Reinforcement to the North Shropshire Electricity Distribution Network: 132kV Electrical Circuit from Oswestry to Wem

APPENDICES 8.1 – 8.2 ECOLOGY

Preliminary Environmental Information Report

November 2017

APPENDIX 8.1

ECOLOGY ASSESSMENT METHODOLOGY

APPENDIX 8.1

ECOLOGY ASSESSMENT METHODOLOGY

1.1 INTRODUCTION

1.1.1 This section outlines the technical methods used to determine what changes to the baseline are likely to occur as a result of the Proposed Development and sets out the significance criteria which will be used moving forward in to the Environmental Statement (ES) stage.

Assessment guidance and methods

1.1.2 The methodology for undertaking the ecological assessment has been developed in accordance with relevant guidance published by the Chartered Institute of Ecology and Environmental Assessment (CIEEM) *'Guidelines for Ecological Impact Assessment in the UK and Ireland*' (CIEEM, 2016) and complies with the requirements of the Overarching National Policy Statement for Energy (EN-1)[1] and National Policy Statement for Electricity Networks Infrastructure (EN-5)[2].

1.1.3 Ecological Impact Assessment (EcIA) is defined within the CIEEM guidelines is 'a process of identifying, quantifying and evaluating the potential effects of development-related or other proposed actions on habitats, species and ecosystems'. The process includes the following stages:

- Determination and evaluation of important ecological features;
- Identification and characterisation of impacts;
- Outline of mitigating measures to avoid and reduce significant impacts;
- Assessment of the significance of any residual effects after such measures;
- Identification of appropriate compensation measures to offset significant residual effects; and,
- Identification of opportunities for ecological enhancement (CIEEM, 2016).

Assumptions and Limitations

1.1.4 A number of assumptions and limitations are identified in relation to the information presented in this chapter of the PEIR. These reflect the evolving nature and preliminary stage of the assessment:

- All conclusions and assessments are by their nature preliminary and the final assessment will be reported in the ES. All assessment work has and continues to apply a precautionary principle, in that where limited information is available (for example in terms of the evolving detailed design), a realistic worst-case scenario is being assessed;
- The assessment focusses on those ecological receptors which would potentially experience potentially significant effects; and

[1] Department for Energy and Climate Change, July 2011
[2] Department for Energy and Climate Change, July 2011

- The preliminary assessment presented in this chapter makes an assessment of whether or not a potential effect is likely to be significant without categorising into defined thresholds (e.g. moderate or major). The work involved to provide this additional level of detail is ongoing and will be provided in the ES.

Baseline Data Gathering and Ecological Receptors

1.1.5 The baseline includes desk based study and data review along with a series of ecology field surveys.

Sources

1.1.6 Available desktop information which has been reviewed includes Ordnance Survey (OS) data, Google Earth Pro and stakeholder feedback.

Surveys to Date

1.1.7 The findings of the desktop study have been informed by a programme of seasonal site surveys undertaken since October 2016 and a broad scale Phase 1 habitat survey of the wider route option corridor undertaken in summer 2016.

Table 8.1.1 Ecological Surveys

Ecological Feature	Survey Type, Extent and Methodology
Habitats	Extended Phase 1 habitat survey along the preliminary 100m wide corridor of the Preferred Line Route (as at the scoping stage), building on the broad-scale Phase 1 completed in 2016 for a 1km wide option corridor. The survey area was extended where necessary along accesses and up to an additional 50m either side of the 100m corridor to ensure that features of ecological interest/ value outside the corridor (for example ponds) were suitably mapped and described. The survey methodology followed the Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit' JNCC (2010), 'extended' to allow the recording of additional features of interest, and assesses the potential for protected or notable species or species listed under Section 41 of the NERC Act 2006.
Species-rich vegetation	Certain locations with potential to support vegetation communities of particular interest, for example in the vicinity of Ruewood Pastures SSSI and near Moorfields Local Wildlife Site (LWS), Loppington. These locations were subject to more detailed botanical (National Vegetation Classification, or NVC), survey based on Rodwell, J. (1991) British Plant Communities Vols. 1-5.
Hedgerows	Hedgerows within the 100m wide survey area and where crossed by accesses were described and mapped as part of the extended Phase 1 habitat survey. Sections of hedgerow likely to be directly affected (e.g. sections to be temporarily removed for access including those beyond the 100m wide corridor) were subject to survey to identify those potentially qualifying as 'Important' under the Hedgerows Regulations 1997.
Trees	An arboricultural survey was undertaken of trees within 25m either side of the Preferred Line Route and along or adjacent to access routes where they may potentially be affected. Survey methods followed British Standard BS5837 Trees in Relation to Construction: 2012. Veteran trees were also identified where present from the combined findings of the arboricultural survey, extended Phase 1 habitat survey and desk study.
Badgers	Signs of badger presence/ activity including setts, latrines, paths etc. within the 100m wide survey corridor and up to 50m buffers either side where required, including along accesses. Information on badgers has been recorded as a separate Confidential Annex to the Technical Appendices.

Table 8.1.1 Ecological Surveys	
Ecological Feature	Survey Type, Extent and Methodology
Bats	Preliminary bat roost assessments (PRA) (ground-based) of trees likely to be affected by works within the 100m wide survey corridor and where trees could potentially be affected by accesses (as described above under Trees). These identified trees with low, medium or high bat roost potential. Activity (transect) surveys and automated detector surveys were undertaken at selected locations along the Proposed Line Route with the aim of identifying any important foraging and commuting flyways. Trees directly affected by the project (felled or cut back) with medium or high bat roost potential will be subject to further survey to identify whether or not they support bat roosts, for example through climbing tree roost inspections. Surveys were undertaken with reference to Bat Conservation Trust, Collins J. 'Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. (2016).
Dormouse	No specific presence/ absence surveys were considered necessary to inform the assessment given the current known distribution of dormice in Shropshire and the relatively limited extents of habitat removal required for the proposed development. It is considered that information from local records obtained through desk study and consultation, and data on habitat suitability gathered during the Extended Phase 1 habitat survey, is sufficient to inform the assessment and any mitigation that might be proposed, and confirmed that due to the nature of the hedgerows and woodland along and intersected by the Preferred Line Route and lack of strong habitat connectivity to more suitable habitat such as woodlands in the wider area, dormice were highly unlikely to be present or affected by the proposed development and hence no surveys were required.
Great crested newts (Amphibians)	Waterbodies within the 100m wide corridor and up to 50m beyond this where required, will be identified from aerial images, desk study and the Extended Phase 1 habitat survey. These will be subject to Habitat Suitability Assessment using HSI methodology (OIdham et al 2000, and ARG UK 20103). Presence/ absence surveys of ponds within the 100m wide survey corridor and 50m buffers will be undertaken using Environmental DNA (e-DNA) methodology (Biggs et al. 2014a)4 with analysis undertaken by a suitably equipped laboratory in adherence to the analysis methodology outlined within the DEFRA Project WC1067 report (Biggs et al., 2014b)5. If required, conventional population level surveys may be undertaken of individual ponds.
Otter and water vole	Watercourses and suitable ditches were surveyed for habitat suitability and signs of otter and water vole presence along both banks 100m upstream and downstream of Preferred Line Route crossing points.

Future Baseline

1.1.8 The preferred line route crosses land that is primarily arable and pastoral in nature and there are no foreseeable reasons for this to change in the near future.

1.2 ECOLOGICAL ASSESSMENT METHOD

1.2.1 For the purpose of the assessment, the terms 'impacts' and 'effects' are referred to in accordance with the definitions set out in the CIEEM Guidelines as follows:

- **Impact**: Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow;

[3] Oldham R.S., Keeble J., Swan M.J.S & Jeffcote M. (2000), Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10 (4), 143-155.
[3] ARG UK (2010), ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.
[4] Biggs J., Ewald N., Valentini A., Gaboriaud C., Griffiths R.A., Foster J., Wilkinson j., Arnett A., Williams P, and Dunn F (2014), Analytical and methodological development for improved surveillance of the Great Crested Newt.
[5] Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust. Oxford.

- **Effect**: Outcome to an ecological feature from an impact. For example, the effects on a species' population from the loss of a hedgerow.

1.2.2 The EIA Regulations require the identification of the 'likely significant effects of the proposed development on the environment' (Schedule 4 Part 1 Para 20).

1.2.3 The proposed development will be assessed as permanent and for ecological effects the resulting effects will be described in terms of their duration as short, medium term and long-term as follows:

- Short-term effects are defined as 0 – 3 years;
- Medium term effects are defined as 3 – 15 years; and
- Long term effects are defined as > 15 years.

1.2.4 Long-term residual effects of the Proposed Development are typically those which would remain after a minimum fifteen years.

1.2.5 The effects on ecological features will be assessed based upon the interaction between the importance, or sensitivity, of the feature and the magnitude of change it is likely to experience.

1.2.6 In accordance with the CIEEM guidelines (2016), an EcIA need only assess in detail, impacts upon important ecological features i.e. those that are considered important and potentially significantly affected by a proposed development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project impacts. Where ecological features are not considered important enough to warrant further consideration, or where they will not be significantly affected, these are scoped out of the assessment presented here, with justification for exclusion provided.

1.2.7 Relevant European, national and local guidance from governments and specialist organisations has been referred to in order to determine the importance (or 'sensitivity') of ecological features. In addition, importance has also been determined using professional judgement and taking account of the results of baseline surveys and the importance of features within the context of the geographical area.

1.2.8 Importance does not necessarily relate solely to the level of legal protection that a feature receives and ecological features may be important for a variety of reasons, such as their connectivity to a designated site and the rarity of species or the geographical location of species relative to their known range.

1.2.9 The potential ecological effects of the construction and operation of the overhead line considered to be relevant to the EIA are:

- Habitat loss, degradation or fragmentation during construction. The operation of the Proposed Development is not considered likely to have any significant effects on habitats additional to the construction phase, however this will be explained with supporting information in the EIA;
- Disturbance or harm to individuals of protected or notable species during construction works. Once operational it is not considered that the Proposed Development will have any significant effects on protected or notable species additional to the construction phase, however this will be explained with supporting information in the EIA; and
- Risk of bird collision or electrocution due to the presence of the overhead line, when operational. The potential for increased predation by raptors and other species on vulnerable ground-nesting birds, caused by the use of poles and lines as hunting perches, will also be considered.

1.2.10 Relevant European, national and local legislation and guidance from government and specialist organizations will be referred to in order to determine the importance of ecological features. Additionally, importance will be determined on a contextual basis, taking into account the results of baseline surveys and the context of the geographic area and not solely the level of legal

protection that a feature receives. Ecological features may be important for a variety of reasons, examples of which include the diversity and naturalness of habitats, the rarity of species or the geographical location of species relative to their known range.

1.2.11 Predicted effects will be classified according to whether they are considered to be major, moderate, minor or negligible and beneficial or adverse. The assessment and reporting of ecological effects upon ecological features identified will follow the principles set out in the CIEEM Guidelines 2016.

1.2.12 The assessment will describe and consider only potentially significant effects in detail. In accordance with paragraph 5.25 of the CIEEM guidelines, a 'significant effect' is an effect that either *'supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general'. The guidance further states at paragraph 5.26, that 'a significant effect is simply an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project'*.

1.2.13 In addition paragraph 5.26 of the guidance also notes that, 'A significant effect is a positive or negative ecological effect that should be given weight in judging whether to authorise a project: it can influence whether permission is given or refused and, if given, whether the effect is important enough to warrant conditions, restrictions or further requirements such as monitoring. A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission'.

1.2.14 For the purposes of this assessment the importance of an ecological feature is considered within a defined geographical context from International to Less than Local (or Site level), as detailed in Table 8.1.2.

Table 8.1.2 Definition of Ecological Value

Sensitivity of Feature/Scale of Importance	Definition (examples)
High - International and European	Beyond a UK scale, typically at European level. E.g. internationally designated site (SPA, SAC and/ or Ramsar site) or proposed/ candidate site (pSPA or cSAC), large area of a habitat listed in Annex I of the Habitats Directive or smaller areas of such habitat which are essential to maintain the viability of the larger whole, large population of an internationally important species or site supporting such a species (or supplying a critical element of their habitat requirement) or species listed in Annex IV of the Habitats Directive.
High - National	UK: A nationally designated site (e.g. SSSI) or a discrete area which meets the selection criteria for national designation. An area of a priority habitat which constitutes a significant proportion of the UK resource of that habitat. Populations of a nationally important species or site supporting such a species (or supplying a critical element of their habitat requirement) which constitutes more than 1% of the national population of that species.
Medium – County	Shropshire. Locally designated sites (Local Nature Reserves, County Wildlife Sites). Areas of priority habitat which constitutes a significant proportion of the County's resource of that habitat. Large populations of species listed in the County 'red data book' or BAP due to its rarity or County context or sites supporting 1% or more of a County population.
Low - Local	Parishes and land areas between Oswestry and Wem along the Proposed Line Route. For example areas of priority habitat but which are not large enough to meet the criteria for County value, or small but sustainable populations of a protected or notable species
Negligible - Site	Considered within the context of the Proposed Line Route only.

1.2.15 Once identified, the potential impacts arising from the proposed scheme are described making reference to the following characteristics as appropriate: positive or negative, extent, magnitude, duration, timing, frequency, and, reversibility.

1.2.16 The assessment only makes reference to those characteristics relevant to understanding the ecological effect and determining significance.

1.2.17 Ecological effects will also be further described as far as possible and where information allows, in terms of the parameters detailed in Table 8.1.3.

Table 8.1.3 Environmental Parameters	
Environmental Parameter	Description
Magnitude	The 'size' or amount of the effect is referred to as the magnitude and is determined on a quantitative basis where possible.
Extent	The area over which an effect occurs. The magnitude and extent of an effect may be synonymous.
Duration	The time over which an effect is expected to last prior to the recovery or replacement of the feature. This can be considered in terms of life cycles of species or regeneration of habitats. The duration may be longer than the duration of an activity.
Reversibility	Reversible (or temporary) effects are those that occur during construction and are either re-instated post construction or in the case of species able to recover within a reasonable timescale which would not affect the functionality of the population. Either spontaneous recovery or effective mitigation is possible. Permanent effects are those which cannot be recreated within the proposed development or there is no reasonable chance that actions can be undertaken to reverse it.
Timing and frequency	The timing of effects in relation to important seasonal and/or life cycle constraints has also been evaluated. Similarly, the frequency with which activities and simultaneous effects would take place can be an important determinant, and has therefore also been assessed and described where possible.

1.2.18 The assessment will consider how existing baseline conditions may change over time. Changes in the baseline could occur through land use and habitat changes, in the form of differing management and natural growth or succession of habitats.

Magnitude of Change

1.2.19 The magnitude of change effected on features will be described within the assessment, described in terms of ecology in Table 8.1.4. The likelihood or probability that an effect will occur will be described as far as possible based on available information. Whilst it is reasonably straightforward to identify effects that are certain to occur, or conversely will not occur, it is generally more difficult to assign a quantified level to occurrences defined as likely, unlikely or highly unlikely. In these circumstances, professional judgement will be used, with reasoning supported by available evidence.

Table 8.1.4 Magnitude of Change	
Magnitude	Criteria
High	The change (either on its own or with other proposals) may negatively or positively affect the conservation status of a site/ species population, in terms of the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest.
Medium	Conservation status of a site or population will not be negatively or positively affected, but some element of the functioning might be affected and the effect

Table 8.1.4 Magnitude of Change	
	on the site/ population is likely to be significant in terms of its ability to sustain some part of itself in the long term.
Low	Neither of the above applies, but some minor negative or positive effect is evident on a temporary basis or affects extent of habitat abundant in the local area.
Negligible	No observable effect in either direction.

1.2.20 The nature or magnitude of change that is likely to occur is determined by reference to its size/ scale, geographical extent and duration/ reversibility. The judgements on magnitude may need to be adjusted (either up or down) to reflect the duration of the change (i.e. short, medium or long term) and whether it is potentially reversible.

1.2.21 The assessment also identifies areas where no change is anticipated. In these instances, 'no change' will be inserted into the appropriate magnitude of effect column and the resulting effect will be described as 'none'.

Determining Overall Significance

1.2.22 Ecological effects are considered in terms of the importance or sensitivity of the ecological feature and the magnitude of change effected upon it. A significant effect in the context of the EIA (as set out in Chapter 5 'PEIR Approach and General Methodology') is considered to be any major or moderate effect on an important ecological feature, whether positive or negative. In accordance with the overall approach described in Chapter 5, the separate judgements about the sensitivity of the ecological receptor and the magnitude of likely effect will be combined to allow a final judgement to be made about whether or not the effect is considered significant, and at what geographic scale (in line with CIEEM guidance). CIEEM guidelines on ecological impact assessment note that, *'A significant effect does not necessarily equate to an effect so severe that consent for the project should be refused planning permission. For example, many projects with significant negative ecological effects can be lawfully permitted following EIA procedures as long as the mitigation hierarchy has been applied effectively as part of the decision-making process*.' In broad terms, significant effects encompass impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

1.2.23 For an effect to be significant, the ecological integrity or conservation status of a sensitive feature must be influenced in some way. It may be that the effect is substantial in magnitude or scale, irreversible, has a long-term effect, or coincides with a critical period in a species' life-cycle. Professional judgement will be employed throughout, and where ecological features of lower value or importance could experience significant effects, albeit at a Local or Site geographic scale, this will be discussed and a precautionary approach adopted where appropriate. Where uncertainty or limitations exist, this will be acknowledged.

1.2.24 It is recognized that discernible effects can also occur at a local geographic level or below which are not sufficiently severe to be categorised as 'significant' in accordance with the approach set out in Chapter 5 but nonetheless merit discussion within the assessment. In the interest of completeness these effects will be discussed in the mitigation section of the Ecology Chapter of the ES in relation to general construction good practices to avoid or minimise low-level or minor disruption as well as standard pollution avoidance and control measures.

1.2.25 The relationship between receptors and effects is not generally a linear one and there are no hard or fast rules about what makes an effect significant. Judgements will therefore be supported by quantitative information supported by professional judgement.

1.2.26 For the purposes of the PEIR only potentially significant impacts will be identified and they will not be described as major, moderate, minor or negligible, as they would within the final EIA.

The final decision on the level of effect and therefore significance ultimately relies on professional judgement supported through transparently explained text. For the purposes of EcIA a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general.

1.2.27 Significant effects are expressed with reference to an appropriate geographic scale. For example a significant effect on a nationally designated site is likely to be of national significance. However, the scale of significance does not necessarily always relate to the importance of an ecological feature. For example an effect on a species which is considered of national importance, may not have a significant effect upon its national population. In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect has been assumed as a precautionary approach. Where uncertainty exists, this is acknowledged.

1.2.28 Where the EcIA proposes measures to mitigate adverse effects on ecological features, a further assessment of residual ecological effects, taking into account any ecological mitigation recommended, has been undertaken.

1.2.29 CIEEM guidelines do not recommend the use a matrix table as commonly set out in ES Chapters to determine 'significant' and 'non-significant' effects. For the purposes of the assessment presented herein, Table 8.1.5 below sets out adapted CIEEM terminology, which also shows the equivalent EIA terms often used in other disciplines for clarity.

Table 8.1.5

Effect (EIA Significance)		Equivalent CIEEM EcIA Terminology
Significant	Beneficial	Significant Positive Impact on ecological integrity or conservation status of an ecological feature above a Local level.
Non-significant	Minor Beneficial	Significant Positive Impact on ecological integrity or conservation status of an ecological feature at a Local level.
Neutral	Negligible	No Significant Impact on ecological integrity or conservation status.
Non-significant	Minor Adverse	Significant Adverse Impact on ecological integrity or conservation status at a Local level
Significant	Moderate Adverse	Significant Adverse Impact on ecological integrity or conservation status at a County level.
Significant	Major Adverse	Significant Adverse Impact on ecological integrity or conservation status at a Regional, National or International level

Cumulative Effects

1.2.30 The assessment of cumulative ecological effects follows a similar methodology to that described above for the main ecological assessment, in that the degree of effect is determined by combining an evaluation of the sensitivity of the ecological feature and the magnitude of change. The resulting effect will be described in the ES as major, moderate, minor or negligible and considers the magnitude of change which would potentially arise from multiple developments.

Approach to Mitigation

1.2.31 An integral part of the iterative design and assessment process undertaken to date has been the consideration of mitigation through sensitive routeing and design in accordance with the Holford Rules. The aim has been to ensure that the development takes account of environmental constraints and opportunities and achieves the optimum environmental fit as part of an environmentally integrated design.

1.2.32 During the ongoing detailed design process, there will be a continuing exploration of further opportunities for mitigation of likely significant ecological effects through sensitive alignment and siting of the component parts of the Proposed Development including:

- Individual pole positions and their associated infrastructure;
- Temporary access arrangements; and
- Construction areas (in relation to important ecological receptors ecological networks and connectivity).

