planting of hedgerows could also be implemented to further enhance ecological networks within both the site and local landscape and to deliver net biodiversity gain, both in terms of habitat quantity and ecological function.
8. All new hedgerows should be planted with a diverse (species-rich) native mix to mitigate and improve this habitat resource within the local area.
9. Prior to development, an Arboricultural Impact Assessment (AIA) will be required in support of a reserved matters/detailed application. This will identify, evaluate and possibly mitigate the impacts of developing land on the existing tree resource.
10. If it is necessary to fell any trees (or remove any limbs of trees) assessed as having low potential for roosting bats during future development, these will need to be section felled under supervision of a licensed bat ecologist. Trees with moderate or high bat potential will require two and three nocturnal surveys respectively to establish if bats

- are using the trees. If bats are found to be roosting then a licence from Natural Resources Wales will be required to permit felling of the tree(s).
11. Common pipistrelle, soprano pipistrelle, brown long-eared bat, Myotis species, noctule and lesser horseshoe are present on site. Once future development proposals are known, more detailed activity surveys will be required to assess potential impacts upon bat populations on site.
  12. Measures will need to be taken during future development to prevent light spill on sensitive habitats such as hedgerows, tree lines and woodland edge habitat. Woodland, hedgerows and trees lines should ideally be retained within any new development. Where this is not possible, new planting with species that are native and locally sourced should be undertaken.
  13. No great crested newts were found on site during eDNA surveys of the one water body. Great crested newts are not known to be present in the wider locality. Great crested newt surveys are valid for at least 2 years and potentially 4 years or more depending on the specific use of the data, local conditions and the potential impact predicted on GCN. When data is greater than 2 years old, advice should be sought from an appropriately experienced ecologist as to the validity of the survey.
  14. Schedule 1 bird species hobby are present on site. Prior to any works being undertaken during the hobby breeding season (April to August), a walkover survey should be carried out by an experienced ornithologist to determine if hobby are nesting at the site. If no nests are identified by mid-June it can be assumed that nesting has not taken place at the site. If hobby are found to be nesting then measures will need to be taken during the construction period of any future works to avoid disturbing this species, such as appropriate stand-off around nest sites.
  15. A nest box scheme for birds including hobby is to be provided across the site. Vegetation clearance works are to be undertaken outside of the bird nesting season (March to August) or vegetation removal supervised by an ecologist.
  16. The waterbodies on site are unsuitable to support water vole or otter and there are no implications for future development of the site regarding water vole and otter.
  17. There are two badger setts on site, one within a block of woodland in the north of the site and one within the band of woodland in the south of the site. There will be implications for badgers and future development within 30m of badger setts.
  18. A single slow worm was recorded on site during reptile surveys in 2018. Measures will need to be undertaken to prevent death or injury to reptiles during any future site clearance works.
  19. The site was assessed as not being important for invertebrates. However enhancement measures will be undertaken within any future development to meet requirement of local planning policies GEN1, WB1, WB5 and WB6 of the Flintshire Unitary Development Plan adopted 28th September 2011 and NPPF, paragraph 118.
  20. A number of enhancement measures are recommended, including protection of hedgerows and woodland, management works to waterbodies and woodland on site, wildflower corridor planting, a bat and bird box scheme and reptile habitat creation.



## 1.0 INTRODUCTION

- 1.1 TEP was commissioned by the Welsh Assembly Government to undertake an ecological assessment of a site off A5104 in North Wales. The purpose is to report on ecological constraints and opportunities that influence the local plan in terms of future development of the site.
- 1.2 This assessment is to accompany an outline planning application and conforms with CIEEM guidance on Ecological Impact Assessment (EclA). The approach in terms of methodology and types of survey within this report have been undertaken after consultation with Natural Resources Wales and Flintshire County Council.
- 1.3 The report has the following objectives:
  - Give an overview of habitats present on site and describe existing vegetation;
  - Identify features of conservation value, such as species or habitats which are legally protected or of biodiversity importance; and
  - Advise on recommendations for mitigation and management strategies including an indication of what licences and method statements are likely to be needed. Provision of evidence to support the allocation of the site, indicating how biodiversity enhancement can be built into the scheme in accordance with the Environment (Wales) Act and the Well Being of Future Generations (Wales) Act.
  - The report will also consider Habitat Regulations both in terms of designated sites and species and advise on the likelihood of significant effect and potential mitigation requirements.
- 1.4 The location of the application site is shown in Figure 1, and the approximate central grid reference is SJ 32475 62539.

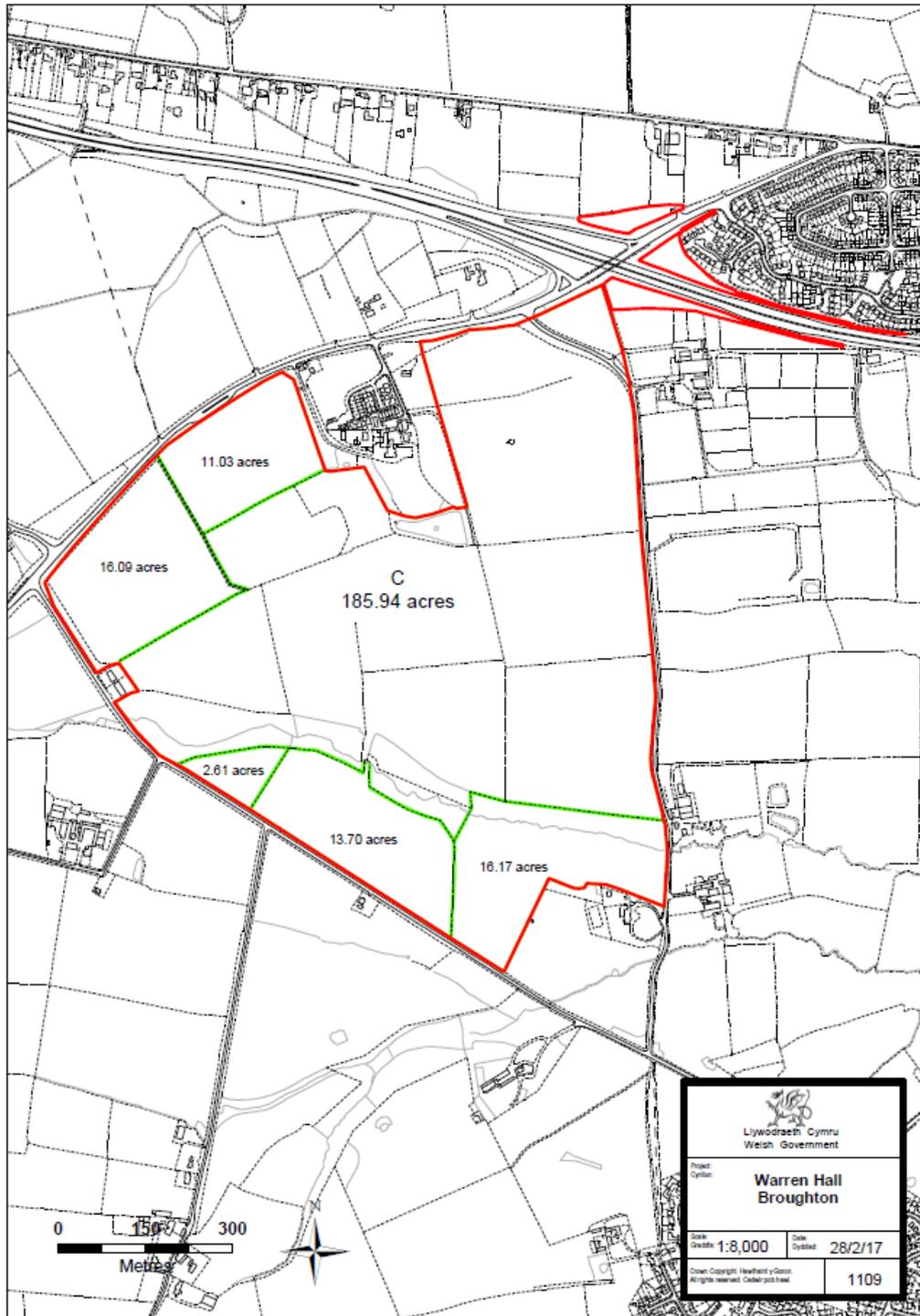


Figure 1. Site Location. Contains Ordnance Survey data © Crown copyright and database right 2019

## 2.0 METHODS

### Desk Study

- 2.1 A desk study was undertaken by reviewing online sources and records obtained from the local record centre (Table 1). A data search of 1km was generally applied within the desktop study, with an additional buffer of 10km applied to international/national designated sites. The desk study is reported at Appendix A.

*Table 1. Ecological Information and Consultations*

SOURCE	NATURE OF INFORMATION
MAGIC Map: Multi-Agency Geographic Information for the Countryside	Maps showing legally protected areas, designated sites and priority habitats
Where's the Path?	Satellite & OS imagery
Google Maps	Satellite imagery
COFNOD	Designated sites and protected species records
Flintshire Unitary Development Plan (adopted 28th September 2011)	Local plan information

### Extended Phase 1 Habitat Survey

#### Habitat survey

- 2.2 An Extended Phase 1 habitat survey was undertaken by Ecologist Clare Gower (BSBI Field Identification Skills (FISC) Level 4) on 11th May 2018. The survey was carried out using the assessment methods set out in JNCC (2010) and the Guidelines for Preliminary Ecological Appraisal (CIEEM, 2018). Habitat types and any incidental evidence of protected or invasive species were noted.
- 2.3 The Phase 1 Habitat Survey is illustrated at Drawing G7016.001 and target notes are presented at Appendix B.

#### National Vegetation Classification (NVC) Survey

- 2.4 The woodland NVC survey was undertaken by Principal Ecologist Lee Greenhough (BSBI Field Identification Skills (FISC) Level 4) on 1st June 2018. Each target area was walked-over and an initial provisional assessment made of the boundaries of different vegetation types (as defined by the NVC system (Rodwell, 1991-2000).