1.2.33 The aim will be to avoid loss and disruption to valuable habitats or effects on protected and notable species populations when siting the different elements of the Proposed Development. Working areas and access tracks will be kept to a minimum and existing tracks and gaps in hedgerows will be used as far as practicable. Any areas disturbed will be reinstated, including the reinstatement of disturbed habitat and replacement planting, including along hedgerows. For example, any sections of hedgerow which have to be removed for pole installation will be stored on site and replaced within 48 hours.

APPENDIX 8.2
ECOLOGY BASELINE AND ASSESSMENT

APPENDIX 8.2:

ECOLOGY BASELINE AND ASSESSMENT

1.1 INTRODUCTION

1.1.1 This section outlines the ecology baseline and the preliminary assessment of the effects on ecology for the PEIR and in advance of the Environmental Impact Assessment and Environmental Statement (ES), with reference to designated sites, protected and notable species and habitats of principal importance.

1.2 BASELINE ENVIRONMENT

1.2.1 The ecological baseline forms the basis for the identification and description of the changes that may result from the Proposed Development, established through desk study and field surveys. Designated features and other sensitive ecological receptors are identified.

1.2.2 Potential sensitive ecological receptors are identified through a review of the baseline studies, by responses from consultees and through site survey.

Existing Baseline

1.2.3 Habitats present across the overhead line route based on extended Phase 1 habitat surveys are described in Appendix 8.3 ‘Extended Phase 1 Habitat Survey’ and shown on Figure 8.2 ‘Phase 1 Habitat Survey’.

1.2.4 The ecological baseline forms the basis for the identification and description of the effects that may result from the Proposed Development. It establishes the value and potential sensitivity of ecological features, and their distribution in relation to the Preferred Line Route. The baseline describes the ecological context within which the proposed development will take place, including biodiversity networks and habitat connectivity.

1.2.5 Ecological features (also known as ecological receptors) are identified through desk-based study and review of biological records available from organisations such as the Shropshire Ecological Data Network (SEDN) and, Shropshire Wildlife Trust (SWT), Royal Society for the Protection of Birds (RSPB), British Trust for Ornithology (BTO), other consultee responses, and from habitat and species surveys.

Definition of study area

1.2.6 In summer 2016, a broad-scale Phase 1 habitat survey was undertaken of a 500m wide corridor along the Preferred Route Corridor (described in Chapter 1: ‘Introduction’). The purpose of this survey was to gather an initial habitat baseline to inform consultations and the scoping of further surveys. The broad-scale Phase 1 habitat mapping involved surveys from publicly accessible land, footpaths and roads, in combination with a review of online aerial imagery and desk study review of statutory and non-statutory designated sites.

1.2.7 The ecological assessment focuses on those areas which are likely to experience significant effects, as set out in the CIEEM Guidelines 2016. This also accords with the EIA Regulations, which require the identification of the ‘*likely significant effects of the proposed development on the environment*’ (Schedule 4 Part 1 Para 20). The assessment methodology is set out in Appendix 8.1 ‘Ecology Assessment Methodology’.

1.2.8 Suitable survey areas and desk study areas were identified to inform the valuation of ecological features as part of the EIA. This informed the selection of important ecological features scoped in to the assessment. The extent of the survey and desk study areas varied in accordance with the typical distribution and movements of individual species and the likely mobility of qualifying

interests of statutory designated sites. These are described further below, and in Table 8.2.1.

1.2.9 The ecological survey area for the Preferred Line Route generally covered a 100m wide corridor, which was extended as necessary to land on either side (additional buffer areas) to take into account habitats and species potentially affected by access routes and additional land take that might be required for construction. The objective was to ensure the survey extents provided appropriate baseline information on habitats and species potentially directly or indirectly affected by the Preferred Line Route to ensure they could be given due consideration within the assessment. The extent of these additional buffer areas beyond the 100m wide survey corridor varied depending on the ecological feature being considered, the 'zone of influence' of potential effects of the proposed development on ecological features, the evolving design, and information gathered from consultees.

1.2.10 Habitat and species surveys undertaken in 2016 and 2017 and a description of the survey extents are described in Table 8.2.1. The need or otherwise for additional surveys at specific locations was regularly reviewed as surveys progressed.

Table 8.2.1 Baseline Field Surveys and Study Areas

Ecological Feature/Importance	Zone of Influence	Survey Type, Extent and Methodology
Habitats Local	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. There will be minimal indirect habitat disturbance beyond the working corridor. A precautionary 100m wide survey corridor is considered sufficient to capture information on habitats within and adjoining working areas.	Extended Phase 1 habitat survey along the 100m wide corridor of the Preferred Line Route, building on the broad-scale Phase 1 habitat survey of a 500m wide corridor completed in 2016. The survey area was be extended where necessary along accesses and up to an additional 50m either side of the 100m corridor to ensure that features of ecological interest/ value outside the corridor (for example ponds within 50m) were mapped and described. The survey methodology followed that set out in Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit' JNCC (2010), 'extended' to allow the recording of additional features of interest, and assesses the potential for protected or notable species or species listed under Section 41 of the NERC Act 2006, as recommended in the Guidelines for Preliminary Ecological Appraisal (CIEEM 2013) and in line with British Standard 42020:2013 Biodiversity – Code of Practice for Planning and Development. **Scoped in to the assessment due to potential loss of Priority Habitat listed under S41 of the NERC Act and habitat connectivity only.**
Species-rich vegetation Local	As for habitats above.	Certain locations may have potential to support vegetation communities of particular interest, for example in the vicinity of Ruewood Pastures SSSI and near Moorfelds, Loppington. These locations will be subject to more detailed botanical (National Vegetation Classification, or NVC), survey based on Rodwell, J. (1991) British Plant Communities Vols. 1-5. **Scoped in to the assessment due to potential loss of Priority Habitat listed under S41 of the NERC Act and habitat connectivity only.**
Hedgerows Local	As for habitats above.	Hedgerows within the 100m wide Preferred Line Route and where crossed by accesses will be described and mapped as part of the extended Phase 1 habitat survey. Sections of hedgerow likely to be directly affected (e.g. sections to be temporarily removed for access including those beyond the 100m wide corridor) potentially qualifying as 'Important' under the Hedgerows Regulations 1997 will be subject to full survey following the Hedgerow Survey Handbook. A standard procedure for local surveys in the UK. (Defra, 2007) and Clements DK and Tofts RJ Hedgerow Evaluation and Grading Systems (HEGS)*: A Methodology for the Ecological Survey, Evaluation and Grading of Hedgerows*

Table 8.2.1 Baseline Field Surveys and Study Areas		
Ecological Feature/Importance	Zone of Influence	Survey Type, Extent and Methodology
		(1992). **Scoped in to the assessment due to potential loss of Priority Habitat listed under S41 of the NERC Act and habitat connectivity only**
Trees Local	To ensure the overhead line is 'resilient' against tree and vegetation damage in 'abnormal weather conditions' damage from trees and vegetation during major storm events, clearance guidance is provided in the Electricity Networks Association (ENA) publication ETR 132 (2005). This defines distances within which trees may require removal or cutting back to ensure adequate and safe clearance distances. Beyond this clearance area, the construction and operation of the preferred one route would not have any effects on trees.	An arboricultural survey was undertaken of trees within 25m either side of the Preferred Line Route and along or adjacent to access routes where they may potentially be affected. This primarily related to trees within the 20 - 40m wide Limits of Deviation. Survey methods followed British Standard BS5837 Trees in Relation to Design, Demolition and Construction - Recommendations. 2012. Veteran trees were also identified where present from the combined findings of the arboricultural survey, extended Phase 1 habitat survey and desk study. **Scoped in to the assessment due to potential loss of Priority Habitat listed under S41 of the NERC Act and habitat connectivity only (see also effects under Bats)**
Badgers Local	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. There will be minimal indirect habitat disturbance beyond the working corridor. A precautionary 100m wide survey corridor is considered sufficient to capture information on badgers within and adjoining working areas.	Signs of badger presence/ activity including setts, latrines, paths etc. within a 100m wide survey corridor and up to an additional 50m buffer either side where required, for example along accesses and where a main sett was identified requiring further survey. Information from the badger survey has been recorded as a separate Confidential Annex to the Technical Appendices. **Scoped in to the assessment due to potential direct effects on badgers or their setts as protected under the Protection of Badgers Act 1997.**
Bats County	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. There will be no night-time working and hence very limited lighting of construction areas (lighting will be further controlled through the CEMP). The operational overhead line will not be lit. There will be minimal indirect habitat disturbance beyond the working corridor. A 100m wide survey corridor is considered sufficient to capture information on bats within and adjoining working areas.	Preliminary bat roost assessments (PRA) (ground-based) of trees likely to be affected by works within the 100m wide Preferred Line Route and where trees may be affected by accesses (as described above under Trees). These will identify trees with low, medium or high bat roost potential. Activity (transect) surveys at selected locations along the Preferred Line Route with the aim of identifying any important foraging and commuting flyways. The 100m wide corridor was extended for activity surveys to capture wider activity patterns across a representative variety of habitats near the Preferred Line Route. Trees directly affected by the project (felled or cut back) with medium or high bat roost potential will be subject to further survey to identify whether or not they support bat roosts, for example through climbing tree roost inspections. Methodologies in accordance with Collins Bat Conservation Trust, Collins J. 'Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition. (2016). All UK bats and their roosts are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended) and the Habitat Regulations as European Protected Species (EPS). So far as achievable, measures embedded in the project design have avoided habitat features likely to be used by bats. All species recorded during baseline surveys are common and widespread species and overall activity was low. Bats are however, assigned a County level of importance, on the basis

Table 8.2.1 Baseline Field Surveys and Study Areas		
Ecological Feature/Importance	Zone of Influence	Survey Type, Extent and Methodology
		of their legislative protection. **Scoped into assessment due to the potential for effects on bat roosts due to tree removal during construction of the proposed development.**
Dormouse County	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. There are no historic records for dormice in the area.	No specific presence/ absence surveys were considered necessary to inform the assessment, given the current known distribution of dormice in Shropshire and the relatively limited extents of habitat removal required for the proposed development. It is considered that information from local records obtained through desk study and consultation, and data on habitat suitability gathered during the Extended Phase 1 habitat survey, are sufficient to inform the assessment and any mitigation that might be proposed. Such information was also be used to review the potential need for targeted surveys at specific locations, for example based on likely construction effects combined with desk study records and presence of high suitability habitat and connectivity with mature woodlands. This review did not show that further surveys would be necessary. Natural England's Standing Advice for dormice[1] states that there is no requirement to survey for dormice if the area provides unsuitable habitat for the species and development is unlikely to affect dormice. The extended Phase 1 habitat survey found few habitat locations potentially suitable for dormice and these were generally poorly connected to more suitable habitat in the wider landscape, often being isolated within open arable fields. Only small sections of species-poor hedgerow (approximately 5m wide) of low/unsuitable value to dormice are likely to be affected, and for a temporary period only which is not considered to present a significant barrier to species moving along the hedgerow network. **Scoped out of the assessment.**
Reptiles County	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. Records of reptiles for the area are very limited – likely due to lack of survey information as well as to a lack of sightings.	Natural England's Standing Advice[2] for reptiles states that surveys are only required if the development: • site has habitat suitable for reptiles • will alter the water levels of the site or surrounding area • will break apart suitable habitat for reptiles • distribution and historical records suggest they may be present The extended Phase 1 habitat survey along a 100m wide corridor around the Preferred Line Route sought to identify areas of suitable reptile habitat. Very few areas of potentially suitable habitat were mapped, and these were limited in terms of extent and degree of connectivity to higher value habitat in the wider area. The proposed development area is considered to have low potential for reptiles. Given the restricted footprint of the construction and operational phases of the proposed development within a largely agricultural area, no specific presence/ absence surveys are

[1] ttps://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects
[2] https://www.gov.uk/guidance/reptiles-protection-surveys-and-licences

Table 8.2.1 Baseline Field Surveys and Study Areas		
Ecological Feature/Importance	Zone of Influence	Survey Type, Extent and Methodology
		considered necessary to inform the assessment. While reptiles may be present within the study area, the proposed development will not isolate, fragment or cause the loss of areas of high value reptile habitat. It is considered that information from local records obtained through desk study and consultation, and habitat suitability gathered during the Extended Phase 1 habitat survey, is sufficient to inform the assessment and any mitigation that might be proposed. Such information was also used review the potential need for targeted surveys at specific locations, but no further survey was considered necessary. **Scoped in to the assessment in relation to good practice mitigation measures only.**
Amphibians including great crested newts County	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor. As a precautionary approach, where the working corridor lies within 50m of ponds, great crested newts are considered potentially at risk from disturbing or damaging activities. The majority of the habitat loss will represent improved grassland of low value to foraging individuals only. Great crested newts, if present, are less likely to use open arable or grazed improved grassland fields and favour more suitable habitat with better shelter such as field boundary hedgerows, woodland, scrub and ruderal marginal vegetated areas. Direct loss of or damage to hedgerows, ruderal vegetation, woodland or scrub habitat could result in the loss of suitable refuge and places of shelter.	Waterbodies within the 100m wide corridor and up to 50m beyond this where required, identified from aerial images, desk study and the Extended Phase 1 habitat survey, were subject to Habitat Suitability Assessment using HSI methodology (Oldham et al 2000, and ARG UK 20103). Presence/ absence surveys of accessible ponds within the 100m wide Preferred Line Route and 50m buffers undertaken using Environmental DNA (e-DNA) methodology (Biggs et al. 2014a)4 with analysis undertaken by a suitably equipped laboratory in adherence to the analysis methodology outlined within the DEFRA Project WC1067 report (Biggs et al., 2014b5). Great crested newts are protected under the provisions of the Wildlife and Countryside Act 1981 (as amended) and the Habitat Regulations as European Protected Species (EPS). **Scoped in to the assessment in relation to potential effects on great crested newts.**
Otter and water vole County	Species potentially present within waterbodies, ditches and watercourses and associated bankside habitat 100m up and down stream of proposed crossing points. The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor.	Watercourses and suitable ditches surveyed for habitat suitability and signs of otter and water vole presence along both banks 100m upstream and downstream of Preferred Line Route crossing points. **Scoped in to the assessment.**
Breeding birds	Disturbance and/or displacement during construction or collision risk during operation phases may affect breeding	A consultation response from the RSPB noted that some agricultural fields may be used for breeding by protected or notable bird species vulnerable to collision, such as lapwing. Additional bird

[3] Oldham R.S., Keeble J., Swan M.J.S & Jeffcote M. (2000), Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10 (4), 143-155.
[3] ARG UK (2010), ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.
[4] Biggs J., Ewald N., Valentini A., Gaboriaud C., Griffiths R.A., Foster J., Wilkinson j., Arnett A., Williams P, and Dunn F (2014), Analytical and methodological development for improved surveillance of the Great Crested Newt.
[5] Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust. Oxford.

Table 8.2.1 Baseline Field Surveys and Study Areas		
Ecological Feature/Importance	Zone of Influence	Survey Type, Extent and Methodology
(including additional surveys for herons and kingfisher) Local/County	target species (generally considered to be geese and other wildlfowl) and all other species of breeding bird. Direct effects during the construction phase would be limited to the working corridor (25m). Indirect effects could influence target species or Schedule 1 species over a greater distance. Effects limited by linear and short term nature of construction works at any one location (poles being worked on over 1-2 days each and not whole development at the same time).	records obtained from RSPB were used in conjunction with field survey results to identify areas of target species breeding activity within at least 200m of the Preferred Line Route. Targeted breeding bird surveys comprised three survey visits at selected locations following a simplified version of the Common Bird Census (CBC) and Gilbert et al. '*Bird Monitoring Methods: A manual of techniques for key UK species'* RSPB (1998). **Scoped in to the assessment.**
Non-breeding (including overwintering) birds Local/County	Disturbance and/or displacement during construction or collision risk during operation phases may affect target species (generally considered to be geese and other wildlfowl) and all other species of breeding bird. Direct effects during the construction phase would be limited to the working corridor (25m). Operation phase may affect flying birds passing across the Preferred Line Route and hence a greater potential zone of influence is considered.	Vantage point (three locations) and non-breeding walkover/ driven surveys completed between October 2016 and March 2017 in line with Natural England guidance TIN069 (2010) and with reference to SNH (2016) guidance on recommended survey methodologies for overhead lines for birds. The surveys focused on target species generally acknowledged to be vulnerable to collision risk, such as geese and waders. **Scoped in to the assessment.**
Aquatic species including fish and white-clawed crayfish County	Within waterbodies, ditches and watercourses 100m up and down stream of proposed crossing points.	Watercourses and ditches mapped as part of the Extended Phase 1 habitat survey. As the Preferred Line Route will not involve any works within watercourses, and poles and construction areas will be set back from bankside habitats, no specific presence/ absence surveys are considered necessary to inform the assessment **Scoped out of the assessment other than standard good practice pollution prevention measures for the protection of watercourses.**
Other species including other mammals, invertebrates and invasive non-native species. Local	The working corridor for construction is described in detail in Chapter 3 'The Proposed Development' and will be approximately 25m wide. Works are short term (1-2 days at each individual pole) with land take and physical disturbance limited to this working corridor.	Potential habitat suitability and presence of notable species including invasive species was noted where observed as part of the Extended Phase 1 habitat survey along a 100m wide survey corridor. Given the relatively restricted footprint of the construction and operational phases of the proposed development within a largely agricultural area, and the fact that waterbodies and watercourses will be avoided and hedgerows will be reinstated, no detailed invertebrate or other species surveys were considered necessary to inform the assessment. **Scoped in to the assessment in relation to standard good practice embedded mitigation and CEMP only.**

Designated Sites

1.2.11 The Multi Agency Geographic Information for the Countryside' (MAGIC[6]), Joint Nature Conservation Committee (JNCC) and Natural England websites were consulted to obtain information on statutory and non-statutory designated sites within a 5km radius of the Preferred Line Route and identify the presence of any 'Ancient woodland' or 'Priority habitats' within and immediately adjacent to the Preferred Line Route. Shropshire's Environmental Network mapping has also been consulted as part of baseline information gathering to help identify potential areas of Priority Habitat 70. Reference has also been made to Ordnance Survey maps of the wider area and online aerial images (www.google.co.uk/maps) in order to determine any features of nature conservation interest in the wider area.

1.2.12 Designated sites such as Sites of Special Scientific Interest (SSSI), Ramsar sites, Special Protection Areas (SPA) and Special Areas of Conservation (SACs) were mapped and described in the Route Corridor Options Report 2016.

1.2.13 Additional information on County Wildlife Sites and Local Nature Reserves was also provided by Shropshire Wildlife Trust in partnership with Shropshire Council.

1.2.14 Part of the Midland Meres and Mosses Phase 2 Ramsar and SSSI site lies approximately 2km north of the Preferred Line Route. The Meres & Mosses of the north-west Midlands form a nationally important series of open water and peatland sites. The Ramsar site supports a number of rare species of plants associated with wetlands, including the nationally scarce cowbane *Cicuta virosa* and, elongated sedge *Carex elongata*. Also present are the nationally scarce bryophytes *Dicranum affine* and *Sphagnum pulchrum*. The site also supports an assemblage of invertebrates including several rare species. There are 16 species of British Red Data Book insects listed for this site including the following endangered species: the moth *Glyphipteryx lathamella*, the caddisfly *Hagenella clathrata* and the sawfly *Trichiosoma vitellinae.* Bird species include passage northern shoveler *Anas Clypeata* and wintering great cormorant *Phalacrocorax carbo carbo*. Great bittern *Botaurus stellaris stellaris* and water rail *Rallus aquaticus*.

1.2.15 The following two Sites of Special Scientific Interest (SSSI) lie within 1km of the Preferred Line Route:

- A section of the Montgomery Canal, lying approximately 850m south of where the route crosses the Canal. The special interest of this section of the Montgomery Canal is in the aquatic features; and
- Ruewood Pastures lying approximately 530m south-east, of the Preferred Line Route is designated for its grassland plant species.

1.2.16 The following SSSIs are all between 1 and 3km from the Preferred Line Route.

- Brownheath Moss lying approximately 1.7km north of the Preferred Line Route is part of the Midlands Meres and Mosses Phase 2 Ramsar area and is important for its fen and carr vegetation communities;
- Sweat Mere and Crose Mere lying 2km north of the Preferred Line Route is part of the Midlands Meres and Mosses Phase 2 Ramsar area and supports a complex of open water, reedswamp, fen and woodland habitats; and
- Fernhill Pastures lying 2.8km north of the Preferred Line Route is a series of traditionally managed fen-meadows situated on gently sloping ground alongside the River Perry.

1.2.17 Three Local Wildlife Sites (LWS) lie within 1km of the Preferred Line Route:

[6] http://www.magic.gov.uk/MagicMap.aspx

- Moorfields, Loppington – lies approximately 100m north of the Preferred Line Route. The LWS comprises two fields which are good examples of unimproved and marshy grassland supporting areas of semi-improved and unimproved neutral grassland and areas of rush-dominated grassland bounded primarily by ditches and alder trees;
- Ruewood Pools lies approximately 630m south of the Preferred Line Route and comprises an area of damp, unimproved pasture with silted murky pools, surrounded by encroaching alders; and
- Halston Hall heronry lies approximately 750m north of the Preferred Line Route and is an area of deciduous woodland containing a heronry on an island within an ornamental lake.

1.2.18 There are no areas of ancient woodland crossed by the Preferred Line Route. The nearest area of ancient woodland is at Gravenall, approximately 750m to the north of the Preferred Line Route.

1.3 ISSUES IDENTIFIED

1.3.1 The findings of the desk study and surveys and discussions with stakeholders, has identified important or sensitive ecological features to be taken into consideration in the iterative detailed design and assessment process.

1.3.2 The following ecological receptors, are considered sensitive and requiring particular consideration in the design and assessment process:

- Designated sites;
- Notable habitats[7] comprising:
  - watercourses including the Montgomery Canal, Rivers Perry and Roden and their potential to support protected species, and to act as flyways for geese and other waterfowl;
  - ponds and their potential to support amphibians in particular great crested newts;
  - woodlands, mature trees and hedgerows; and
  - species-rich grasslands.
- Protected and notable species, including otters, water voles, bats, great crested newts, reptiles, badgers, Schedule 1 protected bird species and breeding bird species at risk during construction and certain bird species at risk when overwintering, flying across the Preferred Line Route or breeding in the vicinity.

Construction

1.3.3 No designated sites will be directly affected by the proposed development. By virtue of their separation distances and static botanical qualifying interests, the nearest designated sites, comprising Ruewood Pasture SSSI, Montgomery Canal SSSI, Moorfield LWS, Ruewood Pool LWS were not considered to be ecologically or hydrologically linked to the habitats crossed by the Preferred Line Route. The closest designated sites, namely Ruewood Pasture SSSI and Moorfield LWS are notified for their botanical and habitat value. The survey area in the vicinity of these sites was extended beyond the 100m survey corridor and included a botanical survey of habitats to identify whether their botanical interests extended beyond the designated sites and into or across the survey corridor. It was found from the botanical surveys that habitats within the survey corridor of the Preferred Line Route were improved grasslands or arable fields

[7] as defined under habitats of Principal Importance under Section 41 of the NERC Act (2006)

and did not share or provide important ecological connectivity with the designated vegetation community features of these sites.

1.3.4 The direct habitat effects arising from construction of the overhead line would be those associated with access and clearance of the line corridor with habitats (and associated species) affected by the felling or cutting back of individual mature trees and scrub and removal of sections of hedgerow. Wayleave corridors will be required when the Preferred Line Route passes through woodland. Short sections of hedgerows may be temporarily removed to provide access for construction and or maintenance, although currently this is not anticipated as being necessary.

1.3.5 Construction of the proposed overhead line would take approximately 12 months, but this would be phased across the length of the route, with works in any one pole location taking approximately 1 – 2 days. .

1.3.6 Removal of trees is normally regarded as a long term effect whereas hedges removed for access can be stored on site and reinstated within 48 hours. Creation of new access tracks, construction compounds and storage areas, and hardstanding may affect local habitats, although such effects would be temporary as tracks and compounds would be reinstated upon completion of the works.

1.3.7 The approximate area of temporary and permanent habitat loss from the proposed development is set out in Table 8.2.2 below. This provides an estimate at this stage of the assessment process and demonstrates that the large majority (96%) of habitat affected by the proposed development comprises arable and improved grassland under agricultural management. This estimate provides a worst case scenario which will be updated for the Environmental Statement and assumes that all habitats within a 25m wide working corridor (10m for undergrounded section and 5m wide for temporary access tracks) would be directly affected during construction, which is a conservative assumption).

Table 8.2.2 Approximate area of habitat loss within overall construction footprint (assumed here to include laydown areas and construction compounds and a 25m wide corridor along the Preferred Line Route)

Habitat type	Approximate Area of Temporary Loss During Construction	Approximate Area of Permanent Loss - where occupied by poles and associated stays
Arable	31ha (38%)	Overall less than 0.5ha
Improved grassland	49ha (60%)	
Semi improved grassland	1ha (1%)	
Hedgerow	Negligible	Negligible
Woodland/Trees/Scrub	1ha (1%)	<0.5ha

Table 8.2.2 Approximate area of habitat loss within overall construction footprint (assumed here to include laydown areas and construction compounds and a 25m wide corridor along the Preferred Line Route)		
Habitat type	Approximate Area of Temporary Loss During Construction	Approximate Area of Permanent Loss - where occupied by poles and associated stays
Ponds	Negligible	Negligible

Operation

1.3.8 The main effects of the proposed overhead line during its operational life would be the presence of additional wood pole structures and overhead line providing a new feature within the countryside. Once constructed, however, there would be no moving parts or lighting and the line would only require very occasional visits by SP Manweb for maintenance and repair.

1.3.9 The wood poles, once installed, would have negligible ongoing ecological effects after construction, occupying a small footprint and with natural vegetation reinstated on all sides. The poles, being located within farmland, will not create new barrier or habitat fragmentation effects.

1.4 ASSESSMENT OF IMPACTS AND EFFECTS

1.4.1 This section provides an outline of the impacts and effects on identified sensitive receptors, to be discussed fully in the ES.

1.4.2 The Preferred Line Route design incorporates a range of embedded mitigation measures to ‘design out’, avoid or minimize the potential for adverse ecological effects and this has been taken into account when assessing potential effects on ecology. These measures include but are not restricted to:

- Routing and alignment amendments to avoid higher value habitat features where practicable (such as woodlands, ponds, mature trees, species-rich hedgerows);
- Using existing field gates and farm tracks for construction access wherever possible and minimizing the need for hedgerow removal or ditch crossings. As a result of this, the planned accesses for the proposed development do not require any tree or hedgerow removal;
- Maintaining a minimum 8m stand-off from the banksides of watercourses and waterways, also protecting the species (such as water vole) present in such habitats; and
- Locating laydown areas, construction compounds away from more vulnerable or sensitive habitats such as woodlands, ponds or watercourses, also protecting the species (such as water vole) present in such habitats.

1.4.3 In addition the assessment has assumed the adoption of standard best practice construction measures, to be set out in the CEMP to avoid and minimize potential effects to habitats and species under the supervision of an appointed Project ecologist. This will include but not be restricted to:

- Stand-off or buffer areas around sensitive habitat features or locations of vulnerable species, appropriate timing of construction, and appropriate pollution prevention and control measures;
- Pre-construction update surveys for key species including badgers, and water voles and otters at watercourse crossing points;

- Adherence to current best practice pollution prevention guidance and in line with Environment Agency requirements;
- Tool Box Talks and site briefings for all construction staff; and
- Species specific working method statements to include habitat protection and species Reasonable Avoidance Measures where required.

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
Midlands Meres and Mosses Natura Site *Internationally important statutory designated site*	The Midlands Meres and Mosses lie approximately 2km distant. There will be no direct land take or potential for habitat loss. There are no direct functional ecological links between the construction area required for the Preferred Line Route and the Natura site. The Preferred Line Route does not cross core non designated habitat for ornithological features associated with the Natura Site. Natural England when consulted has stated that it does not consider that there would be any discernable effects on the Natura Sites from the proposed Development. **It is considered that there would be no significant effects upon this statutory designated site during the construction or operational phase.**
Ruewood Pasture SSSI designated for its botanical interest *Nationally important Statutory designated site*	The SSSI lies approximately 560m from the Preferred Line Route and will experience no direct effects. There will be no loss of associated habitat outside the SSSI due to construction of the proposed development. Habitat and botanical surveys of land around the SSSI did not identify any notable flora or species assemblages which are characteristic of the habitats within the SSSI. Individual plants of meadow rue *Thalictrum flavum,* a characteristic species of the damp meadow habitat within the SSSI was identified around ditches on the eastern side of the River Roden, but located outside the 100m survey corridor around the Preferred Line Route and hence not affected by the proposed development. Construction approach will result in negligible change to existing land drainage/groundwater drainage (see Chapter 10 'Flood Risk and Water Resources') and there will be no potential for indirect habitat effects within arising from alterations to soil water conditions. The SSSI is not designated for mobile qualifying interests (e.g. birds) that could be affected by the operational phase of the proposed development. **It is considered that there would be no significant effects upon this statutory designated site during the construction or operational phase.**
Montgomery Canal SSSI *Nationally important Statutory designated site*	The section of the canal that is designated as SSSI lies over 1km from the proposed crossing point of the Preferred Line Route. There will be no in-canal works. All works will be set back at least 8m from canal banks and pollution prevention, and specific canal protection measures (set out in the CEMP and agreed with the Canal and Rivers Trust) will protect the waterway and its associated species from indirect effects. **It is considered that there would be no significant effects upon this statutory designated site during the construction or operational phase.**
Moorfield LWS *County important Non statutory designated site*	The LWS lies approximately 100m from the Preferred Line Route. Habitat and botanical surveys of land around the designated site did not identify any notable flora or species assemblages characteristic of the habitats within the LWS. Construction approach will result in negligible change to existing land drainage/groundwater drainage (see Chapter 10 'Flood Risk and Water Resources') and hence no potential for indirect habitat effects arising from alterations to soil water conditions.

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
	It is considered that there would be no significant effects upon this non-statutory designated site during the construction or operational phase
Ruewood Pool LWS *County important Non statutory designated site*	The LWS lies 1.3km from the Preferred Line Route and is not considered at risk from indirect effects due to the separation distance involved and the mitigation provided through the CEMP to avoid any risk of effects from runoff and siltation effects during construction. **It is considered that there would be no significant effects upon this non-statutory designated site during the construction or operational phase.**
Arable and grassland habitats	Low ecological value habitat which forms the majority of the habitat crossed by the Preferred Line Route. Extended Phase 1 habitat survey and botanical surveys did not record any areas containing arable weed species which would have been considered notable habitat. Fields were largely cultivated right up to the margins, and hedgerow bases and uncultivated field were frequently narrow and relatively species-poor. **It is considered that there would be no significant effects upon farmland habitats along the Preferred Line Route during the construction or operational phases.**
Trees and woodlands *Priority habitat*	No ancient woodland or veteran trees within the survey corridor. No tree removal is required for construction accesses, which will use existing farm gates and tracks or cross arable/grassland habitat. Some limited tree removal and pruning back to maintain safety distances will be required. Retained trees in proximity to the working area would be protected in accordance with BS 5837:*Trees in Relation to Design, Demolition and Construction - Recommendations. 2012*. **It is considered that there would be no significant effects upon trees or woodland habitats along the Preferred Line Route during the construction or operational phases.**
Hedgerows *Priority habitat*	No hedgerow removal required for accesses – existing field accesses will be used throughout. Construction near hedgerows will follow CEMP method statement for the protection of retained trees and hedgerows in line with BS 5837:*Trees in Relation to Design, Demolition and Construction - Recommendations. 2012*. Any hedgerow removal (although not currently required) will be temporary and restricted to small lengths of approximately 5m at individual locations. Hedgerows will be reinstated using suitable native hedgerow species after works and hence there will be no net loss of hedgerow habitat, or fragmentation or loss of connectivity for the hedgerow network in the wider landscape. Habitat affected during temporary constriction works would rapidly re-establish on completion with negligible loss (confined to small scale loss of species-poor habitat). **It is considered that there would be no significant effects upon hedgerow habitats along the Preferred Line Route during the construction or operational phases.**
Watercourses *Priority habitat*	Watercourses will be crossed by the Preferred Line Route at several locations, including across the Montgomery Canal, River Perry (3 crossing points due to river meanders) and River Roden. At each crossing point, work on pole erection will take place without the requirement for any bankside or in-river works. A minimum 8m stand-off distance will be maintained during works, thereby protecting the watercourses and riparian habitats as well as the species they support. Overhead lines will be connected and brought across the watercourses without the need for in-stream works. **It is considered that there would be no significant effects upon watercourse habitats along the Preferred Line Route during the construction or operational phases.**
Ponds *Priority habitat*	A total of 34 ponds were subject to habitat survey, of which approximately half lay outside the 100m survey corridor but were assessed in the context of their relationship to habitat corridors and other ponds. 18 ponds lie within or adjacent to the 100m wide survey corridor and some are in close proximity to proposed pole locations. No ponds will be lost to the proposed development and no works within ponds are proposed. Embedded design and micrositing of poles will seek to keep a suitable distance away from all waterbodies. Works that are unavoidable in close proximity to pond habitats will be controlled through

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
	implementation of the CEMP, to ensure appropriate pollution prevention measures and physical safeguards are in place. This will include maintaining a stand-off zone around the pond margins, and ensuring works are undertaken following appropriate method statements. Specific measures will be set in place for amphibians (great crested newts) within a Species Protection Plan in the CEMP. No operational phase effects are anticipated on ponds once construction is complete. **It is considered that there would be no significant effects upon pond habitats along the preferred line route during the construction or operational phases.**
Species	
Birds (breeding and overwintering) Target species including lapwing and grey heron as described in **Appendix 8.5 Ornithology Surveys**	Overwintering and breeding bird surveys were undertaken as part of baseline ecological surveys, and ornithological records were obtained from the RSPB and BTO to identify possible areas of sensitivity for target bird species (such as Schedule 1 species, species considered vulnerable to collision risk, bird species during the breeding season). Overall the preferred line route does not constitute a particularly sensitive area for target species of birds and does not support large numbers of vulnerable species such as geese or other waterfowl. Small numbers (1-2 pairs) of lapwing were observed attempting to breed in a small number of the numerous large open fields present across the survey area, however agricultural management and ploughing of fields meant that little or no successful breeding was noted. Numerous heron flights were recorded in winter passing north-south and intersecting the preferred line route. Flights were however all above the height of the proposed overhead line. Few intersecting flights were recorded in the spring/early summer, suggesting that heron movements changes seasonally in the area. During the construction phase, the potential for disturbance/ displacement effects on target species of birds (those more vulnerable to collision risk or other effects from a linear development such as this) were considered. Breeding birds may be affected by the proposed development if works are carried out during the breeding season, but this risk can be addressed through appropriate timing of construction, or pre-works nest checks by an ecologist and associated avoidance measures if required. This would form part of the CEMP which will include measures to protect breeding and overwintering birds and the habitats they utilise. The detailed design of the preferred line route has also avoided more sensitive locations where practicable and has sought to minimize habitat loss for breeding birds overall through the embedded design. Construction works are anticipated to have low/negligible potential for effects on bird species outside the breeding season. During the operational phase, the potential for collision and localized displacement of target bird species has been considered along with potential for increased predation by raptors and other species on vulnerable ground-nesting birds, caused by the use of poles and lines as hunting perches. The survey results indicate that bird activity across the preferred line route is relatively low and, while occasional collisions of individuals will inevitably occur as they already do for existing lines, this would not have significant effects on local populations of any species. Negligible effects on predation are anticipated due to the presence of new poles in the landscape, as the area already provides an abundance of suitable hunting perches for raptors in the form of trees, hedgerows and other vertical features. **It is considered that there would be no significant effects upon populations of any bird species along the preferred line route during the construction or operational phases and that there would be no significant effects on individuals of specific target species.**
Amphibians including great crested newt *Triturus cristatus* as described in **Appendix 8.6: Amphibians**	The construction of the Preferred Line Route will not result in any loss of ponds. Several ponds within 100m of the Preferred Line Route support great crested newts. The construction phase may result in localised habitat loss and disturbance to terrestrial habitat used for foraging or commuting within 250m of ponds during construction (temporary) **It is considered that there would be no significant effects upon the conservation status of great crested newts during the construction or**

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
	operational phase.
Reptiles	The findings of the extended Phase 1 habitat survey was reviewed to identify areas which could be considered suitable or high value habitat for reptile species. The habitats present along the Preferred Line Route are dominated by arable or improved grassland fields subject to regular agricultural management and of limited value to reptile species. The habitats along the route provide very limited extents of higher quality/suitable habitat for reptiles, generally restricted to narrow strips of refuge and foraging habitat along hedgerow bases, and in and around scattered woodland copses, and narrow lengths of scrub and ruderal vegetation along watercourses. See Figure 8.11 for suitable reptile habitats. The most suitable habitats for reptiles, generally accepted to be connected areas of heathland and marshy grassland are effectively absent. High value suitable and connected habitat in the wider landscape is also limited. During a suite of surveys undertaken between October 2016 and August 2017, careful checks were also undertaken for reptiles (including checking under natural refuges) no observations were made of any reptile species. It is considered that, while small numbers of common reptile species are likely to be present along the Preferred Line Route, notable populations or concentrations are not considered likely along the working corridor of the Preferred Line Route, which runs through an arable/pastoral area which is also subject to regular agricultural management and disturbance. The nature of the proposed development entails a restricted construction footprint and construction proceeds in a largely linear way, meaning that habitat disturbance will be temporary and short term at any given location along the route. There will be inconsequential loss of suitable reptile habitat and hence negligible fragmentation effects on reptiles (if present near the construction area). The risk of direct harm to individuals present along the working corridor can be suitably addressed and avoided through implementation species protection measures as part of the CEMP. **It is considered that there would be no significant effects upon the conservation status of any reptile species during the construction or operational phases.**
Water Vole/Otter As described in **Appendix 8.8: Otter and Water Vole**	Otter and water vole surveys were conducted up and down stream of proposed crossing points of watercourses and ditches, where water was present. Signs of presence were also searched for around ponds lying along the survey corridor. No evidence of otter was recorded, however it is considered this species is likely to be present in the area move along the main watercourses as part of wider territories. Water vole presence was recorded at the River Perry and along ditches east of the Rover Roden. No culverting or watercourse re-alignment or other intrusive bankside works are required and construction (including accesses, laydown areas and compounds) will maintain a stand-off of 8m from banksides, thereby protecting both areas of confirmed presence and other sections considered potentially suitable for these species, but where presence was not confirmed. **It is considered that there would be no significant effects upon the conservation status of otters or water voles during the construction or operational phases.**
Dormouse	A desk study search and consultation with the County Ecologists indicated that dormice are not currently recorded in this part of Shropshire. The extended Phase 1 habitat survey showed that the majority of hedgerows along the survey corridor were species poor and offered low suitability foraging or shelter for dormice, and while some were connected to habitats of greater potential for this species in the wider landscape, the likelihood of dormouse being present in sections of hedgerow or woodland copses in the vicinity of the Preferred Line Route was considered to be extremely low. No impacts on dormice are considered likely to occur. **It is considered that there would be no significant effects upon the conservation status of dormice during the construction or operational phases.**
Bats as described in **Appendix 8.7: Bats**	The Preferred Line Route has avoided affecting trees as far as possible through a process of iterative design and alignment. The route passes through a relatively open landscape with scattered trees, treelines and small woodland copses identified along the surveyed corridor within areas dominated by arable and improved grassland fields under agricultural management. As a result, there will be relatively few trees directly affected by the construction of the proposed development. Trees within 25m either side of the Preferred Line Route (and hence having potential to be removed or cut back to facilitate works) were assessed for their potential to support bat roosts. No trees identified as having High bat roost potential would be affected by the proposed development. Of the trees considered to have moderate roost potential, none are currently considered likely to be directly affected by the Preferred Line Route construction