- 2.5 Within each boundary, the vegetation was sampled using quadrats according to JNCC National Vegetation Classification Field Guide to Woodland (4m x 4m quadrats for woodland ground flora and understorey). Each quadrat was recorded in the field by listing all plants within it, along with the abundance of each species and the percentage cover of any bare ground or leaf litter. Sufficient quadrats were recorded so as to include all community types occurring on the site and to allow a robust statistical analysis of the data.
- 2.6 A search was also made for any nationally or locally notable plant species (protected species or those listed in UK or local BAPs). The quadrat data was analysed using TABLEFIT to identify the relevant NVC vegetation community/ies present onsite. Any other habitats of potential biodiversity interest was also noted.
- 2.7 The NVC survey is reported at Appendix C.

#### Hedgerow Assessment

- 2.8 A hedgerow assessment was undertaken by Principal Ecologist Lee Greenhough (BSBI Field Identification Skills (FISC) Level 4) in order to determine whether the hedgerows within the site qualify as 'Important' under the Hedgerow Regulations Act. The survey also determined any important ground flora that may require translocation/re-instatement.
- 2.9 The native hedgerows on site were subject to a detailed sampling survey in accordance with the criteria set out in the Hedgerow Regulations (1997) in terms of wildlife and landscape criteria for determining "important" hedgerows. This entailed recording the number of woody species (as listed on Schedule 3 of the Hedgerow Regulations) within 30m sample sections as well as any features within 2m associated with each hedge. These features include the presence of any bank or wall, ditch, standard trees and ground flora species (as listed on Schedule 2 of the Hedgerow Regulations). Also, the number of connections with adjacent hedgerows was recorded. Hedgerow target notes were made on standard data recording forms for each hedgerow, including a description of the hedge and detailed plant species list. The hedgerow survey is reported at Appendix C.

#### **Arboricultural Survey**

- 2.10 An arboricultural assessment of the site was undertaken by arboriculturalist Heather Elibeck on the 11th and 12th June 2018. The survey was carried out by means of inspection from ground level and trees were assessed in accordance with BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations. The arboricultural survey findings is provided at Appendix D.

#### Protected Species

- 2.11 During the habitat survey, the site was assessed for its potential to support protected species, including amphibians, bats, badger, water vole and otter, reptiles, breeding birds and invertebrates. These are discussed below.

## Bat Assessment of Trees and structures

- 2.12 A daytime scoping assessment for bats was undertaken on 10th September 2018 by Ecologist Dale Mortiboys in accordance with the 2016 Bat Conservation Trust (BCT) guidance (Collins, 2016).
- 2.13 A single concrete pumping station structure was within the north of the site. The trees within the red line boundary were inspected for any evidence of use by bats and classified according to the suitability for roosting bats in line with the criteria set out at Table 2. The surrounding habitat was also assessed for its potential to support foraging and commuting bats.

Table 2. Categorisation of tree roost suitability (from Table 4.1 of BCT Guidelines 2016)

Roosting Habitats	Commuting/ Foraging Habitats
<b>Negligible Suitability</b>	
Negligible potential roost features are present that are likely to be used by bats	Negligible features on site likely to be used by commuting or foraging bats. A general lack of linear features and low habitat, structural or floristic diversity.
<b>Low Suitability</b>	
A structure or tree with one or more potential roost features that could be used by individual bats opportunistically, but which do not offer sufficient space, shelter, protection, appropriate conditions and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats.	Habitat that could be used by small numbers of commuting bats (e.g. a gappy hedgerow or an un-vegetated stream) or foraging bats (e.g. a lone tree or small patch of scrub) but which is isolated from the surrounding countryside.
<b>Moderate Suitability</b>	
A structure or tree with one or more potential roost features that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat, but which is unlikely to support a roost of high conservation status (maternity or hibernation).	Continuous habitat connected to the wider landscape that could be used by bats for commuting (e.g. lines of trees or scrub or linked back gardens), or foraging bats (e.g. trees, scrub, water, grassland).
<b>High Suitability</b>	
A structure or tree possessing one or more potential roost features that are suitable for use by larger numbers of bats on a regular basis and potentially for longer periods of time, due to their size, shelter, protection, conditions and surrounding habitat.	Continuous high quality habitat that is strongly connected with the wider landscape that is likely to be used regularly by commuting bats (e.g. river valley, vegetated stream, woodland edge, hedgerows with trees) or foraging bats (e.g. broadleaved woodland, grazed parkland, tree-lined watercourses or ponds).

### **Bat Activity Surveys**

- 2.14 Bat transect and static detector surveys were conducted on 21st May, 16th July and 10th September 2018. The site was covered by one transect route (Drawing G7016.009). The transect route was devised to cover the whole working area, incorporating a variety of habitats suitable for bat foraging, commuting and dispersal.
- 2.15 The surveys were led by licensed bat ecologist John Crowder (S085437/1). A pair of surveyors walked the route using heterodyne (Pettersson D230) and frequency division (Anabat) detectors. The surveys commenced before sunset and continued for at least 120 minutes after sunset. Number of bat passes, species, and behaviour and flight direction were noted at each pre-determined four-minute stop and the intervening walks.
- 2.16 The static detector locations are shown in Drawing G7016.009. These locations were chosen as the features monitored (e.g. woodland edge and hedgerow) are considered valuable foraging/commuting habitat for bats and are likely to be impacted by the proposals.
- 2.17 The statics were left for a minimum of five nights during favourable weather conditions to monitor bat activity in accordance with the Bat Conservation Trust (BCT) Guidance (Collins, 2016). The bat surveys are reported on at Appendix E.

### **Great Crested Newts (GCN) and other Amphibians**

- 2.18 There is one pond within the site and six ponds within 250m of the site. Two of the off-site ponds were found to be dry at the time of survey. The on-site pond (pond 7) was subject to eDNA survey and Habitat Suitability Index (HSI) on the 20th June 2018 by Ecologist Clare Gower. Two off-site ponds were dry and two were inaccessible being in third party land and access was not allowed by landowner. Two further off-site ponds were subject to HSI, although both were unsuitable for eDNA. The great crested newt surveys are reported on at Appendix F.

### **Breeding Bird Survey**

- 2.19 Breeding bird surveys were undertaken on 11th May, 1st June and 27th June 2018. The surveys were led by Principal Ecologist Mike Walker. The survey was carried out applying methods based on the standard breeding bird survey and common bird census methods developed by the British Trust for Ornithology (BTO).
- 2.20 Three survey visits were carried out in the morning period, starting at least half an hour after dawn. Each survey visit was carried out approximately 4 weeks apart, over the period May to June. Bird species and activity patterns were recorded and mapped using standard BTO symbology. The three survey visits were undertaken using pre-determined transect survey routes to cover the entire site and land within 100m of the site. The breeding bird surveys are reported on at Appendix G.

### **Water Vole and Otter Surveys**

- 2.21 The Water Vole Mitigation Handbook (Dean et al, 2016), recommends that two survey visits be undertaken over a season, to support planning applications or to inform construction activities.
- 2.22 A water vole survey of the on-site pond (pond 7) was undertaken on the 23rd May 2018 by Principal Ecologist Kim Gallaher. The watercourse in the south of the site was subject to a water vole survey by Principal Ecologist Lee Greenhough on 1st June 2018. During the water vole surveys surveyors also inspected for signs of otter e.g, spraints, holts, footprints and feeding remains. Both the waterbody and watercourse were found to be unsuitable to support water vole or otter and a second survey was therefore not undertaken. The water vole and otter surveys are reported on at Appendix H.

### **Badger Surveys**

- 2.23 During the Phase 1 habitat survey on 11th May 2018, Ecologist Clare Gower undertook a badger survey across the site. During the survey, signs for badger such as setts, latrines, snuffle holes, dung pits and footprints were searched for. The badger surveys are reported on at Appendix I.

### **Reptile Surveys**

- 2.24 Reptile surveys were carried out on site during 2018 by Ecologist Dale Mortiboys. Seven survey visits were conducted between 7th and 27th September. Reptile surveys were undertaken in sunny or partially cloudy conditions with temperatures between 10 and 20°C.
- 2.25 Eight visits were undertaken, the first to set up the ACO's (Artificial Cover Objects) and allow these to bed in for a week prior to the first of seven survey visits being carried out. The ACO's were a mix of corrugated metal sheets and roofing felt approximately 0.5m x 0.5m. Reptile tin locations are illustrated at Drawing 7016.010. The reptile surveys are reported on at Appendix J.

### **Invertebrate Assessment**

- 2.26 An invertebrate assessment of the site was undertaken on the 4th June 2018. Ecologist Andy Jukes assessed the site for suitability to support a number of different invertebrate species in terms of the habitats present on site. The invertebrate survey is reported on at Appendix K.

## 3.0 RESULTS

### Desk Study

- 3.1 A summary of the desk study is outlined below. Full results, including maps of designated sites can be found in Appendix A.

#### Designated Sites

- 3.2 There are no statutory designated sites within 1km of the application site, however seven national and internationally designated sites are located within 10km.
- 3.3 The site lies is located within the Impact Risk Zone for River Dee SSSI and Inner Marsh Farm SSSI which are located approximately 6.3km north east and 10.1 km north of the site respectively.
- 3.4 The Dee Estuary Ramsar is 8.6km north west of the site. The Dee Estuary SPA is 8.5km north west of the site. The Dee Estuary SAC is 10km north west of the site.
- 3.5 The Dee Estuary and Bala Lake SAC is 6.1km east of the site.
- 3.6 The Midlands Mere and Mosses Ramsar is 8.4km south east of the site.
- 3.7 There are four locally designated sites within 1km of the application site, which are:
- Fish Pond Wood Local Wildlife Site (LWS), located 637m north of the site boundary.
  - Bilberry Wood Local Wildlife Site (LWS), located 526m north of the site;
  - Warred Dingle Local Wildlife Site (LWS), located adjacent to the west of the site; and
  - The Covert and the Rookery Local Wildlife Site (LWS), located adjacent to the south west boundary of the site.