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
	works. Should this position alter for some reason, and Moderate Roost potential trees require pruning back or removal, this will be subject to further survey (climbing inspection) to confirm whether or not they support bat roosts. Trees with low roost potential requiring removal will be subject to 'soft felling' techniques under supervision. Species protection measures in relation to bats and tree roosts will also be set out in detail, in the CEMP. No trees will be removed without first checking their roost potential and where necessary establishing whether a roost is present. Trees with confirmed bat roosts would only be removed under a European Protected Species derogation licence issued by Natural England. Bat activity transects were undertaken at representative locations along the Preferred Line Route but did not suggest the presence of any roosts in close proximity to the line. Activity levels overall were not high and reflected the open, largely arable/improved grassland habitats crossed by the proposed development. As would be expected, bat activity was higher in the vicinity of woodlands, along watercourses and where the hedgerow network provided commuting routes and connected suitable foraging and roosting habitats. Overall much of the surveyed areas were considered to be of low value for foraging or roosting, comprising exposed open fields often lacking trees suitable for roosting, with more valuable habitat confined to the hedgerow margins. Areas of higher value to bats were considered to be along the watercourse corridors of the River Perry, where tree and hedgerows linked to woodlands in the wider landscape and where clusters of ponds, trees and woodland were well connected and associated with potential roost locations such as fam complexes containing barns and other potentially suitable roost structures. Bat species recorded during surveys comprised soprano and common pipistrelle, noctule, myotis species, and Nyctalus species. The most commonly recorded species was soprano pipistrelle (over 60% of all activity). Effects on bat commuting and foraging habitats are considered to be negligible, with minimal loss of suitable foraging habitat (primarily small areas of arable or grassland pasture around each pole location) and negligible effects on bat commuting routes. At present there is no requirement to remove hedgerow sections for construction. Should any sections of hedgerow need to be temporarily removed to construct the proposed development, the small lengths involved (approximately 5m at a time) are easily crossed by bats and would not represent a barrier to flight lines or connectivity. On currently available evidence no bat roosts are likely to be directly (through tree removal) or indirectly (through disturbance, e.g. from lighting) affected by the proposed development. The CEMP will include a requirement for pre-construction checks on trees with identified moderate/high bat roost potential affected by the proposed works, and a specific working method statement for bats that will be in place during construction to ensure no disturbance occurs during the construction phase. Once operational, negligible effects are anticipated on bat species. Routine maintenance will be required, involving periodic cutting back or trimming (of branch ends) of the encroaching trees to maintain safety clearances, which would be undertaken by suitably experienced contractors. This would not be expected to affect features with roost potential, being designed to address new growth, and would have negligible effects on commuting or foraging resources. However as a matter of standard good practice, tree maintenance would involve advance checks for bat roost potential before works are undertaken. **It is considered that there would be no significant effects upon the conservation status of any bat species during the construction or operational phases**.
Badger as described in **Confidential Badger Appendix 8.9**	Badgers are present along the survey corridor and approximately 29 active and inactive setts were located during surveys. Several setts lie in close proximity to the Preferred Line Route and specific mitigation measures will be required to safeguard individuals and ensure compliance with the legislation. However, badgers are common and widespread in Shropshire and the proposed development will have no discernable effects on local population levels arising from the limited badger mitigation measures likely to be required during the construction of the proposed development. There will be negligible operational effects on badger setts. Much of the habitat crossed by the Preferred Line Route comprises arable fields of lower value for foraging, but hedgerow and woodland margins, and grassland pastures all have the potential to be used by badgers. However the extent of temporary habitat loss during the construction phase will have negligible effect on the availability of foraging resources for badgers. Similarly given the nature of the construction and narrow working corridor, badgers present in the area will be likely to experience very low levels of disturbance and for short periods of time only. Indirect effects can be avoided through implementation of the

Table 8.2.3 – Likely ecological effects	
Receptor and susceptibility / sensitivity	Summary description and overall effect
	CEMP and a specific working method statement will be in place to ensure no disturbance to badgers and the protection of setts or suitable mitigation during construction where setts lie in close proximity (within approximately 50m) of working areas. No significant adverse effects are likely during the construction phase either on local badger populations or individuals that may be locally present during construction works with these measures in place. Pre-construction surveys will be undertaken to identify any new sett construction/badger presence within 50m of working areas, and if found to be present, suitable avoidance, protection or mitigation measures will be set in place before works commence at such locations. **It is considered that there would be no significant effects upon the conservation status of badgers during the construction or operational phases.**

Reinforcement to the North Shropshire Electricity Distribution Network:

132kV Electrical Circuit from Oswestry to Wem

APPENDICES 8.3 – 8.9 ECOLOGY

Preliminary Environmental Information Report

November 2017

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.3: Extended Phase 1 Habitat Survey

avianecology

Document Control				
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CONTENTS

1 INTRODUCTION

1.1 Background

1.1.1 This Technical Appendix presents the findings of an Extended Phase 1 Habitat Survey and Desk Study undertaken to inform the Preliminary Environmental Information Report (PEIR) for the 132kV electrical circuit from Oswestry to Wem.

1.2 Study Area overview

1.2.1 The Study Area comprised the Line Route and a 100m buffer. The Study Area follows the preferred line route across the north Shropshire countryside. The land is largely dominated by open arable farmland with woodland copses, networks of hedgerows, rivers and a canal.

2 METHODOLOGY

2.1 Desk Study

2.1.1 A desk study review of the Multi-Agency Geographic Information for the Countryside (MAGIC) website[1] has been undertaken to identify statutory and non-statutory designated sites for nature conservation and areas of Ancient Woodland to the preferred line route.

2.1.2 Biological records have been obtained from Shropshire Ecological Data Network (SEDN), Shropshire Wildlife Trust, BTO and RSPB. Records included information on non-statutory designated sites within 5km and protected and notable species within a 2km radius of the proposed line routes.

2.1.3 Reference was made to Ordnance Survey maps of the wider area and online aerial images (www.google.co.uk/maps) in order to determine any features of nature conservation interest in the wider area.

2.2 Extended Phase 1 Habitat Survey

2.2.1 Extended Phase 1 habitat surveys were undertaken between April and August 2017 by Ms C Baldock MRes ACIEEM, Mr T Winter BSc Grad CIEEM, Mr A Hulme BSc, Ms S Turner MSc and Mr Z Hinchcliffe BSc; all of whom are suitably competent and experienced ecologists.

2.2.2 The Phase 1 survey area comprised the Preferred Line Route and a 100m buffer. The survey area was extended in places by an additional 50m or more either side to encompass features of higher ecological interest/connectivity such as ponds and watercourses or well-connected linear habitat features.

2.2.3 The survey methodology followed the UK industry standard Joint Nature Conservation Committee (JNCC) Phase 1 Habitat Methodology (JNCC, 2010)[2],

[1] www.magic.defra.gov.uk

[2] JNCC (2010) Handbook for Phase 1 Habitat Survey - a Technique for Environmental Audit. Revised Print 2010. Joint Nature Conservancy Council, Peterborough

whereby all habitats within a site are mapped and described using a series of 'target notes' (TNs). The survey was extended to include the additional recording of specific features indicating the presence, or likely presence, of protected species and other species of conservation significance.

2.2.4 The extended Phase 1 habitat survey area is shown in Figure 8.2.

Limitations of survey

2.2.5 An Extended Phase 1 habitat survey does not constitute a detailed botanical survey or faunal species list nor provide a full protected species survey but enables competent ecologists to understand of the ecology of the surveyed area in order to broadly identify the nature conservation value and assess the significance of any potential impacts on habitat/species recorded. The survey was undertaken within the optimal period for botanical surveys (approximately April – September).

2.2.6 All private land was accessed with landowner consent. Consents were obtained for all sections of the preferred line route with some areas of neighbouring land viewed for context from publicly accessible roads and footpaths and/or from neighbouring landownerships. No significant constraints to survey coverage and habitat mapping were encountered in relation to the objectives of the survey.

3 RESULTS

3.1 Desk Study

Designated Sites

3.1.1 The desk study identified statutory designated sites within a 5km radius. These are detailed within **Tables 8.3.1** and **8.3.2** below.

Table 8.3.1: Designated Sites within 5km of Line Route LNR: Local Nature Reserve; SSSI: Site of Special Scientific Interest.

Designated Site	Distance from Line Route (nearest point)	Descriptions
Midlands Meres and Mosses Ramsar/SSSI	2km North	Nationally and internationally nationally important series of open water and peatland sites
Ruewood Pastures SSSI	150m South-east	A botanically rich meadow designated for its grassland plant species
Montgomery Canal SSSI	850m South	Watercourse supporting notable aquatic macrophytes.
Brownheath Moss SSSI	1.7km North	Part of the Midlands Meres and Mosses Ramsar; an area of open water and fen and carr vegetation communities..

Sweat Mere and Crose Mere SSSI	2km North	Part of the Midlands Meres and Mosses Ramsar; a complex of open water, reedswamp, fen and woodland habitats.
Fernhill Pastures SSSI	2.8km North	Traditionally managed fen-meadows supporting a notable vegetation assemblage.

Table 8.3.2: Non-statutory Designated Sites. LWS: Local Wildlife Site, Ancient Woodland within 2km

Non-Statutory Designated Site (Local Wildlife Sites LWS, Ancient Woodland (AW))	Distance from Line Route (nearest point)	Descriptions
Moorfields LWS	100m North	Two fields which are good examples of unimproved and marshy grassland supporting areas of semi-improved and unimproved neutral grassland and areas of rush-dominated grassland.
Ruewood Pools LWS	650m South	An area of damp, unimproved pasture with silted murky pools, surrounded by encroaching alders
Halston Hall Heronry LWS	750m North	An area of deciduous woodland containing a heronry on an island within an ornamental lake
Gravenall AW	750m North	An area of ancient woodland

Invasive Species

3.1.2 No invasive species records were returned as part of the desk study.

Protected and Notable Species

3.1.3 Biological records from a 2km radius around the preferred line route have been provided by SEDN and Shropshire Wildlife Trust, BTO and RSPB are listed in full within Annex A8.4.1 or in the relevant species survey Technical Appendices (Appendices 8.4 to 8.9). In summary, the following protected or notable species were recorded within the desk study area of search.

Vascular Plants

3.1.4 The data search returned records of species listed under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended), S41 of the NERC Act or under the Habitats Regulations 2010 as well as locally scarce species. Bluebell *Hyacinthoides non-scripta* has been recorded at a number of locations. The most

recent records for the other legally protected species recorded are historic; floating water plantain *Luronium natans,* dated 1917 at Rednal and along the River Roden.

Mammals

3.1.5 Records were returned for otter *Lutra lutra*, water vole *Arvicola amphibius*, hedgehog *Erinaceus europaeus* , brown hare *Lepus europaeus*, badger *Meles meles*, bats, harvest mouse *Micromys minutus* and polecat *Mustela putorius* across the 2km search area

3.1.6 Further information on bats is provided in Technical Appendix 8.7.

3.1.7 Further information on otter and water vole is provided in Technical Appendix 8.8: Otter and Water Vole.

Amphibians

3.1.8 Further information on amphibians is provided in Technical Appendix 8.6: Amphibians.

Reptiles

3.1.9 A single reptile record was returned for common lizard *Lacerta vivipara,* dating from 1997.

Bats

3.1.10 Bat records are provided in Technical Appendix 8.7: Bats.

Birds

3.1.11 Bird records are provided in Technical Appendix 8.5: Ornithology.

Invertebrates

3.1.12 Relatively few invertebrate records were returned, reflecting a lack of survey data for much of the line route. White clawed crayfish *Austropotamobius pallipes* were recorded along sections of the River Perry in 1986 and 2002.

Table 8.3.3: Desk study records of notable invertebrate species within the 2km search corridor

Species	Scientific name
A mining bee	*Andrena apicata*
Small phoenix	*Ecliptopera silaceata*
Club tailed dragonfly	*Gomphus vulgatissimus*
Double kidney	*Ipimorpha retusa*
Wall	*Lasiommata megera*
Small purple-barred	*Phytometra viridaria*
White-legged damselfly	*Platycnemis pennipes*

White-clawed crayfish	*Austropotamobius pallipes*

3.2 Extended Phase 1 Habitat Survey

Overview of Route Habitats

3.2.1 This section should be read in conjunction with the Phase 1 Habitat Plans presented as Figure 8.2, Target Notes (TNs), pond, woodland and hedgerow habitat descriptions are presented in Tables 8.3.3 to 8.3.8 and photographs presented in Annex A8.3.1.

3.2.2 The description of the preferred line route and habitat survey corridor is summarised below, divided for ease of reference here into sections running from Oswestry in the west to Wem in the east. Due to the length of the preferred line route survey corridor, the descriptive text provides a broad overview, with tabulated descriptions of ecological features and accompanying figures providing further detail.

Section 1: Oswestry to the Montgomery Canal

3.2.3 The preferred line route commences at Oswestry, with an underground section cable route until it crosses the A5. The underground section passes through an area of semi-mature broadleaved woodland dominated by oak and ash with a species poor understorey, following a cleared avenue of open grassland through the woodland. East of the A5 the preferred line route reverts to overground, on poles, and crosses the railway line and the Montgomery Canal which run roughly north-south approximately one third and two thirds of the way along Section 1.

3.2.4 The habitats within Section 1 comprised low-lying agricultural land supporting a mixture of arable leys, crops and improved pasture with low lying fields within the floodplain either side of the Montgomery Canal. Field boundaries predominantly comprised intact species-poor hedgerows dominated by hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa*, with a a limited number of more species-rich hedgerows also containing species such as elder *Sambucus nigra*, hazel *Corylus avellana*, rose *Rosa* spp., field maple *Acer campestre.* A number of fields were divided by post-and-wire fences.

3.2.5 The land between Oswestry and the railway line supported scattered mature trees (mainly oak *Quercus robur*) within the field boundaries. Several small ponds were present along field margins directly west of the railway (P1 and P2, P0a,b), . Further mature trees and a tract of broadleaved plantation woodland were also present directly east of the railway line.

3.2.6 Fields west of the Montgomery Canal were more open than those to the east, with largely ditch-lined pastures and mainly post-and-wire field boundaries, although species poor hedgerows containing trees were also present. To the east of the canal, the fields supported occasional mature trees and the preferred line route crosses a tract of mixed plantation woodland (W5). Larger areas of broadleaved woodland present lie to the south of the preferred line route, separated from it by arable and improved grassland fields).

3.2.7 The section of the Montgomery Canal that is crossed by the preferred line route is not designated as SSSI and comprised open water with stone-filled reinforcement gabions supporting its banks. These gabions provided very limited suitability habitat for burrowing species including water voles. Aquatic plant growth was very sparse and included occasional water plantain *Alisma plantago-aquatica* and marginal plants.

Section 2: Montgomery Canal to Lower Hordley

3.2.8 The preferred line route along this section crosses further agricultural fields and species poor hedgerows, and crosses the River Perry at three points.

3.2.9 The River Perry is a small watercourse supporting a good diversity of aquatic and bankside marginal vegetation including floating-leaved, submerged and emergent macrophytes. The sections of the river that lay within the survey corridor and which were crossed by the preferred line route were largely lined by willow *Salix* spp. and ash *Fraxinus excelsior* trees and scrub or by dense bramble *Rubus fruticosus* spp. and nettle *Urtica dioica*

3.2.10 The preferred line crosses several large open improved grassland fields to the west of the River Perry. Some fields contained scattered mature trees with further trees within the hedgerows. Ponds (P5-P7) lie adjacent to tree-lined field boundaries and were well shaded by trees and scrub.

3.2.11 The line route crossed two interconnected ponds, P8 and P9 (TNx), which were located centrally within a grass-sown field and surrounded by mature oak *Quercus sp*. trees, blackthorn *Prunus spinosa* and hawthorn *Crataegus monogyna*. The line route also crossed to the north of pond P10, located beside a hedgerow with trees and surrounded by a mature oak and willow *Salix sp*. trees.

Section 3 Lower Hordley to Noneley

3.2.12 The western half of this section contained several scattered copses (planted broadleaved, mixed and plantation woodland) within a predominantly arable landscape, with a series of improved grassland fields. There was a high density of mature trees within hedgerows present in the western half of this section.

3.2.13 Further east, the numbers of mature trees within hedgerow boundaries steadily decreased. The route then crossed a large semi-improved field subject to seasonal inundation.

3.2.14 Three ponds lie near the line route. The far eastern part of this section comprises mixed agricultural land use with a higher density of scattered ponds within the surveyed corridor West of Noneley the route crossed a network of improved pasture fields, to the south of a series of narrow fields bounded by mature trees, which includes Moorfield LWS approximately 100m to the north of the line. A number of ponds were present in the vicinity of the preferred line route.

Section 4 Noneley to Wem

3.2.15 Around Noneley the network of improved grassland and arable fields were bounded by further hedgerows, some of which were species rich. A small broadleaved woodland copse (W9) was directly intersected by the route.

3.2.16 East of Noneley the route runs south east across large open improved grassland fields before crossing the River Roden. East of the River Roden further large open fields were present, mainly bounded by a ditch network but also with species poor hedgerows, and lines of trees. The route continued north east towards Wem crossing a main road before finally connecting to the Wem substation.

3.3 Survey Findings

3.3.1 Target Notes from the Extended Phase 1 habitat survey are presented in Table 8.3.4 below. Further descriptions of key habitat features are provided in the following Tables:

- Table 8.3.5: Ponds;
- Table 8.3.6: Woodlands;
- Table 8.3.7: Hedgerows;
- Table 8.3.8: Trees and bat roost potential; and
- Table 8.3.9: Watercourses.

Grasslands and Agricultural Land

3.3.2 Agricultural grasslands or cultivated arable land comprise the majority of the survey corridor and surrounds. Most of the grassland was species poor and improved, with only a small number of more species diverse semi-improved grassland fields present west of Noneley, and around Loppington.

Ponds

3.3.3 A total of 34 ponds were subject to habitat survey, of which many lay outside the 100m survey corridor but were assessed in the context of their relationship to habitat corridors and other ponds. 18 ponds lie within or adjacent to the 100m wide survey corridor. Ponds are described in Table 8.3.5. An extensive network of ponds is present across the survey corridor and in the wider landscape. Most are field ponds and frequently lie in relatively isolated positions within large cultivated fields (e.g ponds 8 and 9). P14 and P20 were surrounded by small wooded copses and the tree lined species rich hedgerow (H89) associated with it provided a valuable habitat corridor through the landscape. Ponds in relation to amphibians, specifically great crested newts, are discussed further in Appendix 8.6: Amphibians.

Hedgerows Trees and Woodlands

3.3.4 Woodlands are described in Table 8.3.6 and mapped on Figure 8.4. Along the survey corridor, woodlands are restricted to small scattered broadleaved copses. More extensive areas of woodland are present in the wider area but have been avoided by the alignment of the preferred line route.

3.3.5 There are a number of trees present within hedgerows and as lines of trees or scattered trees within large fields throughout the survey corridor. These are described in details within the Appendix 8.4: Arboricultural Survey. Trees with bat roost potential are also described in Table 8.3.8.

3.3.6 Habitat connectivity within the survey corridor and the immediately surrounding landscape is considered to be moderate, largely comprising intact but species poor hedgerows and tree lines linking scattered small broadleaved woodland copses, and the relatively small number of species rich hedgerows within or adjacent to the survey corridor, located east of Hordley and around Moorfields/Loppington. Hedgerows are described in Table 8.3.7.

Watercourses and Ditches

3.3.7 Watercourses are described in Table 8.3.9. The watercourses along the preferred line route survey corridor provide valuable habitat connectivity within the agricultural landscape. The riparian corridors of the Montgomery canal, Rivers Perry and Roden which are crossed by the preferred line route, and the associated network of ditches and small streams that border the more intensively managed arable and improved grassland fields are key watercourse features.

Invasive species

3.3.8 Overall, stands of non-native species were unusual along the survey corridor, however stands of Japanese knotweed was recorded at two locations TN11 at Lower Hordley, over 100m south of the preferred line route but potentially near an access route, and TN16 over 300m distant (Table 8.3.4).

Mammals

3.3.9 During the extended Phase 1 habitat survey, habitats suitable to support a range of mammal species were identified including brown hare and hedgehog. The majority of the land crossed by the preferred line route comprised open arable and improved grassland fields of more limited suitability for species such as polecat which favours lowland wooded habitats and marshes. This species is however considered to be potentially present in and around the riparian corridors of watercourses, including around Noneley, Babbinswood, Loppington, the Montgomery canal, River Roden and farm complexes nearby. Bats, otters, water vole are discussed further in Appendices 8.7 and 8.8 respectively.

3.3.10 No records for hazel dormouse *Muscardinus avellanarius* or evidence of this species was recorded during the habitat survey and examination of hedgerows. Boundary hedges were generally species-poor and dominated by species not favoured by feeding dormice. Consequently, the preferred line route is considered to have very low potential to support hazel dormouse.

Reptiles

3.3.11 No observations of reptiles were made during any survey visits however, live sightings of reptile species beyond formal survey would be expected to be generally scarce. It is considered that individuals of common species of reptile may potentially be present, for example grass snake around damp habitats especially along watercourse riparian corridors.

3.3.12 Arable habitats and improved grassland along the preferred line route are intensively farmed and would not hold substantial viable reptile populations. Small extents of potentially more suitable habitat comprising narrow field margins along

the bases of hedgerows, scrub and dense marginal vegetation along watercourses and ditches and woodland edges was recorded at a limited number of locations, along with refuge habitat such as log piles (for example TN 10, 12, 13 which lie south of the 100m survey corridor). However, there were no extensive areas of high habitat suitability or with good connectivity to high suitability habitat in the wider area suitable to support more than small populations of or individual reptiles within the survey corridor.

Table 8.3.4: Target Notes from Phase 1 Habitat Survey (see Figure 8.2)

Target Note Number	Comment
TN1	Existing grassy track proposed for access.
TN2	Substantial ditch (D6) with c. 45 degree angle banks which are well vegetated. Habitat suitable for water vole but no signs observed during survey.
TN3	Felled tree trunk, left to decay, with invertebrate potential.
TN4	Felled tree trunk, left to decay, with invertebrate potential.
TN5	Line of mature oaks with bat roost potential tree on northern end with high bat roost potential (see Table 8.6.8).
TN6	Felled ash trunk with decaying wood and fungi. Used by sheep for shelter.
TN7	Crossing point of the River Perry. Willow and ash trees bordering watercourse c. 15-17m tall.
TN8	River Perry bordered by woodland/scrub with dense ground cover of brambles and nettles on banks. Watercourse very overgrown and largely inaccessible.
TN9	Mature oak with barn owl box.
TN10	Narrow strip of tall ruderal with bramble, greater willowherb, willow saplings, glaucous sedge, great reedmace in damp patches.
TN11	Japanese knotweed.
TN12	Field margin c. 8m wide, semi-improved with creeping buttercup, cow parsley, broad-leaved dock, common vetch.
TN13	Log pile offering wildlife refuge.
TN14	Brown hare seen in field.
TN15	Ponds 8 & 9 form a single waterbody, surrounded by a small copse-oaks, hawthorn and blackthorn isolated within a large arable field. One oak had a large cavity in a hollow trunk, providing potential for roosting bats/nesting birds.
TN16	Large stand of Japanese knotweed.
TN18	Old track, now overgrown with hedgerows either side. Provide a wildlife corridor in otherwise open arable land on potato farm.
TN19	Damp area with great reedmace, sweetgrass, branched bur-reed, marsh foxtail.
TN20	Strip of plantation broad-leaved woodland between ditch 40 and the embankment along the R. Roden. Approx. 10m wide, 10m high, dominant birch, also oak, ash, hazel. Understorey of field maple, holy and hawthorn. Woodland is split into two halves by a central strip of scrub / hedgerow
TN21	Felled trees forming a habitat pile
TN22	New residential building with outbuildings and garden.
TN23	Species rich meadow.
TN24	A patch of common meadow rue along a linear-depression (former ditch) which is no longer holding water.
TN25	Crossing point for ditch 42. Alder nearby with high bat roost potential. H126 defunct/ending here and there is a gap in H125 at its northern extent, with some planted hawthorn saplings.
TN26	Log pile providing refuge for wildlife.

3.3.13 Descriptions of ponds are provided below and are shown on Figure 8.6.

Table 8.3.5: Pond descriptions

Pond	Description	Within 50m of line?
P0a	Oxbow shaped pond in corner of field.	Yes
P0b	Shallow pond filled with macrophyte linked to P0a. Good refuge habitat of stone piles and potential hibernacula nearby.	No
P1	Pond on edge of improved grassland field.	Yes
P1a	Manmade pond on edge of access track.	No
P1b	Small shallow pond, no water vegetation, no bank vegetation, highly turbid and heavily poached from livestock use.	No
P1c	Deeper section within ditch, not a separate pond.	Yes
P2	Turbid, shallow but looks to fill regularly. Good vegetation cover.	No
P3	Open, well vegetated pond. Willows, alder and oak around the perimeter but plenty of light reaching water. Marginal vegetation included flag iris, branched bur-reed and water milfoil	Yes close to Pole 44
P4	Open pond fringed with Typha and rushes.	No
P5	Shaded pond surrounded by mature oaks, hawthorn, sycamore.	No
P6/P7	Shaded ponds with a deep layer of mud and debris, overhanging scrub and alder oak and hawthorn. Water turbid and lacking macrophytes	Yes oversail between Poles 78-79
P8/P9	Two field ponds linked by channel. Scrub at margins	Yes adjacent Pole 83
P10	Pond surrounded by mature trees and scrub. A large percentage of the margin overhung by willow scrub. Limited macrophtye presence in water.	No
P11	Field pond	Yes close to Pole 93
P12	Field pond	No
P13	An open shallow waterbody with no defined banks located centrally within an improved grassland field.	Yes adjacent Pole 101
P14	Heavily shaded pond, overhung by large area of dense scrub including hazel, willow, aspen.	Yes near Pole 117
P15	Pond in arable field. Large stand of marginal vegetation with water horsetail, willow, hawthorn shrubs around edge.	Yes adjacent Pole 118

Pond	Description	Within 50m of line?
P16	Open lagoon. Marginal vegetation included water mint, spike rush and soft rush	No
P17	Pond surrounded by hawthorn, dogrose, ash scrub. Enclosed by vegetation but plentiful light penetration. Plentiful invertebrates including dragonflies.	Yes adjacent Pole 120
P18	Adjacent to roadway and well shaded by oak, alder, blackthorn, ash. Pond shallow and largely lacking aquatic vegetation.	Yes
P19	Partially shaded pond with livestock access and surrounded by alder shrubs. Marginal vegetation included hard rush.	Yes near Pole 122
P20	Large ornamental / fishing pond in small woodland. Irregular shape with central island. Shaded with deep layer of leaf litter and limited marginal vegetation (flag iris). Trees around pond included oak, alder, ash, hazel, willow.	Yes near Pole 124
P21	Field pond	No
P22	Field pond	Yes near Pole 144
P23/P24	All one pond. Field pond fringed by scrub and several trees	No
P25/P26	Two adjacent field depressions likely to fill with water only in winter/wet conditions. Dry depression at time of survey	No
P27	Field pond	Yes
P28	Reservoir/lagoon waterbody	Yes
P29	Field pond only likely to fill in winter/very wet conditions. Dry depression at time of survey	Yes
P30	Field pond	Yes adjacent pole 151
P31-P32b	Field ponds over 400m distant	No
P33	Field pond	No
P34	Field pond over 300m distant	No

Table 8.3.6: Woodland Descriptions

Wood Ref: (mark on map)	Species present	SN/ P	Broadleaved/ coniferous/ mixed	Age	Height (m)	Ground flora
W1	Pine, field maple, elderberry.	P	Mixed	Semi-mature	15	Nettles, bramble
W2	Cherry, willow, oak, wych elm. Young trees, open with a sparse ground flora. Older willow and ash trees present.	P	Broadleaved	Immature/ semi-mature	10-15	Bramble, dock, nettle
W3	Ash, tall, narrow trees.	P	Broadleaved	Immature/ semi-mature	17-20	
W4	Oak, willow, elm, holly. Bat & barn owl potential – oak with a hollow limb.	SN	Broadleaved	Mature	17	Wild garlic
W5	Oak, guelder rose, field maple, ash.	P	Broadleaved	Semi-mature	18	Nettle, cleavers
W6	Oak, wych elm, hawthorn, shrubs.	SN	Broadleaved	Mature	12-15	Bramble, ivy
W7	Ash, willow. Tall plantation, trees with spindly trunks	P	Broadleaved			
W8	Field maple, oak sycamore. Hawthorn and rowan scrub/young trees.	SN	Broadleaved	Mature	<18	Cleavers, cock's-foot
W9	Field maple, oak, aspen, hazel, ash, elm, guelder rose, rowan, elder, willow	SN	Broadleaved	Semi-mature	6-12	Nettles, brambles, dog's mercury
W10	Sycamore, horse chestnut, field maple. Some standing deadwood.	P	Broadleaved	Mature	12	False brome
W11	Ash, sycamore, crack willow, alder with wych elm, hawthorn, rose, oak along edge. Single pine. Trees around pond P30.	SN	Broadleaved	Semi-mature	12	Nettles, brambles, cleavers, hogweed etc.
W12	Birch, oak, ash, hazel.	P	Broadleaved	Semi-mature	10	Yorkshire fog, smooth meadow grass, common

						hogweed, false oat grass, cock's-foot.
W13	Alder, spruce, cherry	P	Mixed	Semi-mature	10	
W14	Broad-leaved woodland around large pond. Dominant English oak, frequent willow, hawthorn, hazel, ash.	SN	Broadleaved	Mature and semi-mature	Variable	Yorkshire fog, cock's-foot, bramble, ivy, creeping bent, wood avens, goose grass.
W15	Tall spindly spruce trees with hazel, birch and oak on the edge.	P	Mostly coniferous	Mature	18	Pine needle carpet

*SN: Semi-natural. P: Plantation

Table 8.3.7: Hedgerow Descriptions

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H1	6	3	Hazel, willow, hawthorn, elder, dog rose, crab apple.	Tall & outgrown.	Rich	Yes	Intact
H2	3	2	Hawthorn, blackthorn, elder, hazel, field maple, dog wood, dog rose.	Dense & managed.	Rich	Yes	Intact
H2a	6-10		Willow	Line of trees	Poor	Poor	Intact
H2b	3	4	Blackthorn, willow, holly	Trimmed & dense	Poor	Yes	Intact
H3	6	3	Hawthorn, rose, blackthorn.	Tall, outgrown, defunct.	Poor	Yes	Defunct
H4	3	2	Hawthorn, elder, elm, hazel.	Trimmed & dense	Poor	Yes	Intact
H4a	2	2	Hawthorn, blackthorn, rose.	Trimmed & dense	Poor	No	Intact
H5	2	3	Hawthorn, elm.	Trimmed & dense	Poor	No	Intact
H6	6	2	Hawthorn, blackthorn, hazel.	Tall & leggy	Rich	Yes	Intact
H6a	2	4	Hawthorn, blackthorn. Primrose & violet on edge.	Trimmed & dense	Poor	Yes	Intact
H7	6	2	Hawthorn, blackthorn, hazel.	Tall & leggy	Rich	Yes	Intact
H8	2	2	Hawthorn, hazel, blackthorn, field maple, dog's mercury.	Trimmed & dense	Poor	No	Intact
H8a	7	3	Hawthorn, blackthorn, elm, willow.		Rich	Yes	Intact
H9	2	3	Hawthorn, elm.	Trimmed & dense	Poor	No	Intact
H10	2	3	Blackthorn, hawthorn, ash, rose, cherry, honeysuckle.	Dense & trimmed.	Poor	Yes	Intact
H11	2	3	Blackthorn, hawthorn, rose.	Dense & trimmed.	Poor	Yes	Intact
H12	6	2	Hawthorn, blackthorn, hazel	Tall & leggy, defunct	Poor	No	Defunct
H13	15			Line of trees	Poor	Poor	Intact
H14	2	3	Hawthorn, elm.	Trimmed & dense	Poor	No	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H15	3	2	Hawthorn, rose	Partially outgrown	Poor	Yes	Intact
H16	5	2	Hawthorn, elder, rose	Tall & leggy, defunct	Poor	Yes	Defunct
H17	5	2	Hawthorn, elder, rose	Tall & leggy, defunct	Poor	Yes	Defunct
H18				Line of trees	Poor	Yes	Intact
H19	6	3	Hawthorn, blackthorn, willow, alder	Tall & trimmed	Rich	Yes	Intact
H20	3	3	Hawthorn, rose, hazel, elder	Dense & bushy	Poor	No	Intact
H21	3	3	Willow, alder, blackthorn, hawthorn, elder	Defunct	Rich	No	Defunct
H22	3	2.5	Elder, hawthorn, blackthorn	Dense & bushy	Rich	Yes	Intact
H23	3	2.5	Blackthorn, damson, field maple, hazel, alder, holly, rose, sycamore	Dense & bushy	Rich	Yes	Intact
H24	6	2	Hawthorn, elder, hazel	Tall & trimmed	Poor	Yes	Intact
H25	2	2.5	Hawthorn, hazel, blackthorn	Partially managed along side	Poor	No	Intact
H26	3		Hawthorn, rose, oak	Bushy, defunct	Poor	Yes	Defunct
		3	Willow, alder, blackthorn, hawthorn, elder	Defunct	Rich	No	Defunct
H27	3.5	2.5	Rose, hawthorn, hazel, elder	Dense & trimmed	Poor	Yes	Intact
H28				Line of trees & scrub	Poor	Yes	Intact
H29				Line of trees & scrub	Poor	Yes	Intact
H30	3.5	2.5	Hawthorn, hazel, holly, elder	Dense & trimmed	Poor	Yes	Intact
H31	3.5	2.5	Hawthorn, hazel	Dense, tall in places	Poor	No	Intact
H32			Hawthorn, blackthorn	Line of trees & shrubs	Rich	Yes	Intact
H33				Line of trees & scrub	Poor	Yes	Intact
H33a			Poplar, crack willow	Line of trees & shrubs	Rich	Yes	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H33b	6	4	Oak, ash, hawthorn, blackthorn, dogwood, willow, elder	Line of trees & shrubs	Rich	Yes	Intact
H34	2.5	3	Blackthorn, elder, hazel, hawthorn, damson	Trimmed & dense	Poor	No	Intact
H35	2.5	3	Blackthorn, elder, hazel, hawthorn, damson	Trimmed & dense	Poor	No	Intact
H36	3	1	Hawthorn, blackthorn	Trimmed & dense	Poor	No	Intact
H37	3	1	Hawthorn, blackthorn	Trimmed & dense	Poor	No	Intact
H39	2	2	Hawthorn	Trimmed & dense	Poor	Yes	Intact
H40	2	2	Hawthorn, elder	Managed, defunct	Poor	No	Defunct
H41	2	2	Hawthorn, elder	Managed, defunct	Poor	No	Defunct
H42	2	2	Hawthorn	Trimmed & dense	Poor	Yes	Intact
H43	3	3	Hawthorn, elder	Managed	Poor	No	Intact
H44	4	2	Hawthorn, poplar, horse chestnut. Cow parsley, cleavers, bramble.	Tall, gappy in places	Poor	Yes	Defunct
H45	6	2	Hawthorn, elm	Defunct, trimmed	Poor	No	Defunct
H46	3	3	Hawthorn	Managed	Poor	No	Intact
H47	3	3	Hawthorn	Managed	Poor	No	Intact
H47a	6	3	Hawthorn, rose, elm, sycamore	Tall & trimmed	Rich	No	Intact
H48	2	2	Hawthorn, elder	Managed, defunct	Poor	No	Defunct
H49			Hawthorn, blackthorn, sycamore, wych elm, elm		Rich	Yes	Intact
H50	3	3	Hawthorn, rose, oak	Bushy, defunct	Poor	Yes	Defunct
H51	3	2	Hawthorn, blackthorn, hazel	Variable	Poor	Yes	Intact
H51a	4-6	4	Hawthorn, blackthorn	Tall, trimmed	Poor	Yes	Intact
H52	2	2	Hazel, rose, hawthorn, sycamore, eared willow	Managed	Rich	No	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H53	2	3	Hazel, rose, hawthorn, sycamore, eared willow	Managed	Rich	No	Intact
H54	3	2.5	Hawthorn, hazel, blackthorn, rose, ash	Trimmed & dense	Rich	Yes	Intact
H55	2.5	2.5	Blackthorn, hawthorn, horse chestnut, rose, ash	Trimmed & dense	Rich	No	Intact
H56	7	2.5	Hawthorn, blackthorn, rose	Trimmed along side	Rich	Yes	Intact
H57	4	2.5	Blackthorn, elder, hazel, rose	Trimmed & dense	Rich	No	Intact
H58	2.5	2.5	Hawthorn, blackthorn, hazel	Defunct	Poor	Yes	Defunct
H59	5	2.5	Elder, hawthorn, hazel	Trimmed	Poor	Yes	Intact
H59a	5	4	Blackthorn, elm, hawthorn, rose, hazel, alder	Tall & trimmed	Poor	Yes	Intact
H60	3	2	Blackthorn, hawthorn, ash.	Managed	Poor	No	Intact
H61	3	2.5	Hazel, hawthorn, elder, blackthorn, sycamore	Defunct, dense	Rich	Yes	Defunct
H61a	4	2	Hazel, field maple, rose, hawthorn, blackthorn	Trimmed & dense	Rich	No	Intact
H62	3	2.5	Alder, rose, hawthorn, hazel, willow	Trimmed & dense, defunct	Rich	Yes	Intact
H64	2	2	Blackthorn, elder, hawthorn, hazel, field maple, oak, holly	Managed/ defunct	Rich	No	Defunct
H65	4	3	Elder, hawthorn	Bushy, defunct	Poor	No	Defunct
H66	6	2.5	Holly, elder, blackthorn, elm	Defunct	Poor	No	Defunct
H67	2	2	Hawthorn, oak, rose, alder, holly	Trimmed & dense	Rich	No	Intact
H68	2	2	Holly, hawthorn, sycamore, blackthorn, rose, oak, hawthorn	Trimmed & dense	Rich	Yes	Intact
H69	2	2	Hawthorn, oak, rose, alder, holly	Trimmed & dense	Rich	No	Intact
H70	2	2	Holly, hawthorn, sycamore, blackthorn, rose, oak, hawthorn	Trimmed & dense	Rich	Yes	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H71	3	2	Hawthorn, elder, field maple, dog rose, hazel	Trimmed and dense, partially outgrown and defunct	Rich	Yes	Defunct
H72	6	2	Hawthorn, willow, crab apple	Tall & trimmed	Rich	Yes	Intact
H73	5	3	Hawthorn, blackthorn, rose	Bushy, defunct	Rich	Yes	Defunct
H74	5	2.5	Wych elm, hawthorn, elder, rose	Bushy	Rich	Yes	Intact
H76	3	2	Hawthorn, elder	Defunct	Poor	Yes	Defunct
H77	3	3	Hawthorn	Trimmed and dense	Poor	No	Intact
H78	5	3	Hawthorn, rose, elder, blackthorn	Dense & trimmed along side	Rich	Yes	Intact
H79	6	6	Hawthorn, elder, willow, dog rose	Trimmed, partially bushy & outgrown. Defunct.	Rich	Yes	Defunct
H80	6	6	Hawthorn, elder, willow, dog rose	Trimmed, partially bushy & outgrown. Defunct.	Rich	Yes	Defunct
H81	2.5	2	Hawthorn, blackthorn, damson, alder		Poor	No	Intact
H82	6		Cypress	Defunct	Poor	Yes	Defunct
H83	6	3	Cypress, blackthorn, willow	Bushy	Poor	Yes	Intact
H83	4	3	Hawthorn, elder, blackthorn, sycamore, field maple, hazel, English oak, rose.	Trimmed and dense	Rich	Yes	Intact
H84	3	3	Hawthorn, hazel, blackthorn, crab apple, rose.	Trimmed and dense	Rich	No	Intact but with occasional gaps
H85	4	2	Hazel, hawthorn, blackthorn, field maple	Tall, managed	Rich	Yes	Intact
H86	1.5	2.5	Hawthorn, field maple, blackthorn, hazel, holly, willow. Green	Managed	Poor	Yes/no (depending	Poor

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
			alkanet, dog's mercury.			on the hedgerow)	
H87	8	2	Hawthorn, cherry, blackthorn, field maple, holly	Tall, trimmed	Rich	Yes	Intact
H87	2.5	2.5	Rose, hawthorn, hazel, blackthorn, wych elm. Also yellow archangel present.	Managed	Rich	Yes	Intact
H87a	8	2	Hazel, willow, hawthorn, crab apple, blackthorn	Tall & trimmed	Rich	Yes	Intact
H88	2.5	2.5	Rose, hawthorn, hazel, blackthorn, wych elm. Also yellow archangel present.	Managed	Rich	Yes	Intact
H88a			Alder, blackthorn, oak	Defunct – occasional shrubs	Poor	Yes	Defunct
H88b	4-6		Blackthorn, field maple, hazel, hawthorn, wych elm.	Bushy	Rich	No	Intact
H88c	2	2	Hawthorn, blackthorn, rose, ash, sycamore	Trimmed & dense	Rich	Yes	Intact
H88d	2	2.5	Hawthorn, rose, elder, sycamore, oak	Trimmed & dense	Rich	Yes	Intact
H89	2.5	2.5	Rose, hawthorn, hazel, blackthorn, wych elm. Also yellow archangel present.	Managed	Rich	Yes	Intact
H89c	4	2	Hawthorn, elder	Defunct, bushy	Poor	Yes	Defunct
H89d	1.5	2	Hawthorn, hazel, holly	Managed	Poor	No	Intact
H89e			Alder, oak, sycamore	Line of trees	Poor	Yes	Intact
H90	2.5	3	Hawthorn, blackthorn, elder, oak, willow	Managed, but with large gap	Rich	No	Defunct
H90a			Ash, alder	Well-spaced line of trees	Poor	Yes	Defunct
H90b	2		Hazel, rose, hawthorn, sycamore, eared willow	Managed	Rich	No	Intact
H90c	3		Oak, hawthorn, hazel, sycamore	Defunct, managed	Rich	No	Defunct