#### Relevant Planning Policies and Guidance

- 3.8 Half of the application site is allocated for employment allocations (EM1/2). Some areas are allocated for minerals safeguarding (MIN8) and the rest of the site is unallocated under the Flintshire Unitary Development Plan (adopted 28th September 2011). Relevant planning policies are considered to be:
- GEN1 (General Requirements for Development);
  - WB1 (Species Protection);
  - WB5 (Undesignated Wildlife Habitats);
  - WB6 (Enhancement of Nature Conservation Interests).

#### Notable Species Records

- 3.9 There are numerous records of notable species within 1km of the site, which are described under the subheadings below. The records are summarised below and are from the last 10 years only. For a full list of records see Appendix A. Species include those listed under any of the following:
- European Protected Species (EPS);

- Schedule 5 of the Wildlife and Countryside Act 1981, as amended (WCA5);
- Species of principal importance under Section 7 of the Environment Wales Act 2016
- Local Biodiversity Action Plan (LBAP); and
- Red and Amber listed Birds of Conservation Concern (BoCC) (BRd/BAm).

#### *Amphibians*

- 3.10 There are records of great crested newt *Triturus cristatus*, common frog *Rana temporaria*, palmate newt *Lissotriton helveticus* and smooth newt *Lissotriton vulgaris* within 1km of the site. There are no records for GCN on site or within 250m of the site boundary. There are no records for GCN from adjoining planning applications.

#### *Birds*

- 3.11 There are a number of Section 7 and Schedule 1 (WCA, 1981) bird species and Birds of Conservation Concern located within 1km of the site. These include:

- Barn owl *Tyto alba*;
- Black-headed gull *Chroicocephalus ridibundus*;
- Bullfinch *Pyrrhula pyrrhula*;
- Common gull *Larus canus*;
- Curlew *Numenius arquata*;
- Dunnock *Prunella modularis*;
- Grey partridge *Perdix perdix*;
- House martin *Delichon urbicum*;
- House sparrow *Passer domesticus*;
- Kestrel *Falco tinnunculus*;
- Lapwing *Vanellus vanellus*;
- Lesser black-backed gull *Larus fuscus*;
- Lesser spotted woodpecker *Dendrocopos minor*;
- Linnet *Linaria cannabina*;
- Mallard *Anas platyrhynchos*;
- Meadow pipit *Anthus pratensis*;
- Red kite *Milvus milvus*;
- Redwing *Turdus iliacus*;
- Reed bunting *Emberiza schoeniclus*;
- Skylark *Alauda arvensis*;
- Song thrush *Turdus philomelos*;
- Starling *Sturnus vulgaris*;
- Swift *Apus apus*;
- Tree sparrow *Passer montanus*;
- Woodcock *Scolopax rusticola*;
- Yellowhammer *Emberiza citrinella*.

#### *Terrestrial Mammals*

- 3.12 There are several records of the following mammals within 1km of the application site:

- Otter *Lutra lutra* (S7, WCA5 & EPS);

- Hare *Lepus lepus* (S7)
- Badger *Meles meles* (PBA)
- Unknown bat species;
- Common pipistrelle *Pipistrellus pipistrellus* (S7, WCA5 & EPS);
- Noctule *Nyctalus noctula* (S7, WCA5 & EPS);
- Brown long eared bat *Pletocus auritus* (S7, WCA5 & EPS);
- Hedgehog *Erinaceus europaeus* (S7);

3.13 As several species of bats were recorded within 1km, it is likely that these species are roosting within this radius. The application site lies within the Core Sustainance Zones (CSZ) for these bat species. A CSZ is defined as "the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost" (Collins, 2016).

### **Extended Phase 1 Habitat Survey**

3.14 The site is located in close proximity to the town of Broughton, Flintshire. The site is surrounded on all sides by farmland. Brief descriptions of the key species and relative importance of the habitats on site are set out below and illustrated in Drawing G7016.001.

#### Habitats and Flora

3.15 The following habitats are present within or immediately adjoining the site:

- Plantation broadleaved woodland;
- Plantation mixed woodland;
- Scattered broad leaved trees;
- Native species-rich intact hedge;
- Species-poor intact hedge;
- Scattered scrub;
- Dense/continuous scrub;
- Semi-improved neutral grassland;
- Poor semi-improved grassland;
- Marshy grassland;
- Tall ruderal herb;
- Standing water;
- Running water;
- Fences;
- Earth bund;
- Bare ground;
- Hardstanding; and
- Buildings.

#### *Plantation broadleaved woodland*

- 3.16 There are a number of areas of plantation broadleaved woodland across the site. A large area of plantation woodland is within the south of the site and has a watercourse passing through the centre of it. Tree species include ash *Fraxinus excelsior*, Pine species *Pinus* sp., English oak *Quercus robur*, holly *Ilex aquifolium* and sycamore *Acer pseudoplatanus*. Lesser celandine *Ficaria verna*, English bluebell *Hyacinthoides non-scripta* and bramble *Rubus fruticosus* are frequent within the ground flora. Creeping buttercup *Ranunculus repens*, hartstongue fern *Asplenium scolopendrium* and hard rush *Juncus inflexus* occasionally occur (Target Note T7 Appendix B).
- 3.17 A detailed woodland NVC survey was conducted in May 2018 and detailed results are reported at Appendix C. The survey found that although some areas were particularly diverse, the match to recognised NVC communities was low.

#### *Plantation mixed woodland*

- 3.18 A block of plantation mixed woodland is within the north of the site. Tree species include goat willow *Salix caprea*, sycamore *Acer pseudoplatanus*, larch *Larix decidua*, wych elm *Ulmus glabra*, Scots pine *Pinus sylvestris* and English oak. The flora underneath this area is very limited and has been heavily poached by cattle Target Note T5 Appendix B.
- 3.19 A detailed woodland NVC survey was conducted in May 2018 and detailed results are reported at Appendix C. The survey found that although some areas were particularly diverse, the match to recognised NVC communities was low.

#### *Scattered broadleaved trees*

- 3.20 A number of broadleaved scattered trees are present across the site and are mainly associated with hedgerows and boundaries of the site. Tree species include English oak, ash *Fraxinus excelsior*, sycamore, Scots pine, beech *Fagus sylvatica*, red horse chestnut *Aesculus x carnea* and crack willow *Salix fragilis*. A full species list is provided within the arboriculture constraints report at Appendix D.

#### *Hedgerows*

- 3.21 A number of native species rich and species poor hedgerows are present across the site. The hedgerows form field boundaries within the site and boundaries around the wider site. Details of these hedgerows including full species lists and hedgerow status is provided at Appendix C.

#### *Scrub*

- 3.22 A small area of scattered scrub is within the block of plantation mixed woodland in the north of the site. The scrub borders an area of tall ruderal. A further area of scattered scrub is associated with scattered trees that border the watercourse in the south east of the site. An area of scattered scrub is associated with an area of semi-improved neutral grassland in the north east of the site. An area of dense scrub is associated with the watercourse in the south east of the site.

#### *Semi-improved neutral grassland*

- 3.23 An area of semi-improved neutral grassland is within the north east of the site. The grassland contains areas of scattered scrub and an area of tall ruderal. A road bisects the grassland. Yorkshire fog *Holcus lanatus* is the dominant species with common mouse ear *Cerastium fontanum* and hawthorn *Crataegus monogyna* abundant and cow parsley and knapweed frequently occurring (Target Note T1 Appendix B).

#### *Poor semi-improved grassland*

- 3.24 The majority of the site is poor semi-improved grassland that is heavily grazed by sheep and cattle. A small flooded area (Target Note T4 Appendix K) was observed in May 2018, however this area dried out during the course of the summer months in 2018. Two earth bunds, the result of farming activities, are within the western part of the site.

#### *Marshy grassland*

- 3.25 There are two areas of marshy grassland within the north of the site. The largest area is east of pond 7. Another area of marshy grassland is associated with the watercourse in the south east of the site.

#### *Tall ruderal*

- 3.26 There are two areas of tall ruderal on site. The first area of tall ruderal is in the north east of the site and is within an area of semi-improved neutral grassland. The second area of tall ruderal is within a block of plantation mixed woodland in the north west of the site.

#### *Standing water*

- 3.27 A waterbody (pond 7) is within the north west part of the site. The waterbody was created as a facility for boating. An island is in the centre of the waterbody. The waterbody is surrounded by woodland on all sides.

#### *Running water*

- 3.28 A watercourse is within a band of plantation woodland in the south of the site. The watercourse has shallow banks and contains a lot of leaf litter.

#### *Bare Ground*

- 3.29 A large area of bare ground is present within poor semi-improved grassland in the north west part of the site.

#### *Buildings*

- 3.30 A small brick structure (a water pump house) is within the north part of the site.

### Protected and Non-native Invasive Plants

- 3.31 Native bluebell *Hyacinthoides non-scripta* was noted in the block of mixed plantation woodland in the north of the site and within the block of plantation woodland that borders the stream in the south of the site. No other protected (Schedule 8 of the Wildlife and Countryside Act 1981, as amended) plant species were noted during the survey.
- 3.32 A stand of Japanese knotweed *Fallopia japonica* is within the western part of the plantation woodland that surrounds pond 7 in the north of the site.
- 3.33 Rhododendron *Rhododendron ponticum* is within the understorey of the plantation woodland that surrounds pond 7 in the north of the site. This rhododendron is also a non-native species listed on Schedule 9 of the Wildlife and Countryside Act.

### **Arboricultural Survey**

- 3.34 A set of Tree Constraints Plans (Ref: D7016.001-007) has been produced detailing the existing tree stock in accordance with BS5837. Trees across this site generally form larger woodland blocks or plantation groups with good species diversity. Towards the centre and southern sections of the site, a larger proportion of mature hedgerow trees are present. The arboricultural survey data is at Appendix D.