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H91	6-8	3	Holly, oak, field maple, blackthorn, hawthorn	Trimmed along side	Rich	Yes	Intact
H91a			Willow, alder, oak and ash	Line of trees and shrubs	Poor	Yes	Intact
H92	7	2.5	Hawthorn, blackthorn, rose, oak.	Tall, trimmed	Rich	Yes	Intact
H93	3.5	3	Hawthorn, rose, blackthorn	Trimmed & dense	Poor	Yes	Intact
H94	5		Elm, blackthorn, elder, hawthorn, field maple	Trimmed & dense	Rich	No	Intact
H95	1.5	1.5	Rose, hawthorn	Slightly defunct	Rich	No	Intact
H96	2.5	2	Elm, hawthorn, holly, rose, hazel, field maple, elder	Trimmed & dense	Rich	Yes	Intact
H96a	4-7	3	Field maple, rose, elder, hawthorn	Bushy, outgrown	Rich	Yes	Intact
H97	2.5	1.5	Hawthorn, field maple, elder, holly, elm, rose	Trimmed & dense, taller and bushier at end.	Rich	Yes	Intact
H98	2	2	Hawthorn, elm, rose, elder, holly	Trimmed & dense	Rich	No	Intact
H99	2	3	Hawthorn, holly, elm, elder, crab apple	Trimmed & dense	Rich	Yes	Intact
H100	2	3	Hawthorn, holly, elm, elder, crab apple	Trimmed & dense	Rich	Yes	Intact
H101	2	3	Hawthorn, holly, elm, elder, crab apple	Trimmed & dense	Rich	Yes	Intact
H102	5		Elm, blackthorn, elder, hawthorn, field maple	Trimmed & dense	Rich	No	Intact
H103	6	2	Elder, hawthorn, holly	Tall & trimmed	Poor	No	Intact
H103a	2	2	Hawthorn, blackthorn, rose	Managed	Poor	Yes	Intact
H104	1	2	Elder, hawthorn, alder, hazel	Well managed	Rich	Yes	Intact
H105	2	2	Hawthorn, elder		Poor	No	Intact
H106	1	2	Elder, hazel, rose, hawthorn, blackthorn	Dense, trimmed – turns in to a line of trees to E beside line hen hedge and trees again.	Rich	Yes	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H107	2	2	Blackthorn, elder, rose, bramble	Managed	Poor	Yes	Defunct
H107a	3-4		Hawthorn, ash, field maple, crab apple.	Bushy	Rich	No	Intact
H108	6	4	Hawthorn, blackthorn, elder	Dense bushy/trimmed	Poor	Yes	Intact
H109	2.5	4	Hawthorn, elder, blackthorn, rose	Tall & outgrown	Poor	Yes	Intact
H110	6	3	Hawthorn, rose	Tall & outgrown	Poor	Yes	Intact
H111	6	3	Hawthorn, blackthorn, hazel, rose, willow, elder	Outgrown	Rich	Yes	Intact
H112	3	2	Hawthorn, blackthorn	Defunct & bushy	Rich	Yes	Defunct
H113	6	3	Hawthorn, blackthorn, hazel, rose	Tall & trimmed	Poor	Yes	Intact
H114	6	3	Hawthorn, blackthorn, field maple	Tall & outgrown	Poor	No	Intact
H115	2	2	Hawthorn, blackthorn, hazel	Managed, hedge banks present	Poor	No	Intact
H116	2.5	2	Hawthorn, hazel, crab apple	Managed	Rich	Yes	Intact
H117	2	2	Hawthorn, hazel, ash, holly, crab apple	Defunct managed	Rich	Yes	Defunct
H118	1.5	2	Hawthorn, field maple, hazel, holly, elder	Managed	Poor	Yes	Intact
H119	1.5	2	Hazel, hawthorn, elder	Managed	Poor	No	Intact
H120	8	2	Hazel, willow, hawthorn, crab apple, blackthorn	Tall & trimmed	Rich	Yes	Intact
H121	6	3	Hawthorn	Defunct, outgrown	Poor	Yes	Defunct
H122			Hawthorn, blackthorn, elder, holly, hazel, rose	Managed	Poor	Yes	Intact
H123				Well-spaced line of trees	Poor	Yes	Defunct
H124				Line of trees & shrubs	Poor	Yes	Intact
H125				Line of trees & shrubs	Rich	Yes	Defunct
H126	4	3	Blackthorn, field maple, hawthorn	Bushy	Poor	No	Intact

Hedgerow	Height (m)	Width (m)	Hedge species	Structure	Hedge type		
					Rich/ Poor	Trees	Defunct/ Intact
H127	4	2	Dog, rose, hawthorn, blackthorn	Trimmed & dense, recently planted	Poor	No	Intact
H128	6		Elder, hawthorn	Bushy, defunct	Rich	Yes	Defunct
H129	4	5	Hawthorn, elder, blackthorn	Occasional trees, turns bushy and defunct	Poor	Yes	Defunct
H130	4		Hawthorn, ash, field maple, crab apple	Bushy	Rich	No	Intact
H133	4	5	Hawthorn, elder, blackthorn	Occasional trees, turns bushy and defunct	Poor	Yes	Defunct
H134	6	4	Elder, guelder rose, hawthorn	Trimmed on side	Rich	Yes	Defunct
H135	3	5	Hawthorn, blackthorn, gorse, rose, broom.	Dense, not managed	Rich	No	Intact
H136	Variable	5	Hawthorn	Tall and leggy, gappy for first 100m.	Poor	Yes (after first 100m)	Generally intact, gappy in first 100m.

Table 8.3.8: Tree Descriptions and Bat Roost Potential (High Potential Highlighted)

Tree Number	Species	Description	Tree Category
T1	Ash	Dead wood, cracks in bark.	Low
T2	Oak	Some small linear crevices were a limb has come away.	Low
T3	Elm	Dead wood, cracks in bark.	Low/negligible
T4	sycamore	Large hollow in trunk.	Moderate
T5	Oak	Splintered limbs, cracked dead wood and flaking bark.	Low/moderate
T6	Oak	Large oak	Low?
T7	Oak	Small oak within hedgerow, cracked deadwood and flaking bark.	High
T8	Oak	Dead limbs and crevices.	High
T9	Oak	Dead wood, cracks in bark.	Low
T10	Oak	Dead limbs, cracks, holes, peeling bark.	Low/moderate
T11	Oak	Dead limbs, cracks.	Low
T12	Oak	Dead limbs, cracks and crevices, holes, splits and peeled bark. Two old corvid bird nests.	Moderate/high
T13	Ash	Small tree.	Low
T14	Ash	Small amount of ivy covering trunk, splits and peeling bark.	Moderate
T15	Oak	Dead wood, cracks in bark.	Low
T15	Ash	Decayed inside with large fissure.	High
T16	Ash	Large ash with snapped branches, dead limbs, cracks and crevices, hole and splitting bark.	High
T16	Poplar	Gnarled old trunk with cracks, crevices and decayed inside. The top has fallen behind the trunk.	Moderate/high
T17	Willow	Split and broken branches have created cracks and crevices.	Moderate
T18	Oak	Few dead limbs.	Low
T19	Oak	Dead limbs and crevices.	High
T20	Oak	Dead wood, cracks in bark.	Low
T23	Oak	Dead limbs creating large cracks and crevices, peeled bark.	Moderate
T24	Oak	Dead limbs, cracks and crevices.	Low
T25	Oak	Few dead limbs, lifted bark and crevices.	Low
T26	Oak	Few dead limbs creating cracks and crevices.	Low/moderate
T27	Oak	Small oak on edge of field, with a small hollow, peeling bark, cracks, dead wood.	Low/moderate
T28	Oak	Dead wood, cracks in bark.	Low
T29	Oak	Dead wood, cracks in bark.	Low
T30	Oak	Dead wood, cracks in bark.	Low/ negligible
T31	Oak	Dead wood, cracks in bark.	Low

Tree Number	Species	Description	Tree Category
T32	Oak	Dead limb and deep crevices and holes.	High
T33	Oak	Crevice in dead branch.	Moderate
T34	Oak	Small crevices	Moderate
T35	Alder	Small holes and crevices in trunk.	Low
T36	Oak	Hollow, with a large hollow in a secondary branch.	High
T37	Oak	Spit wood and crevices where large limb has broken off.	Moderate
T38	Ash	Small crevices	Low
T39	Oak	Linear crevices/split wood and cavity at base of branch.	Low
T40	Ash	Hollow trunk with large cavity.	High
T41	Alder	Hollow, with large opening and some lifted park.	High
T42	Alder	Hollowed out main trunk, crevice in top branch, flaking bark.	Moderate
T43	Alder	Minimal cracks and crevices	Negligible
T44	Oak	Hole, snapped limb, cracks and crevices	Low
T45	Ash	Dead limbs, cracks and crevices	Moderate
T46	Oak	Holes, dead limbs, cracks and crevices	Moderate
T47	Oak	Dead limbs, cracks and crevices	Low
T48	Oak	Dead limbs, cracks and crevices	Low
T49	Oak	Holes, snapped/dead limbs, cracks and crevices	Low
T50	Oak	Dead limbs, cracks and crevices	Low
T51	Oak	Dead limbs, cracks and crevices	Low
T52	Dead	Trunk ivy covered, cracks in branches	Low
T53	Sycamore	Ivy covering most of trunk and branches	Low
T54	Alder	Ivy covering most of trunk and branches	Low
T56	Sycamore	Peeling bark on dead limbs.	Low
T57	Oak	Cracks, crevices, holes in dead trunk.	Moderate
T58	Sycamore	Peeling bark, holes, crevices in dead limbs.	Moderate
T59	Oak	Peeling bark, crevices, holes	Moderate
T60	Oak	Holes, peeled bark, crevices and dead limbs.	Moderate
T61	Oak	Lots of peeling bark and hole in cut off scar.	Moderate
T62	Oak	Mature; decaying wood & crevices in missing limb.	Moderate
T63	Oak	Mature, no specific features but potential for small crevices to be present and some split wood where branches lost.	Low
T64	Oak	Hole in branch.	Moderate
T65	Oak	some cracks and crevices	Low
T66	Oak	some cracks and crevices	Low
T67	Oak	Linear crevices where bark outer layer has come away.	Low
T68	Oak	Lifted bark & small crevices on limbs.	Low
T69	Oak	Some deadwood & cracks on smaller limbs.	Low

Tree Number	Species	Description	Tree Category
T70	Oak	Some deadwood & cracks on smaller limbs.	Low
T71	Oak	Dead outer crown. Linear crevices and holes in dead wood and where missing limbs.	High
T72	Oak	Hole on base of cut limb. Linear crevice and decaying wood.	High
T73	Ash	Woodpecker holes, probably hollow trunk, one hole with nesting birds. Top removed.	High
T74	Oak	Mature, nothing noticed but of suitable size and structure.	Low
T75	Ash	Minimal leaf cover, cracked bark, flaked bark	Low/Negligible
T76	Oak	Mature, cracked limbs, rot holes, woodpecker holes	Low/Medium
T77	Oak	Mature, cracked bark, some ivy covering	Low
T78	Oak	Mature, large holes, broken limbs, rot holes	Medium/high
T79	Oak	Mature, several rot holes, old woodpecker holes, cracks	Medium
T80	Oak	Mature, some cracked limbs, few large holes/gaps	Low
T81	Ash	No cracks, gaps, holes etc.	Negligible
T82	Oak	Medium/mature, no cracks, holes etc.	Negligible
T83	Ash	Mature, some woodpecker holes, rot holes	Low/Medium
T84	Oak	Mature, ivy covering, no cracked limbs, holes	Low
T85	Oak	No cracks, holes etc.,	Negligible
T86	Oak	2 trees very close together, no cracks, holes etc.	Negligible
T87	Oak	Mature, flaked bark	Negligible/low
T88	Oak	Mature, ivy covering, broken limbs, rot holes	Medium
T89	Oak	Mature, cracked bark, broken limbs	Low
T90	Oak	Dead wood, cracks in bark.	Low
T90	Oak	Mature, rot holes, cracked bark	Low/medium
T91	Oak	Large cavity in mature oak, and large dead limb with cracks.	Moderate
T91	Oak	Mature, rot holes, cracks, broken limbs	Medium/high
T92	Oak	Oak within hedgerow. Few deadwood limbs.	Low
T92	Sycamore	Ivy covering most of trunk and branches	Low
T93	Oak	Small oak with dead wood with cracks in it and large hollow. Owl potential.	Low
T94	Oak	Large oak with some dead wood and limbs and flaking bark.	Low
T95	Oak	Small oak with minimal deadwood, but flaking/peeling bark and cracks.	Low
T96	Oak	Small oak within hedgerow. Abundance of deadwood limbs with crevices and flaking bark.	Moderate
T97	Oak	Oak within hedgerow. Some deadwood limbs and large amount of ivy.	Moderate

Tree Number	Species	Description	Tree Category
T98	Oak	Oak within hedgerow. Some deadwood and limbs with cracks and peeling bark.	Low
T99	Oak	Small oak within hedgerow.	Negligible
T100	Oak	Large oak within hedgerow. Some deadwood limbs and cracks.	Low
T101	Oak	Oak within hedgerow. Cracks in bark and deadwood limb.	Low
T102	Ash	Within hedgerow. Cracks in limbs and flaking bark.	Low/negligible
T103	Oak	Within hedge and corner of small coppice. Some dead limbs.	Low
T104	Oak	Large oak on edge of coppice. Small amount of dead limbs.	Low/negligible
T105	Oak	Very large tree on corner of coppice. Large amount of dead limbs with cracks. Dense ivy cover.	Moderate
T106	Ash	Large tree in corner of coppice. Woodpecker holes & some cracks in bark.	Low/moderate
T107	Oak	Moderate size, next to coppice with cracks in bark and some broken limbs.	Negligible/low
T108	Oak	Large oak with several broken limbs & cracks. Tree where potential post erection.	Low/moderate
T109	Ash	Large ash with snapped branches, dead limbs, cracks and crevices, hole in trunk and splitting bark.	High
T110	Alder	Large cracks in trunk close to base	low
T111	Ash	Some dead limbs.	Negligible
T112	Oak	Some dead limbs.	Negligible
T113	Ash	Some dead limbs.	Negligible
T114	Oak	Some dead limbs.	Negligible
T115	Oak	Cracks in deadwood limbs, hollows in trunk.	High
T116	Oak	Some cracks in dead limb.	Low
T117	Oak	Some dead limbs with cracks.	Low
T118	Oak	Few dead limbs.	Low
T119	Oak	Dead limbs and crevices.	High
T120	Oak	Some dead limbs with cracks.	High
T121	Oak	Oak with large amount of dead limbs, cracks in bark and hollows.	High
T122	Oak	Small old oak with several large hollows, cracks in bark and limb.	High
T123	Oak	With dead limbs, cracks in bark and ivy cover.	Moderate
T124	Oaks	Some deadwood limbs with cracks and flaking bark	low
T125	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low
T126	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low

Tree Number	Species	Description	Tree Category
T127	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low
T128	Oak	Located on ditch edge. Some deadwood limbs and flaking bark.	Low
T129	Alder	Dense ivy cover.	Low
T130	Oak	Some cracks in deadwood limbs.	Low
T131	Oak	Some cracks in deadwood limbs and flaking bark.	Low
T132	Oak	Large cracks in deadwood limbs and hollows in trunk	Moderate
T133	Oak	Three woodpecker holes, large hollow with nesting jackdaw and some deadwood limbs with cracks and pealing bark.	High
T134	Oak	Located on coppice edge with large crevices in deadwood and a hollow in the trunk	Moderate
T135	Oak	Abundance of crack deadwood limbs with flaking bark	low
T136	Oak	Cracks in deadwood limbs and flaking bark.	Low
T136	Oak	Deadwood limbs with cracks in bark	Negligible
T137	Oak	Dense ivy cover	Negligible
T138	Ash	Large cavity and hollow trunk	High
T139	Oak	Deadwood limbs with cracks	Negligible
T140	Ash	Small hollows	Moderate
T141	Oak	Woodpecker hollows and cracks in deadwood limbs	Moderate
T142	Oak	Woodpecker hollows and an abundance of deadwood limbs with cracks and flaking bark	Moderate
T143	Oak	Within hedgerow. small amount of deadwood limbs with cracks	Negligible
T144	Oak	Within hedgerow. Dense ivy cover	Low
T145	Oak	On roads edge. Some deadwood limbs with cracks	Negligible
T146	Ash	Abundant woodpecker hollow and cavity. Jackdaw nesting within cavity.	High
T147	Oak	Large deadwood limbs with large cracks. Hollow within trunk. Abundance of smaller deadwood limbs with cracks and flaking bark.	High
T148	Oak	Abundance of deadwood limbs with cracks and flaking bark. Dense ivy cover.	Moderate
T149	3 Oaks	Three oaks within a field without access.	Two oaks: low
T150		Centre tree has large dead limbs with visible cracks. Two flanking oaks have several small deadwood limbs centre tree.	Centre oak: Moderate/ High.
T151	Ash	On the edge of dry pond. Some small rot hollows.	Low/ moderate
T152	Oak	Some deadwood limbs with cracks and flaking bark	low

Tree Number	Species	Description	Tree Category
T153	Alder	Some hollows in dead branches	Moderate
T155	Alder	Some hollows in dead branches. Dense ivy cover	Moderate
T156	Alder	Several hollows and deadwood limbs with cracks.	Low
T157	Oak	Deadwood limbs with cracks	Negligible
T158	Oak	Deadwood limbs with cracks and small amount of ivy cover	Low
T159	Alder	Fallen limbs have left large hollow in trunk. Rest of trunk also hollow.	High
T160	Alder	Dense ivy cover	Low
T161	Alder	Dense ivy cover	Low
T162	Alder	Hollows in limbs	Low
T163	Oak	Ancient oak with hollow trunk and abundance of deadwood limbs with crevices	High
T164	Oak	Cracks in deadwood limbs	Low
T165	Oak	Cracks in deadwood limbs	Low
T167	Oak, Ash, Sycamore, hawthorn, Conifer	Dead limbs, cracks and crevices	Low
T168	Oak	Some hollows and cracks in deadwood limbs with flaking bark	Moderate
T169	Oak	Cracks in deadwood limbs	Low
T170	Oak	Tree line. Cracks in deadwood limbs	Low
T171	Oak	Tree line. Cracks in deadwood limbs	Low
T172	Oak	Tree line. Cracks in deadwood limbs	Low
T173	Oak	Tree line. Cracks in deadwood limbs	Low
T174	Oak	Tree line. Cracks in deadwood limbs and a small amount of ivy cover	Low
T174	Oak	Tree line. Cracks in deadwood limbs	Low
T176	Oak	Tree line. Cracks in deadwood limbs	Low
T177	Oak	Tree line. Abundance of in deadwood limbs with cracks in bark	Moderate
T178	Oak	Tree line. Abundance of in deadwood limbs with cracks in bark	Moderate
T179	Oak	Tree line. Cracks in deadwood limbs	
T180	Oak	Some deadwood limbs with cracks and flaking bark	low
T181	Oak	Some deadwood limbs with cracks and flaking bark	low
T182	Oak	Some deadwood limbs with cracks and flaking bark	low
T183	Ash	2 rot holes, 3-4 m. one on trunk the other on a limb south west side.	Medium
T184	Oak	Group of 8 mature oaks with numerous potential roost features including rot holes,	High

Tree Number	Species	Description	Tree Category
		large cavities, woodpecker hole, hollow trunks, split limbs, lifted bark.	
T185	Alder	None, semi mature tree	Negligible
T186	Oak	None visible but large mature, ivy clad oak so likely to be present.	Low
T187	Oak	Dead limbs, cracks and crevices	Low
T188	Oak	Hollows in trunk and dead limbs with cracks and crevices	High
T189	Oak	Dead limbs, cracks and crevices	Low/Negligible
T190	Ash	Hollows in limbs and cracks and crevices in bark	Moderate
T192	Ash	Hollow within trunk	Moderate
T193	Oak	Dead limbs, cracks and crevices	Low
T194	Oak	Dead limbs, cracks and crevices	Low
T195	Oak	Dead limbs, cracks and crevices	Low
T196	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T197	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T198	Oak, Alder, Ash, willow	Dead limbs, cracks and crevices + Ivy	Moderate
T199	Oak	Dead limbs, cracks and crevices	Low
T200	Oak	Dead limbs, cracks and crevices	Low
T201	Oak	Dead limbs, cracks and crevices	Low
T202	Oak	Dead limbs, cracks and crevices	Low
T203	Oak	Some deadwood limbs with cracks and flaking bark	low
T204	Oak	Some deadwood limbs with cracks and flaking bark	low
T205	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T206	Alder	Woodpecker hollowed and cracks in deadwood	Moderate
T207	Alder	Woodpecker hollowed and cracks in deadwood	Moderate
T208	Ash	Tree under proposed line.	Negligible
T209	Oak	Cracks in deadwood limbs.	Low
T210	Oak	Within hedgerow. Cracks in deadwood limbs	Low
T211	Oak	Within hedgerow. Cracks in deadwood limbs	Low
T212	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T213	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T214	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T215	Oak	Cracks in deadwood limbs.	Low
T216	Oak	Cracks in deadwood limbs.	Low

Tree Number	Species	Description	Tree Category
T217	Oak, Hawthorn, Alder	Surrounding pond edge. Cracks in deadwood with some woodpecker hollows.	Moderate
T218	Oak	Cracks in deadwood limbs.	Low
T219	Oak	Within hedgerow. Cracks in deadwood limbs and ivy	Moderate
T220	Oak	Within hedgerow. Cracks in deadwood limbs and ivy	Low
T221	Ash	Some hollows in limbs	Low
T222	Oak	Hollows in trunk and dead limbs with cracks and crevices	Moderate
T223	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T224	Oak	Within hedgerow. Cracks in deadwood limbs with some hollows	Moderate
T225	Oak	Small cavity, some lifted bark, small crevices.	Low
T226	Oak	Cracks in deadwood limbs.	Low
T227	Ash	Small tree with hollow trunk, open but with small crevices.	Low
T228	Oak	Some deadwood where limb lost, lifted bark. Gap between branch and main trunk.	Moderate
T229	Sycamore	Some flaking bark	Negligible
T230	Crack willow	Large split trunk, full of cavities but open.	Moderate
T231	Crack willow	Tree with small cavities, large linear crevices where branches cut and lifted sections of bark.	Moderate-high
T232	Oak	Many cavities and woodpecker holes	High
T233	Oak	Small shallow holes.	Low-negligible
T234	Oak	Cracks & crevices beneath bark.	Low
T235	Oak	Dense ivy, some small crevices.	Low
T236	Alder	Small cavities.	Low
T237	Alder	Dense ivy.	Low
T238	Ash	Number of small rot holes and fissures	Moderate
T239	Crack willow	Very limited – lifted bark and splits	Low
T240	Oak	Very limited – lifted bark and splits	Low
T241	Ash	Large rot hole / hollow 3m high east side (obscured by foliage, may be open above)	Moderate
T242	Ash	Rot hole 6m north side	Moderate
T243	Ash	Large rot cavity in trunk 8m NE	High
T244	Oak	Split branch 6m north side	Low
T245	Alder	Large rot hole / hollow trunk 2-3m high south-east side. Dense ivy present.	Moderate
T246	White / crack willow	Split branch 3m high north side	Low

Tree Number	Species	Description	Tree Category
T247	Oak	Large rot hole 3m west side, woodpecker hole 5m south side, split branch 6m high north side, lifted bark 6m high south side	High
T248	Ash	None	Negligible
T249	Alder	Large rot hole 3m west side, knot / woodpecker hole 8m north side, rot holes in split trunk 7m east side.	High
T250	White willow	Split branch 5m south side.	Moderate
T251	Sycamore	None	Negligible
T252	Alder	Two alders, no features	Negligible
T253	Alder	Group of five alders, no visible bat roost features, some ivy present.	Low
T254	White willow	None visible	Low
T255	Ash	None visible, dense ivy on tree	Low
T256	Ash	None	Negligible
T257	Oak	Small cavity, some lifted bark, small crevices.	Low
T258	Oak	None visible, but mature tree with some dead limbs, so potentially present	Low
T259	Sycamore	None	Negligible
T260	Alder	Group of 4 alder, relatively young, no features	Negligible

Table 8.3.9: Watercourse Descriptions

Watercourse Ref: (mark on map)	Width (m)	Depth (m)	Current	Bank profile	Disturbance / water level change?	Adjacent habitat	Aquatic vegetation	Bankside vegetation
D1	1	1		Steep	Water level change	Poor	n/a	n/a
D2	1	1		Steep	Water level change	Poor	n/a	n/a
D4, D10	1	0.5	Dry	Steep	Some water change		Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D5	1	1		Steep	Water level change	Poor	n/a	n/a
D6	2	0.2	Mod SE	Steep	Water level change	Grassland	n/a	n/a
D7	1	1		Steep	Water level change	Poor	n/a	n/a
D9	1	0.1	Still	Steep	Some water change	Grassland	Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D13, D16	1	0.5	Slight N	Shallow	Some water change	Grassland	Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.