### **Bat Assessment**

- 3.35 The bat survey results are reported in full at Appendix E. A single concrete structure is within the north of the site. The structure is a small pumping station with an open top and does not have any features suitable to support roosting bats. There are 38 trees on site that have potential for roosting bats. Twelve trees were classified as low potential, fourteen trees as moderate potential and twelve trees as high potential (Bat Conservation Trust Guidelines 2016).
- 3.36 The site contains foraging and commuting habitat suitable for use by the local populations of bats within their CSZ, in particular the blocks of woodland, hedgerows, pond and watercourse. The activity transects and static surveys revealed at least five confirmed species of bat across the site;
- Common pipistrelle *Pipistrellus pipistrellus*;
  - Soprano pipistrelle *Pipistrellus pygmaeus*;
  - Brown long-eared bat *Plecotus auritus*;
  - Unidentified Pipistrelle species;
  - Noctule bat *Nyctalus noctula*;
  - Big bat species;
  - Unidentified Myotis species;
  - Lesser horseshoe bat *Rhinolophus hipposiderous*.
- 3.37 Bat activity was focussed around the woodland edge habitats and hedgerows.
- 3.38 Twelve data records for multiple species (including roosts) have been returned within 1km of the Warren Hall site.

## **Amphibians**

- 3.39 The amphibian results are reported in full at Appendix F. There is one pond on site and eDNA survey revealed that this does not currently support great crested newts. The other waterbody -a flowing watercourse in the south of the site, is unsuitable to support great crested newts due to flowing water. There are six ponds off site but within 250m of the site. Two of these ponds were dry during the summer 2018 and unsuitable to support breeding amphibians. A further two ponds were unsuitable to undertake eDNA survey on and a further two ponds could not be surveyed as access was refused by the land owner. The woodland, hedgerows, tall ruderal and scrub within the site offers foraging and hibernation potential for amphibians.

## **Breeding birds**

- 3.40 The breeding bird survey results are presented in full at Appendix G. The mosaic of grassland, scrub, hedgerow, woodland, scattered trees and marshy habitats across the site provide habitat for a range of bird species offering nesting, foraging and commuting opportunities. A total of 55 species were recorded within the site boundary and 100m buffer during the breeding bird survey.
- 3.41 One Schedule 1 species, hobby, was recorded to breed within the site during the breeding bird survey. This species was recorded to nest in a tree within the centre of the site.
- 3.42 During the breeding bird survey, nine S7 species were recorded within the site buffer.
- 3.43 Fifty two species were assessed to at least possibly breed within the site and 100m buffer based on the survey results, with 48 species of these species possibly nesting within the site itself. Seventeen bird species were confirmed to breed within the site boundary and 100m buffer. These are blackbird, blue tit, carrion crow, goldfinch, great spotted woodpecker, great tit, hobby, house martin, lapwing, mallard, mistle thrush, moorhen, pied wagtail, song thrush, woodpigeon and wren.
- 3.44 With regards to notable bird species, 1 pair of hobby, 1 pair of lapwing, 1 pair of mallard, 1 pair of mistle thrush, 1 pair of song thrush and 1 pair of spotted flycatcher, were confirmed to nest within the site itself.

## **Water vole and Otter**

- 3.45 The water vole and otter survey results are presented in full at Appendix H. No signs of water vole or otter were found during water vole and otter surveys of the site in 2018. The pond on site (pond 7) and the watercourse in the south of the site were found to be unsuitable to support water vole and otter.

## **Badger**

- 3.46 The full results of the badger survey are presented at Appendix I. A badger sett was found within a block of woodland in the north of the site and a badger sett was found within woodland in the south of the site. The site provides foraging habitat for badger.

### **Other mammals (brown hare and hedgehog)**

- 3.47 No evidence of hare was recorded during the survey, however the site has potential to provide foraging habitat for hare and hare breeding habitat within the longer grass.
- 3.48 The grassland, scrub and woodland provide suitable nesting and foraging opportunities for hedgehog.

### **Reptiles**

- 3.49 The full results of the reptile survey are presented at Appendix J. A single slow worm was found on one occasion during the surveys. The location where the slow worm was found is at drawing G7016.010.

### **Invertebrates**

- 3.50 The full results of the invertebrate survey are presented at Appendix K. Overall the site was deemed to be of poor suitability to support invertebrates in its current condition.

## 4.0 CONCLUSIONS

### Desk Study

#### Designated Sites

- 4.1 The site is not covered by any nature conservation designations. The desktop information from Cofnod did not provide any LBAP or S7 habitats on site or adjacent to the site.
- 4.2 There are seven national and internationally designated sites within 10km.
- 4.3 The site is located within the Impact Risk Zone for River Dee SSSI and Inner Marsh Farm SSSI which are located approximately 6.3km north east and 10.1 km north of the site respectively. The nature of the development and the distances involved mean that no adverse direct or indirect effect is predicted from the proposed development.
- 4.4 The Dee Estuary SPA and Ramsar is designated for the populations of waterbirds it supports during the non-breeding period, as well as its breeding populations of two species of tern. The site does not provide suitable wintering habitat for the qualifying non-breeding waterbird species or breeding habitat for tern. The site is therefore highly unlikely to provide any supporting habitat to these protected sites.
- 4.5 In relation to the Dee Estuary SPA, SAC and Ramsar, River Dee and Bala Lake SAC, and Midlands Mere and Mosses Ramsar the intervening distance and the lack of any "pathway" for adverse effect on the SPA, SAC and Ramsar means there is no possibility of an adverse effects on qualifying features or conservation objectives.
- 4.6 The development may therefore be screened out of a Habitats Regulations Assessment.
- 4.7 There are four locally designated sites within 1km of the site. All four sites are designated for habitats. The Fish Pond Wood is also designated for birds. Two of the sites; Fish Pond Wood and Bilberry Wood, are separated from the site by a major barrier (the A55). For Warred Dingle and the Covert and the Rookery, there are significant functional links between the application site and the locally designated sites and the distance is considered small enough for there to be possible impacts as a result of the proposals. Any potential impacts can be mitigated against and do not preclude development.

#### Planning Context

- 4.8 Future schemes should be undertaken in line with policies GEN1, WB1, WB5 and WB6 of the Flintshire Unitary Development Plan, adopted 28th September 2011.

Future schemes should also be designed in line with the mitigation hierarchy and protection and enhancement measures set out in the NPPF, paragraph 118.

## **Habitats and Flora**

- 4.9 A detailed woodland NVC survey was conducted in May 2018 and detailed results are reported at Appendix C. The survey found that although some areas were particularly diverse, the match to recognised NVC communities was low. There are no further implications for future development and woodlands on site in terms of NVC.
- 4.10 All native hedgerows qualify as S7 habitat. One of the hedgerows, H7, have been assessed to qualify as “important” under the Hedgerow Regulations 1997. Two of the hedges are species-rich during the Phase 1 habitat survey. Hedges provide foraging, commuting and refuge habitat for a range of faunal species and form part of a network of hedgerows across the wider landscape. As such, the hedges are considered to have local importance within the landscape.

## **Arboricultural Survey**

- 4.11 Future development of the site will require an arboricultural impact assessment to ascertain impacts on trees to be removed as part of any future development.

## **Protected and Non-native Invasive Plants**

- 4.12 Native bluebell was recorded in the block of woodland in the north of the site, the band of woodland in the south of the site and hedgerow 7. No bluebell was recorded in the other woodland areas on site, or along the hedgerows. Measures will need to be taken to protect bluebell during future works on site.
- 4.13 Rhododendron and Japanese knotweed are all listed under Schedule 9 of the Wildlife and Countryside Act, 1981 (as amended) and were found on or adjacent to the site. It is an offence to facilitate the spread of these species into the wild.

## **Bats**

- 4.14 A single concrete structure is within the north of the site. This feature is unsuitable to support roosting bats. There are no implications for future development of the site and this structure.
- 4.15 A number of trees across the site were noted as having low, moderate or high potential for roosting bats. If these trees are to be removed or pruned as a result of future development works then further surveys will be required.
- 4.16 The habitats on site provide good foraging and commuting habitat. Full evaluation of the daytime bat surveys and bat activity surveys are reported at Appendix E. Bat activity transect surveys were undertaken to determine the foraging use of the habitats on site by bats in order to inform future habitat creation and lighting in terms of future development and the local plan.
- 4.17 Taking these roost sites into account, and based on preliminary data analysis completed, the evaluation of the site is of Regional importance for commuting bats. The site is assessed as being of County importance for foraging bats.

## **Amphibians**

- 4.18 There are currently no additional survey requirements. Survey scope and timing is sufficient to inform development proposals and review legal and policy requirements. eDNA surveys have confirmed great crested newts are absent from the pond (P7) onsite.
- 4.19 P2 & P3 south of the development boundary are dry and present no habitats to support a GCN population. P5 & P6 are stocked with fish and fished commercially – the presence of GCN is highly unlikely within these ponds. P1 scored Poor within the HSI assessment, P4 scored Average. Both ponds are south of the Warren Hall development site and close to the Eland Homes development site which is currently ongoing without an EPS licence. It is therefore considered unlikely for GCN to be present within these ponds.
- 4.20 Great crested newt surveys are valid for at least 2 years and potentially 4 years or more depending on the specific use of the data, local conditions and the potential impact predicted on GCN. When data is greater than 2 years old advice should be sought from an appropriately experienced ecologist to determine whether the survey information remains valid. Full evaluation is presented at Appendix F.

## **Breeding birds**

- 4.21 The 55 bird species recorded within the site boundary and 100m survey buffer during the spring 2018 breeding bird survey represents a moderate to high species diversity. 52 bird species were confirmed, probable and possible breeders which indicates the site at the lower end of county importance. A schedule 1 species (hobby) was recorded breeding on site. Full evaluation of the breeding bird surveys is provided at Appendix G.

## **Otter and water vole**

- 4.22 No signs of otter or water vole were found on the watercourse in the south of the site and pond 7 in the north of the site. These features are unsuitable to support water vole or otter. There are no implications for future development of the site and water vole and otter. Full evaluation of water vole and otter is provided at Appendix H.

## **Badger**

- 4.23 There are two badger setts on site, one within a block of woodland in the north of the site and one within the band of woodland in the south of the site. There will be implications for badgers and future development within 30m of badger setts. Full evaluation of badger survey is provided at Appendix I.

## **Other mammals (brown hare and Hedgehog)**

- 4.24 There are records of hedgehog and brown hare within 1km of the site and suitable habitat within the site. Hedgehogs and brown hare are listed under Section 7 of the NERC Act and are LBAP Flintshire. There will be inevitable habitat loss as a result of future proposals. Retained habitat should be managed in order to avoid a decline in the population of hedgehogs and brown hare in the area.

## **Reptiles**

- 4.25 A single slow worm was recorded on site during reptile surveys in 2018. Measures will need to be undertaken to prevent death or injury to reptiles during any future site clearance works. Full evaluation of the reptile survey is provided at Appendix J.

## **Invertebrates**

- 4.26 The site was assessed as not being important for invertebrates. However enhancement measures will be undertaken within any future development to meet requirement of local planning policies GEN1, WB1, WB5 and WB6 of the Flintshire Unitary Development Plan adopted 28th September 2011 and NPPF, paragraph 118. Full evaluation of reptile survey is provided at Appendix K.

## 5.0 RECOMMENDATIONS

### Designated sites

- 5.1 There are four locally designated sites within 1km of the site. Two of these sites, Warred Dingle and the Covert and the Rookery have connectivity to the site through areas of woodland and hedgerow. Enhancements in the form of native species planting to "gap up" hedgerows and woodland and increase the connectivity of the site internally and within the wider area should be undertaken.
- 5.2 A Construction Environment Management Plan (CEMP) should be implemented to limit pollution, including noise and dust, to avoid potential effects on the Warred Dingle and Covert and the Rookery wildlife sites.
- 5.3 The CEMP would include measures to minimise risk of emissions, pollution, sediment run-off and encroachment into protective buffer zones, thereby reducing risk of adverse effects on the offsite designated sites.
- 5.4 Any future SuDS for the site should aim to maintain the current hydrology so that it does not affect Warred Dingle and Covert and the Rookery. The SuDS should also ensure that the flow of the watercourse within the south of the site is maintained.

### Habitats

- 5.5 Where possible, detailed design should seek to retain all native hedgerows within the final design. Mitigation measures should be implemented to protect retained hedgerows within and adjacent to the site from construction activities, including dust, airborne debris and run-off.
- 5.6 Where hedgerow retention is not possible, priority for retention should be placed upon the important and species-rich hedgerows, and on hedgerows which provide an important connectivity function. Where hedgerow loss cannot be avoided, losses should be mitigated or compensated for through new hedge planting. New planting and gap-planting of hedgerows could also be implemented to further enhance ecological networks within the site and local landscape and to deliver net biodiversity gain, both in terms of habitat quantity and ecological function.
- 5.7 All new hedgerows should be planted with a diverse (species-rich) native mix to mitigate for and improve this habitat resource within the local area.

### Invasive species

- 5.8 Japanese knotweed and Rhododendron are present on site. It is an offence to allow these species to spread, therefore an invasive species management plan detailing removal and control methods will be required.

### Protected plant species

- 5.9 English bluebell are present on site. If future development works impact upon bluebell then they will require translocation to other areas of the site. The translocation will involve digging up the bluebell in turves during the winter period and translocating them to a retained area of woodland on site.

## Bats

- 5.10 If it is necessary to fell any trees (or remove any limbs of trees) assessed as having low potential for roosting bats during future development, these will need to be section felled under supervision of a licensed bat ecologist. Trees with moderate or high bat potential will require two and three nocturnal surveys respectively. If bats are found to be roosting then a licence from Natural Resources Wales will be required to permit felling of the tree(s).
- 5.11 Common pipistrelle, Soprano pipistrelle, Brown long-eared bat, Myotis species, noctule and lesser horseshoe are present on site. Once proposals are known, detailed activity surveys will be required to assess potential impacts upon bat populations from the future development.
- 5.12 Indirect impacts on bats are possible as a result of light pollution of the woodland and will need to be minimised through sensitive design of the lighting scheme.
- 5.13 Areas of woodland, tree lines and hedgerows across the site should be retained
- 5.14 An unlit buffer should be maintained, where possible, between the proposed development and retained woodland, hedgerows and tree lines so that it may continue to provide commuting and foraging opportunities for bats. Where an unlit buffer cannot be maintained, a sensitive lighting strategy should be adopted to reduce light spill on to tree canopies.
- 5.15 To compensate for any loss of woodland, replacement planting of native trees will be provided within the scheme. Provision of newly created grassland habitat, including planting wildflower seeds, will encourage insect assemblage and abundance and create eco-passages for foraging bats.
- 5.16 Bat boxes should be installed within woodland areas that are retained on site (Schwegler 2F Bat Box or similar) to provide roosting opportunities for bats. Full recommendations are provided at Appendix E.

## **Birds**

- 5.17 Schedule 1 species hobby are present on site. Prior to any works being undertaken during the hobby breeding season, a walkover survey should be carried out by an experienced ornithologist to determine if hobby are nesting at the site. If no nests are identified by mid-June it can be assumed that nesting has not taken place at the site.
- 5.18 If hobby nesting is noted at the site, any works within the vicinity will be subject to an ornithological watching brief to monitor breeding success and confirm that the hobby nest has not been disturbed as a result of the works. It will also be necessary to implement a buffer zone between the nest and the works, the buffer distance will be at least 100m but will be more if the works being undertaken have the potential to cause greater disturbance (e.g. piling). An experienced ornithologist will confirm the buffer distance and decide if visual and/or acoustic screening would need to be deployed to further minimise disturbance.
- 5.19 A nest box scheme undertaken as part of the development, including small nest boxes with holes and open fronted nest boxes, would provide additional nesting sites for a number of species such as blue tit and robin. House sparrow have been recorded to nest within surrounding habitat and therefore house sparrow terraces should be incorporated into the new development to encourage this notable bird species.
- 5.20 Any vegetation clearance undertaken in the nesting bird season (March to August inclusive) must be subject to a nesting bird check prior to works. The nesting feature will be checked by a suitability qualified ecologist no more than 24 hours prior to any clearance works. If nests are identified, works must cease in that area and an appropriate buffer zone established around the nest until the young have fledged. This will require monitoring by an ecologist who will advise when works within the buffer zone can proceed. Full recommendations are provided at Appendix G.

## **Badgers**

- 5.21 Two badger setts are present on site. It is recommended that as part of any future development of the site the areas of woodland where the badger setts are located are retained within any future development and connectivity maintained across the site to allow badger to range across the site and to the wider locality. If future works encroach within 30 metres of any badger sett then a licence from Natural Resources Wales may be required to permit works. Full recommendations are provided at Appendix I.

## **Hare and hedgehog**

- 5.22 Buffers of wildflower planting areas across the site and boundary features should be managed to provide foraging and commuting habitats for both hare and hedgehogs. A Reasonable Avoidance Measures (RAMs) method statement should be produced to outline measures to limit potential impact upon hedgehog during scrub removal within hibernation period, which typically runs from November to mid-March. These methods may include the destructive search of scrub and an initial "strim" of vegetation to 30mm to allow hedgehogs to move from the scrub before the complete removal of the vegetation.

## **Reptiles**

- 5.23 The site offers suitable foraging and basking habitat for reptiles, with some features suitable for hibernation. There is potential for the site to be used by reptiles, however, the only evidence of a population found during surveys was a single juvenile slow worm.
- 5.24 Works should proceed following a Risk Avoidance Measure Method Statement (RAMMS). Mitigation in the form of landscaping should also be pursued. Full recommendations are provided at Appendix J.

## **Trees**

- 5.25 Wherever development occurs, there is a potential for effects on trees. This might comprise the removal of trees that would physically prevent the development but also those that are nearby and vulnerable to changes in local conditions that would arise because of construction.
- 5.26 There should be a common sense ambition to limit tree loss to that which is strictly necessary to facilitate the proposal, and to ensure that the condition and safety of all remaining trees would not be compromised by the development. The quality and distribution of trees should also be considered amongst other constraints in the development of the proposed design and may not always have the highest priority.
- 5.27 An Arboricultural Impact Assessment (AIA) will be required in support of a reserved matter/detailed application. This will identify, evaluate and possibly mitigate the impacts of developing land on the existing tree resource.
- 5.28 One function of the AIA process will be the consideration of trees alongside other project disciplines (layout, drainage, utilities etc.) in order to minimise future conflict and avoid uncalculated expense or undesirable tree loss.
- 5.29 The AIA should include a detailed Tree Removal Plan outlining the proposed schedule of tree works. It may also include details of any tree protection measures that would be required during the construction phase. In certain circumstances it may be appropriate to set out a heads of terms for tree protection and defer the detail to a Condition of planning consent.
- 5.30 The AIA should also explore mitigation that is included in the application and make an assessment of the net effects of proposed development, along with any effects that cannot be mitigated and in respect of which compensation measures are proposed.

## **Biodiversity Opportunities**

- 5.31 The NPPF requires biodiversity enhancement measures to be implemented on new development sites. The following measures are appropriate to the proposed housing development at Warren Hall. A map G7016.014 sets out the measures discussed below.
- 5.32 The existing network of woodland and hedgerows across the site can be retained and enhanced. Buffers of wildflower planting may be created around some woodland edge habitats.