Watercourse Ref: (mark on map)	Width (m)	Depth (m)	Current	Bank profile	Disturbance / water level change?	Adjacent habitat	Aquatic vegetation	Bankside vegetation
D17	2-3	Bank 1m, water 0.1m	Sluggish	Steep	Water level change	Improved grassland	Hemlock water-dropwort, flag iris, lesser pond sedge	
Montgomery Canal	6		Slow	Vertical-gabion reinforce banks	Water level change	Improved grassland	Water plantain, branched bur-reed.	Line of trees both sides, more open on western bank.
D18	2	Banks 4m water 0.1m	Sluggish/still	Very steep	Water level change	Improved grassland	Fools watercress, duckweed	Red campion, tall ruderal.
D19	1	Dry	Dry	Steep	Water level change	Arable	Duckweed	Tall ruderal overgrown into ditch
D20	1	0.1	Damp, no current	Steep	Water level change	Improved grassland and arable	Reed canary-grass, floating sweetgrass.	Nettle, tall ruderal
River Perry	4.5	0.5-1	Slow	Steep	Minor, some water level change	Arable, cattle pasture	Water crowfoot, curled pondweed, perforate pondweed, reed sweet grass, fools watercress, hemlock water dropwort, branched bur-reed. Aquatic vegetation good density of marginal emergent vegetation, floating leaved and submerged.	Nettle, greater willowherb, nettles, water figwort. Dense.
D23	1.5	1	Slight N	Steep	Water level change	Grassland	Species in ditches included great	Bankside vegetation included nettle, hogweed,

Watercourse Ref: (mark on map)	Width (m)	Depth (m)	Current	Bank profile	Disturbance / water level change?	Adjacent habitat	Aquatic vegetation	Bankside vegetation
							willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D25	2	2	Sluggish	Steep	Water level, cattle	Poor/ improved grassland	None.	Between two hedgerows. Hawthorn, elder, hazel, dogwood, bramble.
D27	3	3	Dry	Steep	Water level change	Poor	None.	Common grasses, nettle, dog's mercury, bramble.
D34	1.5	Dry	n/a	steep	Water level change	Improved grassland (paddock)	Duckweed. Fool's horsetail, fools watercress and redshank growing in channel.	Tall ruderal - false oat grass, great willowherb, dock, cock's-foot, nettle, meadowsweet.
D35, D36	1	2	Dry	steep	Water level	Good (wood)	None	Common grass and ruderals
D38	0.5	0.5	Dry	steep	Water level	Poor	Willow herb and rush	Common grass and ruderals
D39	0.5	2	None	steep	Water level	Good	Grass, star wort.	Common grass and ruderals
River Roden	3	2.5m banks 10-20cm water	Slow	Steep with muddy toe, c. 45 degrees	Water level change, otherwise fenced from livestock	Improved grassland and arable	Common reed, reed sweetgrass, vegetation fringing water	Dense tall ruderals
D40	2	<0.5	Slow	Steep	Water level change	Improved grassland and arable	Algae, reed canary grass and floating sweetgrass.	Tall ruderal with abundant false oat grass. Occasional hawthorn, alder and rose scrub on bank top.
D42	0.5	<0.5	Slow	Steep		Hedgerow / grazing	None	Tall ruderal with hedgerow in places. Great willowherb, hawthorn, cocksfoot,

Watercourse Ref: (mark on map)	Width (m)	Depth (m)	Current	Bank profile	Disturbance / water level change?	Adjacent habitat	Aquatic vegetation	Bankside vegetation
								blackthorn, nettle, common hogweed, goosegrass. At western end no hedgerow and grass dominant – false oat grass, cocksfoot and Yorkshire fog.

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.4: Arboricultural Impact Assessment and Method Statement

Document Control				
Project Name:	132kV Electrical Circuit from Oswestry to Wem			
Project Number:	Gille-391-746			
Report Title	Appendix 8.4: Arboricultural Impact Assessment			
Issue	Date	Notes	Prepared	Reviewed
V1	01/10/2017	Draft prepared by Treesure on Behalf of Avian Ecology	G Smallthwaite *BA, FdSc Arb, M Arbor A*	U Maginn *MCIEEM*
V2	10/11/2017	Final	G Smallthwaite *BA, FdSc Arb, M Arbor A*	U Maginn *MCIEEM*

Contents

1.0 EXECUTIVE SUMMARY

1.1 This Arboricultural Impact Assessment (AIA) presents detail on the distribution and value of trees that would be directly impacted by the construction of the 132KV line connection between Oswestry and Wem (the North Shropshire Reinforcement project). Direct impacts are defined as instances in which the removal of trees (or lopping of parts) is necessary in order to install components or maintain a minimum operational clearance.

1.2 The survey was carried out over a five week period starting May 2017 and July 2017. Areas of land were re – surveyed in October due to changes in pole positions. The land affected by the proposed development was surveyed from ground level by a team of qualified Arboriculturists. The survey covered the length of the preferred line route over which 187 individual trees and 58 groups of trees were surveyed.

1.3 The tree survey was carried out using the methodology set out in BS5837:2012 '*Trees in relation to design, demolition and construction – recommendations*'. The survey methodology was slightly modified to reflect the scope and nature of the proposed development.

1.4 Recommended safety distances with regard to the proximity of trees and electricity conductors are produced by the Energy Networks Association (ENA) (Refs 2 and 3). For 132kV lines the minimum safety distance for trees growing towards a line with conductors hanging vertically in still air or deflected at any angle up to 45 degrees from the vertical is 1.4m increasing to 3.6m where the tree is capable of supporting a ladder. The Vicinity Zone is a distance applied as a radial measurement around each conductor position. All trees with branches that may intercept this zone or capable of growing into this zone within three years were considered for pruning or removal on a case by case basis.

1.5 48 trees and 15 sections of tree groups may need to be removed to facilitate the construction of the preferred alignment. A further 26 individual trees and sections of 11 groups have been identified for pruning based on current

dimensions and/or estimated growth over the next three years. The actual number of trees to be removed will be finalised as part of the detailed line design.

1.6 The Arboricultural Impact Assessment has taken into account the effects of any tree loss required to implement the design, and any potentially damaging activities proposed in the vicinity of retained trees.

2.0 INTRODUCTION

2.1 Treesure has been commissioned to conduct an Arboricultural Survey of a route for the proposed 132kV electrical circuit covering a 21km linear route from Oswestry to Wem. The route comprises of 1.2km undergrounding exiting Oswestry substation and an approximate 21km 132kV Trident design overhead line. The tree survey corridor consists of a 50m corridor (25m either side of the Preferred Line Route).

2.2 The report details the distribution and value of tree populations located within impact distance of the proposed line and adapted to BS 5837(2012) 'Trees in relation to design, demolition and construction – Recommendations'. The categorisation method identifies the quality and value of the existing tree stock.

2.3 All tree stems and crowns within the corridor were recorded. Groups and woodlands were recorded as one unit using the cardinal points of their position within the corridor to establish their location. Proposed access roads were also included in the survey. This report details the arboricultural impact of the proposed overhead line installation.

3.0 PROPOSED DEVELOPMENT

3.1 The installation of the Proposed Development would start in Oswestry on the west side of the A5 and runs due east to north of Middleton. The line heads east, dipping slightly south crossing arable and dairy/ beef farming grazing pastures with hedgerows and mature oak and ash trees. The line proceeds towards Babinswood and just before reaching crosses the B5009 it crosses

south of the road bridge over the railway line. The line heads due east until it crosses the Montgomery canal into the Rednal Estate. There are more trees and wooded areas in this area. Grassland, dairy beef and sheep farming dominate the landscape. The line then crosses the road at Rednal Mill Bridge and continues due west until it runs down the side of the drive to Lower Lee Farm heading west and crossing the river Perry before heading north-west towards Lower Hordley.

3.3 The line curves north over Lower Hordley and descends below Ellesmere. It continues southeast over mainly undulating arable land. Just south of Cockshutt it crosses the A528 (Shrewsbury Rd) with improved pastures for dairy grazing and then towards Malt Kiln Farm which is mostly sheep grazed fields. The line continues southwest crossing the B4397 heading towards Noneley village and north of Sleap Air Field where the land is flat peat ground. The land continues to be flat as it heads northwest over the top of Noneley village, south of Loppington. The line proceeds south- east and crosses a straight section of the River Roden just north of the village of Tilley. The line then heads north-east over a few remaining fields, then crosses the B5063 (Ellesmere Rd) 100metres on the north side to sub – station at the end in Wem.

4.0 SCOPE AND LIMITATIONS OF THE SURVEY

4.1 The scope of the survey includes a visual inspection from ground level using the 'Visual Tree Assessment Methodology'. The brief was to conduct a Tree survey including an Arboricultural Impact Assessment in accordance with S5837:2012 Recommendations.

4.2 Any legal descriptions or information given by Treesure are understood to be accurate.

4.3 No responsibility is assumed by Treesure for legal matters that may arise from this report, and the consultant shall not be required to give testimony or to attend court unless subsequent contractual arrangements are made.

4.4 Any alteration or deletion from this report will invalidate it as a whole.

4.5 Trees are large dynamic organisms whose health and condition can change rapidly, therefore due to the changing nature of trees and other site considerations, this report and any recommendations made are only valid for a 1 year period.

4.6 Any operational practices recommended in this report are to be undertaken by the appropriate specialist company. Operatives are to carry out the relevant risk assessment and record such information, prior to commencement of tasks and work in accordance with current Health and Safety standards, practices and legislation.

4.7 The nature of the soils on site was not assessed during the survey. The possibility of soil movement due to tree root activity cannot be discounted. Prior to the undertaking of foundation depth calculations the exact location of all trees in relation to structures will be required.

5.0 SURVEY METHODOLOGY

5.1 The tree survey was carried out using the methodology set out in BS5837:2012 '*Trees in relation to design, demolition and construction – recommendations*'. The survey methodology was slightly modified to reflect the scope and nature of the proposed development.

5.2 A 21km linear route was mapped from Oswestry to Wem and a 25m corridor on either side of the preferred line route was surveyed. All tree stems and crowns within the corridor were recorded. Groups and woodlands were recorded as one unit using the cardinal points of their position within the corridor to establish their location. Proposed access roads were also included in the survey.

5.3 All survey data was inputted into survey data tables using a tablet. Locations were recorded using a Garmin GPS Map 64S, a rugged, full-featured handheld with GPS, GLONASS, advanced sensor and wireless connectivity.

5.4 A separate topographical survey was undertaken and the data was examined during a post survey review to compare the locations of all trees.

5.5 The survey was undertaken from May 2017 through to August 2017. Some areas of land were surveyed on more than one occasion to accommodate changes to the proposed line. Weather ranged from bright sunshine and hot spells to intermittent rain. The lead surveyors were qualified arboriculturists assisted by a CIEEM accredited ecologist with an arboricultural background.

5.6 Individual trees, groups of trees and woodlands were assessed for their quality and benefits within the context of proposed development, in a transparent, understandable and systematic way. The term "group" is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. parkland or wood pasture).

5.7 Tree canopies or branch spread was measured in four directions N-S-E-W using a Leica Disto laser measure to enable an accurate representation of the tree crown. Canopy spread from groups was measured using the cardinal point nearest the line.

5.8 Trunk diameters are measured at breast height in mm and rounded to the nearest 10mm. Diameters were estimated when trunks were inaccessible. Group diameters were measured using the mean measurement of a selected representation of the group.

5.9 Height was measured using a Nikon Pro Rangefinder equipped with three-point measurement capability. This function enables a user to obtain the height of a tree even when the top or base of a tree is blocked by branches or bushes, preventing the use of conventional separation measurement where the laser beam is required to reach those points. All heights were recorded to the nearest half metre for dimensions up to 10m and the nearest whole metre for dimensions over 10m. For groups, the height of the tallest tree within the group was recorded.

5.10 Photographs were taken on site recording trees/landscape features within land parcels.

5.11 All survey data was inputted into a digital ordnance survey map to check for any irregularities or erroneous results. Accuracy of grid references was validated and proximity of proposed line to trees was confirmed.

6.0 TREE CATEGORISATION METHOD

6.1 The purpose of the tree categorisation method is to identify the quality and value (in a non-fiscal sense) of the existing tree stock, allowing informed decisions to be made concerning which trees should be removed or retained in the event of development.

6.2 Life Stage was recorded as either Y- young, SM – Semi – Mature, M – Mature or V – veteran tree (shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem.

6.3 Category rating was given to all the trees surveyed. Category A (Green) Trees of high quality, Category B (Blue) - Trees of moderate quality, Category C (Grey) - Trees of low quality, Category U (Red) - Trees that are unsuitable for retention.

Table 8.4.1. Tree Categorisation

Category A Trees of high quality with an estimated remaining life expectancy of 40 years	Trees of high value including those that are particularly good examples of their species and/or those that have visual importance or significant conservation or other value
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.	Trees of moderate value including those that do not qualify as Category A due to impaired condition and/or those that collectively have higher value than they would as individuals; also trees with material conservation or other value
Category C Trees of low quality with an estimated life expectancy of at least 10 years	Trees of low value including those with very limited merit or impaired condition; trees offering transient or temporary landscape benefits
Category U Trees in such poor condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.	Trees with irremediable defects and anticipated early loss due to collapse; dead trees or those in immediate decline and those with infectious pathogens that threaten other trees

6.4 A, B and C trees are also given a sub – category of 1, 2 or 3 which reflects their arboricultural, landscape or cultural and conservation values respectively.

6.5 Life expectancy categories were simplified to long, medium and short.

7.0 IMPACT ASSESSMENT METHOD

7.1 To ensure the overhead line is 'resilient' against tree and vegetation damage in 'abnormal weather conditions' damage from trees and vegetation during major storm events, clearance guidance is provided in the Electricity Networks Association (ENA) publication ETR 132 (2005).The impacts of trees on trees of the 132KV overhead powerline are assessed and the management of vegetation in proximity to trees requiring pruning based on their current

dimensions and/or estimated growth over the next three years (i.e. where likely to have operational effects on the new overhead line).

7.2 Recommended safety distances with regard to the proximity of trees and electricity conductors are produced by the Energy Networks Association (ENA) (Refs 2 and 3). For 132kV lines the minimum safety distance for trees growing towards a line with conductors hanging vertically in still air or deflected at any angle up to 45 degrees from the vertical is 1.4m increasing to 3.6m where the tree is capable of supporting a ladder. The Vicinity Zone is a distance applied as a radial measurement around each conductor position. All trees with branches that may intercept this zone or capable of growing into this zone within three years were considered for pruning or removal on a case by case basis.

7.3 An additional 1.4m is also added to create a buffer for tree works called the 'Tree Management Zone'. This is based on the estimated annual growth of a fast growing species (assuming a maximum of 450mm shoot extension growth per annum). The combination of the Tree management Zone and the Vicinity Zone gives a 5m buffer. Each tree was considered on a case by case basis depending on species and health. Trees have been identified for removal only when crown reduction or pruning could result in the decline of the tree.

7.4 Falling distance: The possibility of each tree to fall within a minimum distance of a line with conductors hanging vertically in still air has been considered. For 132kV lines, the minimum safety clearance is 1.4m. The falling distance of a tree is calculated as being equivalent to its height plus ten percent. The condition of all trees capable of falling into the clearance zone at their current height has been recorded to allow resilience management.

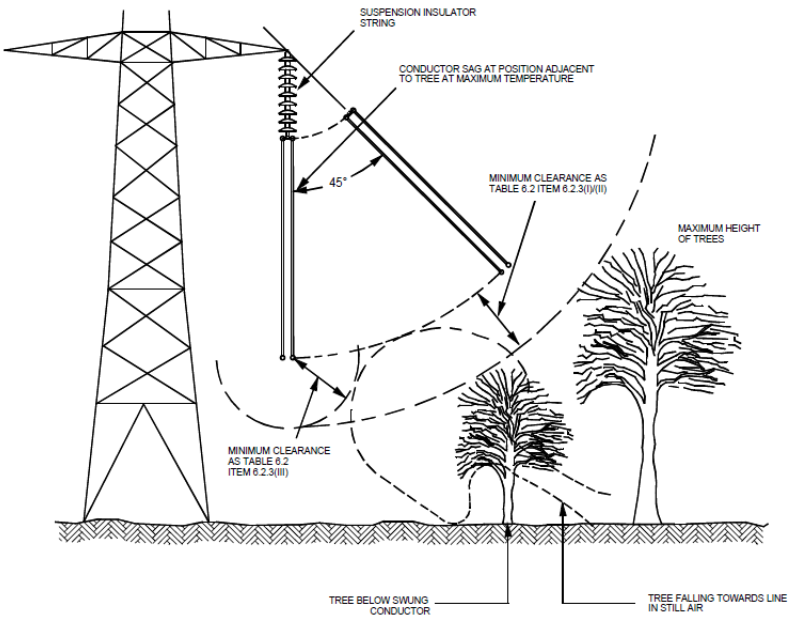

Figure 1. ENA Technical Specification. Clearance to Trees

7.5 A, B and C trees are also given a sub – category of 1, 2 or 3 which reflects their arboricultural, landscape or cultural values respectively.

8.0 STATUTORY PROTECTION AND GUIDANCE

Conservation Areas

8.1 If a tree in a conservation area is not covered by a Tree Preservation Order, written notice to the LPA is required (by letter, email or on the LPAs form) of any proposed work, describing what is required, at least six weeks before the work starts. There is no need to give notice of work on a tree in a conservation area where the tree is less than 7.5 centimetres in diameter, measured 1.5 metres above the ground (or 10 centimetres if thinning to help the growth of other trees).

Tree Preservation Orders

8.2 Tree Preservation Orders (TPO) are administered by Local Planning Authorities (LPA) (e.g. a borough, district or unitary council or a national park authority) and are made to protect trees that bring significant amenity benefit to the local area. This protection is particularly important where trees are under threat. All types of tree, but not hedges, bushes or shrubs, can be protected, and a TPO

can protect anything from a single tree to all trees within a defined area or woodland. Any species can be protected, but no species is automatically protected by a TPO. An Order prohibits the: cutting down, topping, lopping, uprooting, wilful damage and wilful destruction of trees without the local planning authority's written consent. If consent is given, it can be subject to conditions which have to be followed. In the Secretary of State's view, cutting roots is also a prohibited activity and requires the authority's consent.