- 5.33 Measures should be taken to protect retained hedgerows, woodland edge habitat and matures trees during construction. This could be in the form of protective fencing placed around these habitats.
- 5.34 Enhancements for birds and bats can be achieved by installing bat and bird boxes on suitable retained trees within retained woodland areas and bat tubes and bird boxes on new buildings, boxes into the exterior walls of the new builds.
- 5.35 The landscaping proposals should take into account the possible presence of hedgehogs in the area and encourage use within the site. Planting hedges as property boundaries as opposed to fences will create suitable habitat. Hedgehog boxes will provide areas for shelter and breeding and should be sited out of direct sunlight with the entrance facing away from prevailing winds, in or under thick vegetation.
- 5.36 Management works to be undertaken on the area of retained woodland across the site including removal of conifer trees and thinning of trees to allow light penetration to encourage ground flora.
- 5.37 The watercourse within the south of the site to be de-silted during the winter period to provide better habitat for wildlife.
- 5.38 The pond (pond 7) in the north of the site to have management works, including tree thinning, clearing of pond and planting of aquatic vegetation.
- 5.39 In the north of the site an area of bare ground created to provide basking potential for reptile and a small wildlife area retained and managed to include wildflower planting to encourage wildlife including invertebrates. Habitat piles from wood brash will be created within this area.
- 5.40 If fences are used, non-toxic preservative should be used on fences (and any other wooden furniture) to avoid the use of chemical treatments. Any wood panel fencing should include small gateways (13cm x 13cm) to allow dispersal of hedgehogs across the site.
- 5.41 During the site clearance works, consideration should be given to chipping or composting vegetation for re-use on the new habitats on site, or creation of brash piles on the periphery of the site as a further aid to increasing biodiversity. This could also enhance the site for hedgehogs by providing additional refuge opportunities for this S7 species which is frequently recorded in residential gardens.
- 5.42 The use of Breathable Roofing Membrane (BRM) must not be installed in the construction of roof spaces where bats will be intended to access, in accordance with best practice guidance from BCT:

[http://www.bats.org.uk/pages/breathable\\_roof\\_membranes.html](http://www.bats.org.uk/pages/breathable_roof_membranes.html)

- 5.43 BRMs are made from non-woven plastic fibres that are known to abrade over time, forming loose fibres, in which bats may become entangled. BCT recommends that only bituminous roofing felt that does not contain polypropylene filaments should be used. For example, bitumen felt type 1F, which is hessian reinforced. High resistance bitumen underlays are acceptable under BS 5250:2011 (recommended in Part C of the Building Regulations) as long as appropriate ventilation is provided.

## 6.0 REFERENCES

- Chartered Institute of Ecology and Environmental Management. *Guidelines for Preliminary Ecological Appraisal*. (CIEEM <http://www.cieem.net/>), 2013.
- Collins, J. *Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd Edition*. Bat Conservation Trust, 2016.
- Committee, Joint Nature Conservation. *Handbook for Phase 1 Habitat Surveys - A technique for environmental audit*. Peterborough, 2010.
- Dean, M., Strachan, R., Gow, D. and Andrews, R. *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. The Mammal Society, London, 2016.
- Nature, English. *Great Crested Newt Mitigation Guidelines*. Peterborough: English Nature, 2001.
- Oldham R.S., Keeble J., Swan M.J.S & Jeffcote M. "Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*)."  
*Herpetological Journal* 10 (4) (2000): 143-155.

## **APPENDIX A: Desk based ecological assessment**



## **APPENDIX B: Target Notes**



## **APPENDIX C: National Vegetation Classification and Hedgerow Survey**





## **APPENDIX D: Arboricultural Survey**



## **APPENDIX E: Bat Survey**



## **APPENDIX F: Amphibian Survey**



## **APPENDIX G: Breeding Bird Surveys**



## **APPENDIX H: Water Vole and otter survey**



## **APPENDIX I: Badger survey**



## **APPENDIX J: Reptile survey**



## **APPENDIX K: Invertebrate survey**



## **DRAWINGS**

**Drawing 1 – G7016.001 Phase 1 Habitat Survey**  
**Drawing 2 - G7016.013 Mitigation and Constraints Plan**



**KEY**

- Survey Boundary
- ⊙ Target Note
- × Scattered Scrub
- Scattered Broad-leaved Trees
- Broad-leaved Tree with Moderate Bat Potential
- Broad-leaved Tree with High Bat Potential
- JK Japanese Knotweed
- RP Rhododendron Ponticum
- ~ Native Species-rich Intact Hedge
- Species-poor Intact Hedge
- + Fence
- Earth Bank
- Semi-natural Broad-leaved Woodland
- Plantation Broad-leaved Woodland
- Plantation Mixed Woodland
- Semi-improved Neutral Grassland
- Marsh/Marshy Grassland
- SI Poor Semi-improved Grassland
- Tall Ruderal
- Standing Water
- Buildings
- Bare Ground
- Hardstanding

**Species Code**

QR European Oak

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 Base mapping provided by client

Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

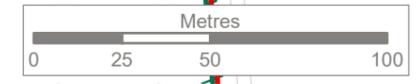
Genesis Centre, Birchwood Science Park, Warrington WA3 7BH  
 Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project  
**Warren Hall**

Title  
**Phase 1 Habitat Survey**

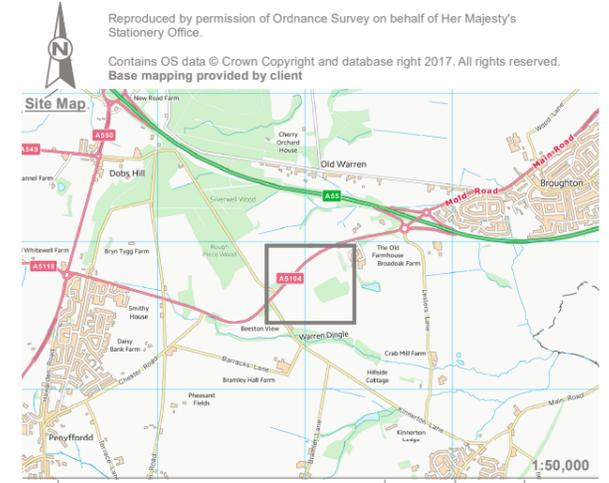
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**G7016.001.1** Sheet 1 of 5

Drawn	Checked	Approved	Scale	Date
NG/CR	JS	CG	1:2,000 @ A3	18/03/2019





- KEY**
- Survey Boundary
  - Target Note
  - Bluebell
  - X Scattered Scrub
  - Scattered Broad-leaved Trees
  - Broad-leaved Tree with Low Bat Potential
  - Broad-leaved Tree with Moderate Bat Potential
  - Broad-leaved Tree with High Bat Potential
  - Species-poor Intact Hedge
  - Fence
  - Semi-natural Broad-leaved Woodland
  - Plantation Broad-leaved Woodland
  - Plantation Mixed Woodland
  - Marsh/Marshy Grassland
  - Poor Semi-improved Grassland
  - Tall Ruderal
- Species Code**
- Ap Sycamore
  - Qr European Oak



Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

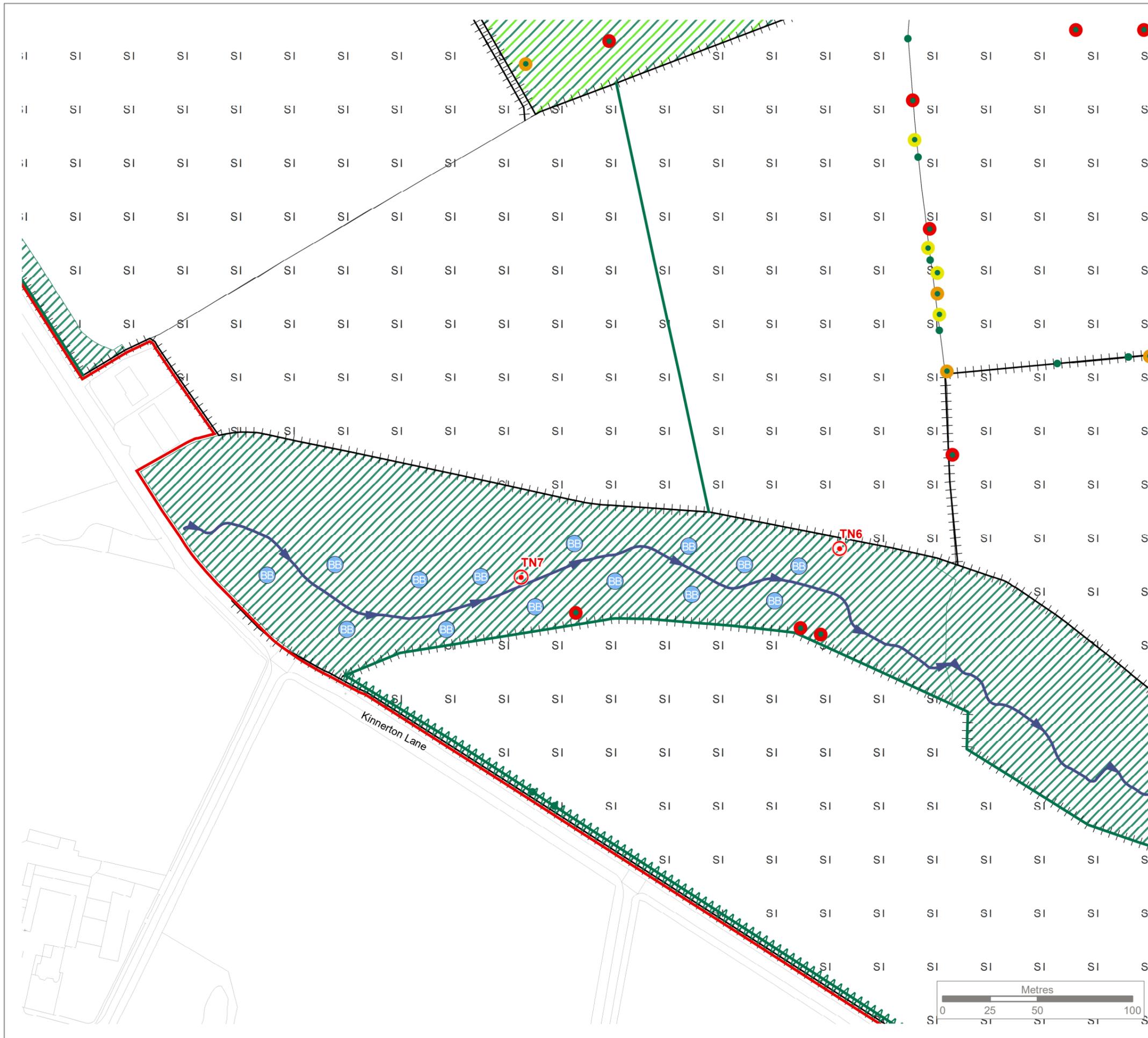
Genesis Centre, Birchwood Science Park, Warrington WA3 7BH  
 Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project  
**Warren Hall**

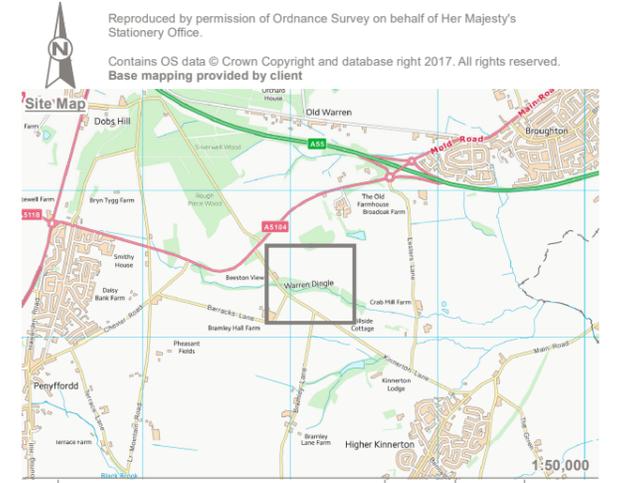
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Drawing Number  
**G7016.001.2** Sheet 2 of 5

Drawn	Checked	Approved	Scale	Date
NG/CR	JS	CG	1:2,000 @ A3	18/03/2019



- KEY**
- Survey Boundary
  - Target Note
  - Bluebell
  - Scattered Broad-leaved Trees
  - Broad-leaved Tree with Low Bat Potential
  - Broad-leaved Tree with Moderate Bat Potential
  - Broad-leaved Tree with High Bat Potential
  - ➔ Running Water
  - ▬▬▬ Native Species-rich Intact Hedge
  - ▬▬▬ Species-poor Intact Hedge
  - Fence
  - Plantation Broad-leaved Woodland
  - Plantation Mixed Woodland
  - SI Poor Semi-improved Grassland
- Species Code**
- Ap Sycamore
  - Qr European Oak



Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

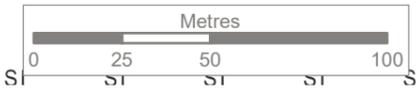
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 Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

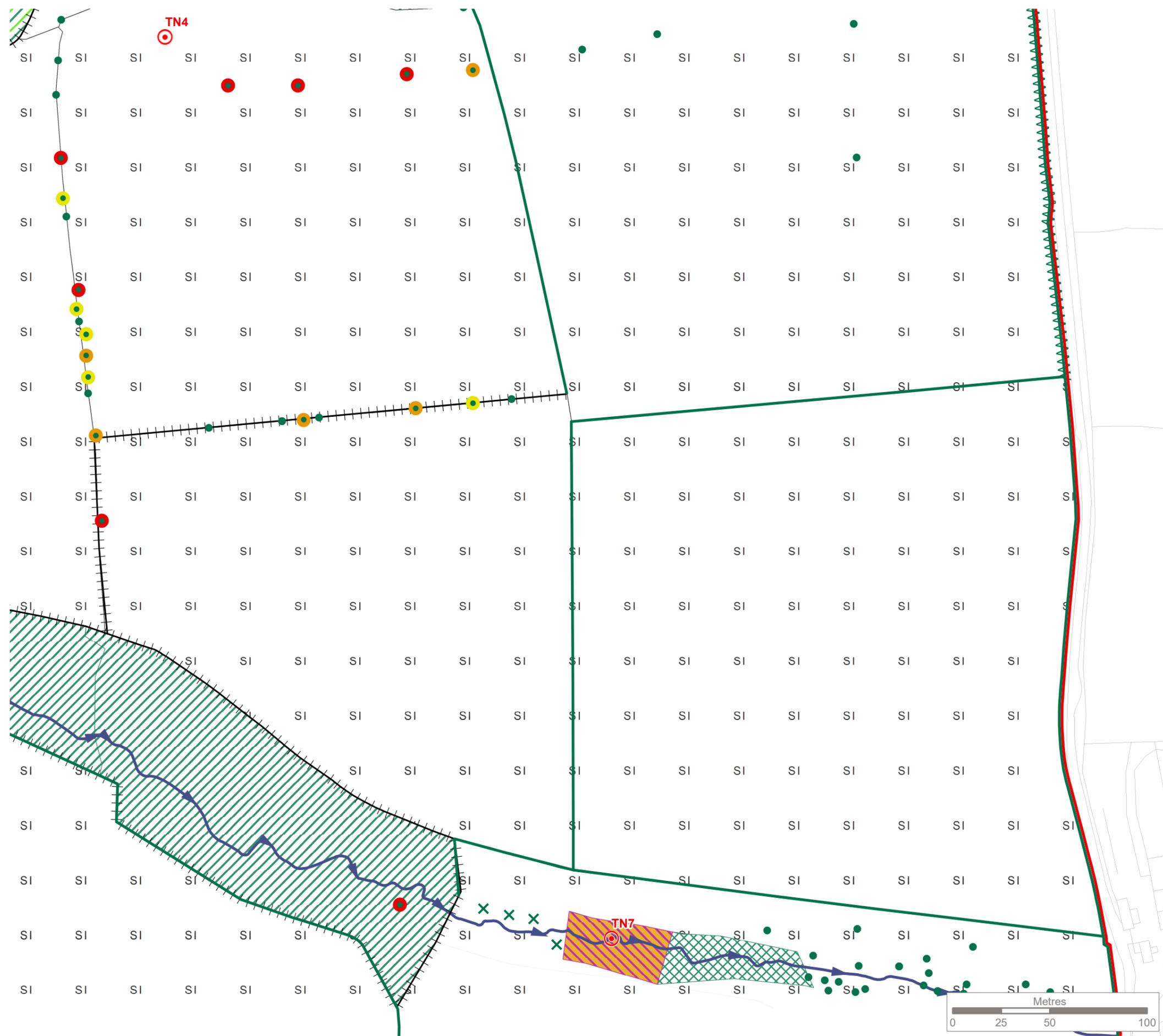
Project  
**Warren Hall**

Title  
**Phase 1 Habitat Survey**

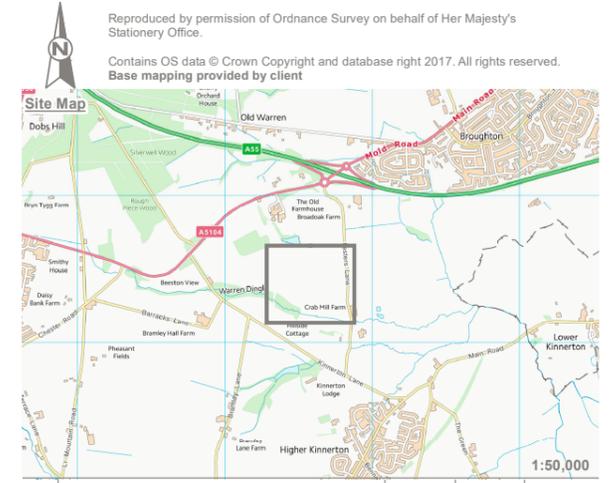
Drawing Number  
**G7016.001.3** Sheet 3 of 5

Drawn	Checked	Approved	Scale	Date
NG/CR	JS	CG	1:2,000 @ A3	18/03/2019





- KEY**
- Survey Boundary
  - Target Note
  - X Scattered Scrub
  - Scattered Broad-leaved Trees
  - Broad-leaved Tree with Low Bat Potential
  - Broad-leaved Tree with Moderate Bat Potential
  - Broad-leaved Tree with High Bat Potential
  - ▶ Running Water
  - Native Species-rich Intact Hedge
  - Species-poor Intact Hedge
  - Fence
  - Plantation Broad-leaved Woodland
  - Plantation Mixed Woodland
  - Dense/Continuous Scrub
  - Marsh/Marshy Grassland
  - Poor Semi-improved Grassland
- Species Code**
- Ap Sycamore
  - Qr European Oak



Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

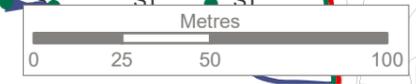
Genesis Centre, Birchwood Science Park, Warrington WA3 7BH  
 Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

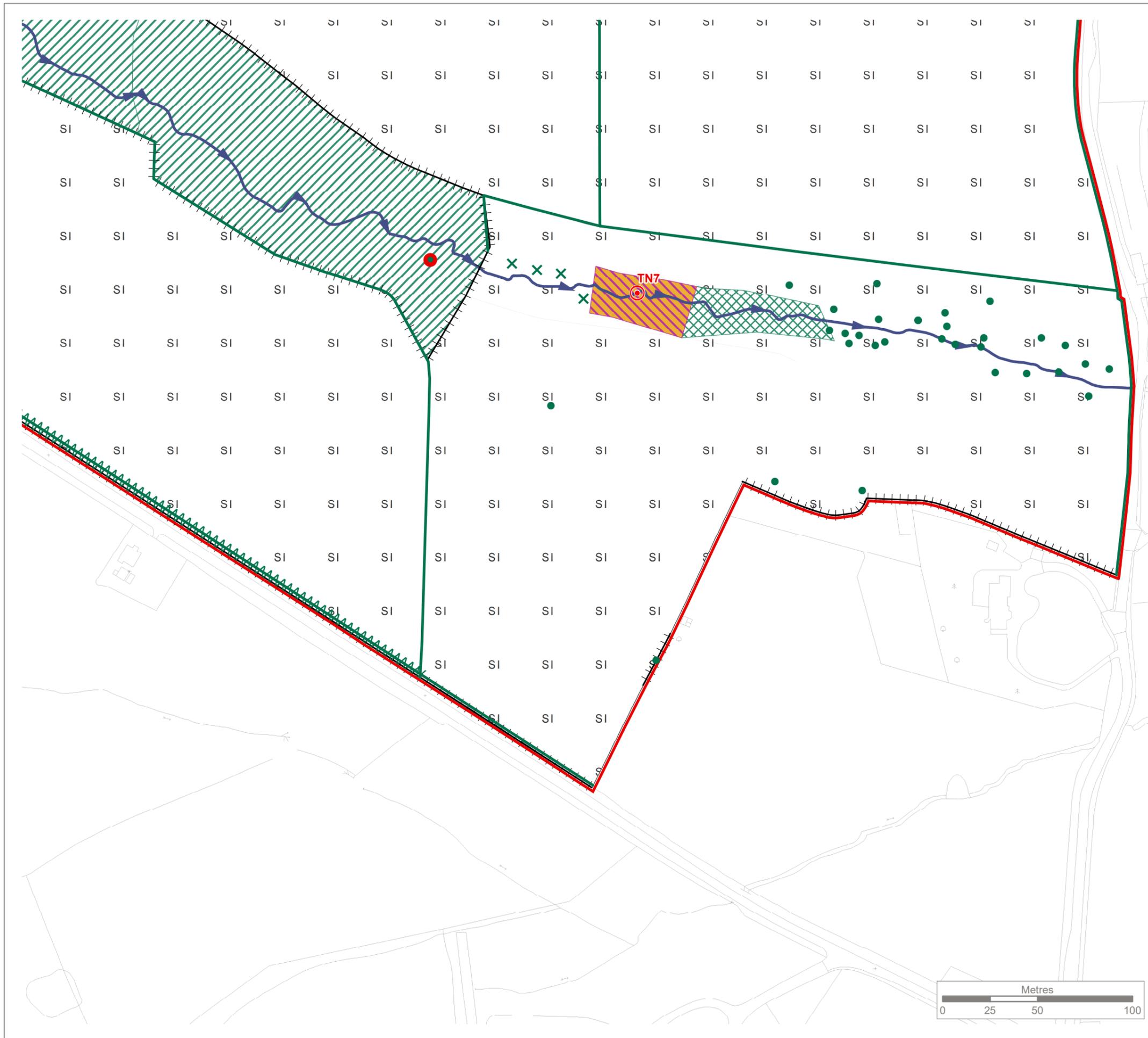
Project  
**Warren Hall**

Title  
**Phase 1 Habitat Survey**

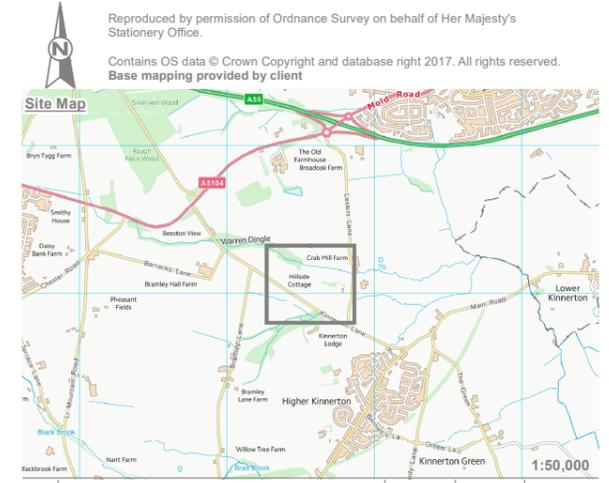
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**G7016.001.4** Sheet 4 of 5

Drawn	Checked	Approved	Scale	Date
NG/CR	JS	CG	1:2,000 @ A3	18/03/2019





- KEY**
- Survey Boundary
  - ⊙ Target Note
  - × Scattered Scrub
  - Scattered Broad-leaved Trees
  - Broad-leaved Tree with High Bat Potential
  - ▶ Running Water
  - ▬▬▬ Native Species-rich Intact Hedge
  - ▬▬▬ Species-poor Intact Hedge
  - + + + Fence
  - Plantation Broad-leaved Woodland
  - Dense/Continuous Scrub
  - Marsh/Marshy Grassland
  - Poor Semi-improved Grassland
- Species Code**  
Qr European Oak



Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

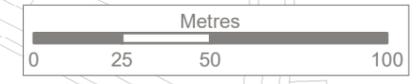
Genesis Centre, Birchwood Science Park, Warrington WA3 7BH  
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Project  
**Warren Hall**

Title  
**Phase 1 Habitat Survey**

Drawing Number  
**G7016.001.5** Sheet 5 of 5

Drawn	Checked	Approved	Scale	Date
NG/CR	JS	CG	1:2,000 @ A3	18/03/2019



12 bat and bird boxes to be placed on suitable trees within this woodland. these include:  
 - 3S Schwegler Starling Nest Box  
 - 2FN Schwegler Bat Box  
 - 2F Schwegler Bat Box  
 - 2H Robin Schwegler  
 - Tree Creeper FSC Nest Box  
 - 1B Schwegler Next Box  
 - 2F Schwegler Double Panel Bat Box

Hedgerow to be enhanced as a wildlife corridor with a 5m buffer of wildflower planting

Area of land to be retained and managed for wildlife

10m buffer strip of wildflower grassland around this woodland for the benefit of wildlife including foraging birds and bats

Basking area for reptiles

Removal of invasive plant species prior to development

Enhancement works to pond include:  
 - thinning of trees around pond  
 - clearing out of pond  
 - planting of aquatic and emergent vegetation

Area of woodland to be retained for benefit of wildlife and ground flora, including bluebell  
  
 Woodland management to be undertaken, including removal of conifer trees and thinning of trees to allow light in and encourage ground flora

10m buffer of wildflower grassland to benefit wildlife including foraging for bats and birds

It is recommended that all trees displaying any level of bat potential be retained. If any of these trees require removal, further survey of the site is necessary

Hedgerow enhanced as wildlife corridor with a 5m buffer of wildflower planting on either side

Woodland to be retained. Woodland management works including the thinning of trees to allow for more light in, benefiting ground flora

12 bat and bird boxes to be placed on suitable trees within this woodland:  
 - 3S Schwegler Starling Nest Box  
 - 2FN Schwegler Bat Box  
 - 2F Schwegler Bat Box  
 - 2H Robin Schwegler  
 - Tree Creeper FSC Nest Box  
 - 1B Schwegler Next Box  
 - 2F Schwegler Double Panel Bat Box

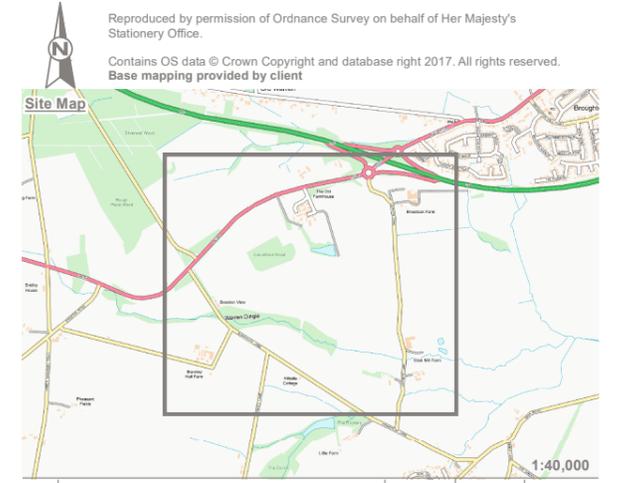
Retention of woodland for protection of woodland. Ground flora including blue and provision of habitat for nesting birds including hobby

Enhancement works to watercourse including de-silting of vegetation

**Note:**  
**During Construction**  
 If work takes place during hours of darkness between April and September, lights will switch on in the hedgerow, woodland edge, or water feature  
  
 All lighting across the site to be directed away from retained hedgerows, woodland edges, and tree canopies lighting in close proximity to these areas to be a maximum of 3 lux  
  
**Future Construction**  
 All hedgerows across the site will be retained. They must be protected during any future development works  
  
 Approximately 30% of new builds within any future development will have bat and bird boxes on them. These include:  
 - 1FR Schwegler bat tube  
 - Housemartin nest  
 - 1 SP Sparrow terrace  
 - No.10 Schwegler swallow nest

**KEY**

- Survey Boundary
- Mitigation Strategies
  - Habitat Piles
  - Reptile Basking Area
  - Retained Land
  - Wildflower Planting
- Phase 1 Habitat Survey
  - Bluebell
  - Scattered Scrub
  - Scattered Broad-leaved Trees
  - Broad-leaved Tree with Low Bat Potential
  - Broad-leaved Tree with Moderate Bat Potential
  - Broad-leaved Tree with High Bat Potential
  - Japanese Knotweed
  - Rhododendron Ponticum
  - Running Water
  - Native Species-rich Intact Hedge
  - Species-poor Intact Hedge
- Earth Bank
- Semi-natural Broad-leaved Woodland
- Plantation Broad-leaved Woodland
- Plantation Mixed Woodland
- Dense/Continuous Scrub
- Semi-improved Neutral Grassland
- Marsh/Marshy Grassland
- Poor Semi-improved Grassland
- Tall Ruderal
- Standing Water
- Building
- Bare Ground
- Hardstanding
- Fence



Rev	Description	Drawn	Approved	Date

**TEP** | **THE ENVIRONMENT PARTNERSHIP**

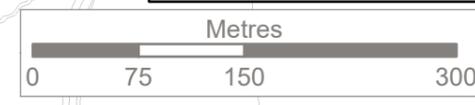
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Project  
**Warren Hall**

Title  
**Mitigation and Constraints Plan**

Drawing Number  
**G7016.014**

Drawn	Checked	Approved	Scale	Date
CR	MK	JC	1:5,000 @ A3	19/03/2019





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