Protected Species (Bats)

8.3 All British Bat species are protected by law and many bats roost in trees; although some bat species have adapted to living in buildings, trees still remain important throughout the year for most of the UK's 16 species. Suitable trees are becoming fewer and further between as older and hollow trees, which provide holes to roost in and a feast of insect life (and even younger trees with suitable cavities) are removed. Trees such as oak, beech and ash are particularly suitable for bats, but any woodland or tree has potential for a bat roost – especially if it has cavities in the trunk or branches, woodpecker holes, loose bark, cracks, splits and thick ivy.

8.4 Mature trees often contain cavities, crevices and hollows that offer potential habitat for species such as bats and birds. They are both afforded protection under the Schedule 1 and 5 of the Wildlife and Countryside Act 1981 (as amended), as well as under Schedule 2 of the Conservation of Habitats and Species Regulations 2010.

8.5 Lines of trees and hedgerows are likely to provide potential foraging and commuting habitat for bats. In particular, veteran trees and those identified with high habitat conservation value (see below) have an increased potential to support roosting bats.

Protected Species (Birds)

8.6 Trees are a potential habitat for nesting birds, which (as well as their nests and eggs) are protected under the Wildlife and Countryside Act 1981 (as amended). This makes it an offence to intentionally or recklessly, damage or destroy an active bird's nest or any part thereof. Due to the suitability of the trees and

hedgerow within the survey boundary for nesting birds, all tree work should ideally be undertaken outside the bird nesting season (British bird nesting season: March to August inclusive). If this is not possible then a detailed inspection of each tree should be undertaken by a qualified ecologist immediately prior to the arboricultural works. Should an active nest be found (being built, containing eggs or chicks) work must be halted until the nest becomes empty.

Felling Licenses

8.7 Certain types of felling do not need permission from the Forestry Commission. The Forestry Act 1967, as amended, and related regulations gives these exceptions in full. The exceptions include felling trees immediately required for the purpose of carrying out development authorised by planning permission (granted under the Town and Country Planning Act 1990) or for work carried out by certain providers of gas, electricity and water services and which is essential for the provision of these services.

Veteran and Habitat Trees

8.8 The term veteran tree is not precisely defined, as various criteria may determine the veteran status of an individual tree when compared to others. For example, a tree may be regarded as a veteran due to great age; great age relative to others of the same species, existing in an ancient stage of life or due to its biological, aesthetic or cultural interest. Key characteristics of an ancient tree can include:

- Crown 'growing downwards' or flattening (in conifers) through the ageing process;
- A large girth by comparison with other trees of the same species – (it may have a smaller girth if it is growing in poor conditions or is a pollard);
- Hollowing trunk; this may have one or more openings to the outside
- Stag-headedness (dead, antler-like branches extending beyond the crown)
- Fruit bodies of heart-rot fungi
- Cavities (eg where branches have broken away), sap runs or naturally forming water pools in branch hollows
- Rougher or more creviced bark
- An 'old' look which has high aesthetic appeal

- Aerial roots growing down into the decaying trunk or branches. The more of these a tree has, the more likely it is to be ancient.

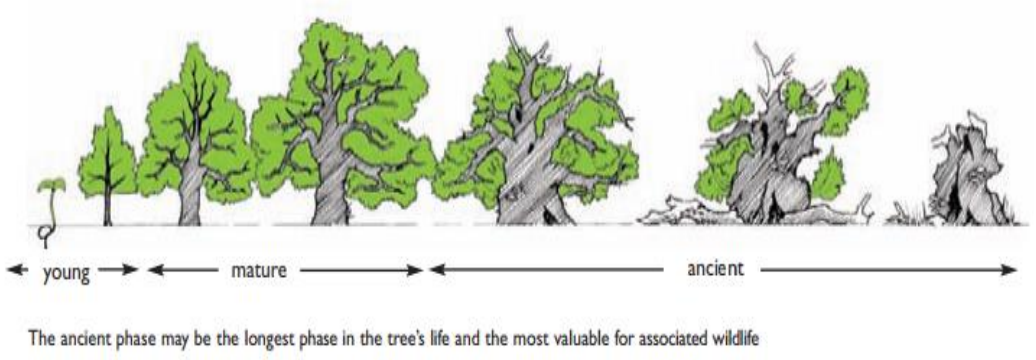

Figure 2. Stages in life of an Ancient Tree (Woodland Trust 2008).

Ancient Woodlands

8.9 Trees and woodland classed as 'ancient' or 'veteran' are irreplaceable. Ancient woodland takes hundreds of years to establish and is considered important for its wildlife, soils, recreation, cultural value, history and contribution to landscapes. 'Ancient woodland' is any wooded area that has been wooded continuously since at least 1600 AD. It includes: 'ancient semi-natural woodland' mainly made up of trees and shrubs native to the site, usually arising from natural regeneration and 'plantations on ancient woodland sites' areas of ancient woodland where the former native tree cover has been felled and replaced by planted trees, usually of species not native to the site. Ancient semi-natural woodland and plantations on ancient woodland sites have equal protection under the National Planning Policy Framework.

8.10 10 individual trees were noted as veterans and 12 trees were mature/veterans. In addition 12 trees were noted as having particular habitat conservation value.

9.0 TREE POPULATIONS

9.1 187 individual trees (T1-T187) were recorded and 58 groups (G1 – G58) of trees were recorded within the 25m survey corridor. A schedule of all trees and groups in terms of species condition, age, management recommendations and

BS 5837:2012 quality categories is provided at **Annex A8.4.1** and shown on **Figure 8.3**.

10.0 ARBORICULTURAL METHOD STATEMENT

10.1 Any development activity which affects the adaptation of trees to a site could be detrimental to their health, future growth and safety. Tree species differ in their ability to tolerate change, but all tend to become less tolerant after they have reached maturity or suffered previous damage. Planning and subsequent site management need to minimise the effect of change.

11.0 RECOMMENDED PRECAUTIONS INSIDE THE CONSTRUCTION EXCLUSION ZONE

11.1 The following precautions are recommended:

- No mechanical excavation.
- No excavation without arboricultural site supervision.
- No hand digging without a written method statement approved by the arboriculturists.
- No lowering or raising of levels.
- No storage of plant or materials.
- No storage of handling of any chemicals including waste from cement mixing.
- No vehicular access.

12.0 RECOMMENDED PRECAUTIONS OUTSIDE THE CONSTRUCTION EXCLUSION ZONE

12.1 Planning of site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweight. Such contact can result in serious damage to the trees and might make their safe retention impossible.

12.2 Fires on site should be avoided.

12.3 Material whose spillage could cause damage to a tree should be stored and handled away from the outer edge of the RPA, downhill and at least 10m away.

13.0 SCHEDULE OF SPECIFIC SITE EVENTS

13.1 Whenever trees on or adjacent to a site have been identified within the tree protection plan for protective measures, there should be an auditable system of arboricultural site monitoring. Effective tree protection relies on following a logical sequence of events and arboricultural inspection and supervision

14.0 REFERENCES

Bat Conservation Trust.2017. Bats and Trees.
www.bats.org/publications.org.uk

BS5837:2012 Trees in Relation to Design Demolition and Construction

Patch D, Holding B. 2007. Through the Trees to Development APN 12.

Arboricultural Advisory and Information Service.

NJUG Guidelines for the Planning, Installation and maintenance of Utility Apparatus in Proximity to Trees. Volume 4. The National Joint Utilities Group

Woodland Trust. 2008. What are ancient, veteran and other trees of special interest? Ancient Tree Guide 4.

Energy Networks Association. Engineering Recommendation G55/1, Safe Tree Working in Proximity to Overhead Electric Lines. London: Energy Networks Association, 2002.

Energy Networks Association. Technical Specification 43-8, Overhead Line Clearances Issue 3. London: Energy Networks Association, 2004.

Energy Networks Association. Engineering Technical Report 132, Improving Network Performance Under Abnormal Weather Conditions by use of a Risk Based Approach to Vegetation Management Near Electric Overhead Lines. London: Energy Networks Association, 2006.

Key: Survey Classification key

Tree no. Numerical reference for tree on survey plan and tag number

Species. Scientific name and common name

Height In metres

RPA Root Protection Area

TPP Tree Protection Plan

TCP Tree Constraints Plan

Stem diameter In millimetres

Branch spread Branch spread in metres taken at four cardinal points to give an accurate representation of the crown

First significant branch and direction First large limb and its cardinal direction

Canopy Clearance in metres until the start of the canopy

Life stage Y = Young MA = Middle Aged M = Mature OM = Over Mature V = Veteran

Estimated remaining contribution This is measured in years (<10, 10+, 20+, 40+)

Category rating Category A (Green) Trees of high quality with an estimated life expectancy of at least 40 years

Category B (Blue) Trees of moderate quality with an estimated remaining life expectancy of at least 20 years

Category C (Grey) Trees of low quality with an estimated remaining life expectancy of at least 10 years

Category U (Dark Red) Tree of such condition that cannot be realistically retained

Subcategories **1** Mainly arboricultural qualities **2** Mainly landscape qualities **3** Mainly cultural values, including conservation

Observations Structural and physiological condition

Management recommendations Remedial work needed to either improve the condition of the tree or to protect the canopy from access during development

ANNEX A8.4.1: Tree Survey Schedule

Individual Trees

Final Label	Ref	Parcel I	Easting	Northing	Grid Ref	Species	Height (m)	Stem Diameter	Cardinal Points	Life Stage	Category Grading	Estimated Remaining Contribution	Work Recommendation	Comments
T1	T1	83	331126	329869	SJ3112629869	Elm	10	563mm	N45S45E45W5	Y	B2	Medium	Reduce crown to avoid confliction with vicinity zone	
T10	T1	112	332952	329771	SJ3295229771	Oak	19	1000	N5 S2 E5 W6	M	C1	Short	Remove	Tree in decline
T100	T10	42	342038	328255	SJ4203828255	Oak	12	891	N4 S5 E5 W5	M	A2	Long	Remove	Obstructing pole
T101	T11	42	342044	328272	SJ4204428272	Oak	12	700	N0 S4 E5 W5	M	B2	Long		
T102	T12	42	342063	328229	SJ4206328229	Alder	7	multistemmed	N3 S2 E2 W2	M	C2	Medium		
T103	T13	42	342071	328223	SJ4207128223	Oak	12	764	N4 S4 E4 W4	M	B2	Long	Crown Reduction	adjacent to line
T104	T14	42	342080	328220	SJ4208028220	Alder	9	multistemmed	N2 S2 E2 W2	M	B2	Medium	Crown Reduction	adjacent to line
T105	T3	12B	342269	328139	SJ4226928139	Oak	19	1210	N7 S7 E7 W7	MV	B2	Medium		Stem leaning over ditch to east, large tension failure crack from basal root.
T106	T1	12B	342260	328111	SJ4226028111	Oak	9	630	N6 S6E6 W6	SM	B1	Long		Good condition
T106a	T4	12B	342503	328129	SJ4250328129	Oak	17	1270	N7 S9 E11 W6	M	A2	Long		Good condition, no significant defects
T107	T2	12B	342257	328096	SJ4225728096	Oak	10.5	600	N5 S7 E7 W7	SM	B1	Long		Good condition
T107a	T5	12B	342526	328092	SJ4252628092	Field Maple	8	670	N6 S6 E6 W6	M	B1	Long		Slight lean to east, Good condition and no significant defects
T108	T6	12B	342517	328158	SJ4251728158	Field Maple	17	1000	N7 S9 E9 W6	M	A2	Long		Lean to east,Good condition and no significant defects
T109	T5	46	342707	328179	SJ4270728179	Oak	12	*800	N8 S7 E6 W7	M	B2	Long	Remove	Adjacent to line
T11	T1	120	333411	329640	SJ3341129640	Oak	15	1025	N8 S3 E5 W7	V	A1,3	Long	Prune back branches on south side	Large buttress roots evident due to changes in soil level
T110	T4	46	342706	328169	SJ427067281699	Ash	12	780	N5 S5 E5 W5	M	U		Remove	Hazardous/severe decline and adjacent to pole
T111	T3	46	343050	328173	SJ4305028173	Oak	8.6	*900	N5 S4 E4 W5	MV	A1,3	Long		conservation value for wildlife. Fissures/boreholes evident
T112	T2	46	343096	328212	SJ4309628212	Oak	16	370	N3 S4 E4 W4	M	A1,3	Long		conservation value for wildlife. Fissures/boreholes evident
T113	T1	46	343238	328191	SJ4323828191	Oak	9.8	*400	N3 S4 E3 W3	M	B1	Medium	crown reduction	Clad in ivy, adjacent to line
T114	T4	26	343390	328130	SJ4339028130	Oak	12	*800	N5 S7 E5 W5	M	B1	Long		
T115	T1	26	343670	328131	SJ4367028131	Ash	19	1200	N9 S8 E8 W8	V	A1,3	Long		Habitat Value
T116	T2	26	343677	328173	SJ4367728173	Ash	10	*800	N4 S4 E3 W3	M	U	Short	Remove	In decline and close to line
T117	T3	26	343679	328181	SJ4367928181	Oak	7.5	*500	N1 S3 E3 W2	M	B2	Medium		
T118	T3	12A	343936	328139	SJ4393628139	Apple	5	200	N1 S1 E1 W1	M	C2	Short		
T119	T2	12A	343947	328151	SJ4394728151	Holly	4	100	N1 S1 E1 W1	M	C2	Short		
T12	T2	120	333412	329626	SJ3341229626	Oak	6.5	300 (approx)	N2 S2 E2 W2	Y	B2	Medium		On railway embankment, no apparent defects
T120	T1	12A	344384	328194	SJ4438428194	Oak	14.2	1050	N7 S7 E7 W7	M	A1	Long		
T120a	T4	12A	344384	328194	SJ4438428194	Oak	14.2	1050	N7 S7 E7 W7	M	A1	long		
T121	T5	12A	344393	328168	SJ4439328168	Ash	14	*1000	N4 S5 E4 W4	M	B1	long		
T122	T6	12A	344438	328188	SJ4443828188	Holly	6	300	N2 S2 E2 W2	M	C2	Medium		
T123	T7	12A	344504	328222	SJ4450428222	Alder	8	450	N2 S2 E2 W2	M	C2	Medium		
T124	T8	12A	344587	328328	SJ4458728328	Alder	6	400	N3 S3 E3 W3	M	U	Short		In decline but not tall enough to cause damage to line

T125	T10	12A	344712	328380	SJ4471228380	Alder	4.8	700	N3 S3 E3 W3	M	C1	Short		Damaged crown
T126	T9	12A	344757	328413	SJ4475728413	Alder	7.5	Multi	N3 S3 E3 W3	M	C2	Short		Previously coppiced multi stemmed Alder
T127	T1	114	345321	328389	SJ4532128389	Oak	11	850	N6 S5 E5 W5	M	B2	Long	Prune back branches (south) closest to line	Good condition
T128	T2	114	345318	328377	SJ4531828377	Ash	11	420	N3 S5 E5 W3	M	B2	Long	Remove	Directly under line
T129	T3	114	345332	328370	SJ4533228370	Ash	12	340	N3 S3 E3 W3	Y	B2	Long	Remove	Directly under line
T13	T3	120	333418	329629	SJ3341829629	Hawthorn	5.6	400	N2 S2 E2 W2	M	B2	Medium		
T130	T4	114	345535	328286	SJ4553528286	Oak	12	900	N4 S5 E5 W6	M	B2	Long	Remove	Canopy under line
T131	T5	114	345541	328273	SJ4554128273	Oak	10	900	N5 S5 E6 W6	MV	B2	Long	Remove	Decay in trunk, longitudinal cracks evident in branches
T132	T6	114	345545	328278	SJ4554528278	Alder	7.2	445	N1 S1 E1 W1	SM	C	Short	Remove	Decay evident in trunk
T133	T7	114	345548	328252	SJ4554828252	Oak	10	850	N4 S4 E5 W6	M	B2	Long		Epicormic growth, clad in Ivy
T134	T8	114	345567	328237	SJ4556728237	Oak	11	900	N5 S6 E6 W5	M	B2	Long		Good condition
T135	T13	114	345809	328213	SJ4580928213	Ash	8	750	N2 S2 E2 W2	Y	B2	Long		Young healthy tree
T136	T14	114	345808	328184	SJ4580828184	Alder	8	600	N4 S3 E3 W3	Y	B2	Long		Young healthy tree
T137	T9	114	345805	328154	SJ4580528154	Alder	10	573	N4 S4 E2 W2	M	B2	Long	Remove	Trifurcate at base. Approx 5 mtrs south of line
T138	T10	114	345800	328146	SJ4580028146	Alder	11	750	N3 S2 E2 W2	M	U	Short	Remove	Large cavity in central trunk
T139	T11	114	345803	328140	SJ4580328140	Alder	7.6	500	N2 S2 E2 W2	SM	B2	Long		Bifurcated in good health
T14	T4	120	333426	329618	SJ3342629618	Oak	7	400x200x300	N4 S4 E4 W4	M	B2	Medium	Remove	Obstructing pole
T140	T12	114	345805	328132	SJ4580528132	Sycamore	11	600	N2 S2 E2 W2	SM	B2	Short	Remove	Tree in decline
T141	T1	6	346330	328024	SJ4633028024	Alder	9.5	363,636	N5 S5 E4 W5	M	B1	Long		Dual limbed
T142	T2	6	346483	327877	SJ4648327877	Ash	15	*850	N6 S7 E6 W6	M	B1	Long	Remove	Obstructing pole
T143	T3	6	346561	327765	SJ4656127765	Oak	14.6	900	N6 S6 E6 W6	M	A1,3	Long		
T144	T5	6	346662	327719	SJ4666227719	Alder	11	*400	N3 S3 E3 W3	M	C1	Medium		Trench being dug adjacent to tree
T145	T4	6	346689	327757	SJ4668927757	Alder	13.2	*350	N2 S2 E2 W2	M	C2	Medium		
T146	T6	28	346776	327699	SJ4677627699	Alder	10	500 x 4	N6 S5 E5 W5	M	U	Short	Remove, within falling distance	In severe decline, with large cavity at base of trunk
T147	T7	28	346776	327699	SJ4677627699	Alder	9	300	N1 S2 E1 W3	M	C2	Medium		
T148	T5	28	346770	327691	SJ4677027691	Hawthorn	4	200mm	N2 S1 E2 W1	M	C2	Medium		Low growing species
T149	T2	28	346767	327686	SJ4676727686	Alder	7	550mm	N3 S3 E3 W3	M	C2	Medium	Remove, adjacent to Pole 132	
T149a	T1	28	346767	327682	SJ4676727682	Ash	14	600mm	N5 S4 E5 W4	M	B2	Long	Remove, adjacent to Pole 132	
T15	T5 ID5313	120	333477	329617	SJ3347729617	Oak	13	1044	N3 S7 E5 W3	M	A1	Long		measures 10.7 m from edge of canopy to power line
T150	T3	28	346761	327678	SJ4676127678	Alder	9	600mm	N2 S3 E3 W2	M	C2	Short	Remove, within falling distance	In decline with large cavity at base.
T151	T4	28	346764	327676	SJ4676427676	Alder	6	400mm	N0 S2 E1 W1	M	C2	Medium		
T152	T8	28	346861	327604	SJ4686127604	Oak	13	800	N5 S6 E6 W6	M	A1	Long	Remove	Adjacent to pole and line
T153	T9	28	347215	327773	SJ4721527773	Oak	14	996	N3 S6 E6 W5	M	B1	Long		
T154	T10	28	347221	327795	SJ4722127795	Alder	7	400	N2 S4 E1 W3	M	U	Short	Remove	Decay column in trunk and close to pole, may fail
T155	T11	28	347223	327799	SJ4722327799	Sycamore	12.5	600	N4 S4 E4 W4	M	B1	Long	Remove	Adjacent to pole and line
T156	T12	28	347224	327806	SJ4722427806	Sycamore	13	500	N4 S4 E4 W4	M	C2	Short	Remove	Large longitudinal crack in trunk. Decay evident.
T157	T13	28	347227	327815	SJ4722727815	Alder	9	400	N2 S4 E1 W3	M	B2	Medium		
T158	T14	28	347227	327822	SJ4722727822	Hawthorn	4.5	200	N2 S2 E2 W2	M	B2	Medium		
T159	T2	103N	347802	328536	SJ4780228536	Oak	19	1300	N7 S7 E8 W7	MV	A1	Long		Previous loss of primary limb. No evidence of decline or decay.
T16	T6	120	333684	329487	SJ3368429487	Oak	13.5	*700	N4 S8 E4 W9	M	B1	Long		
T160	T1	103N	347816	328564	SJ4781628564	Oak	13	900	N4 S4 E4 W4	M	A1	Long	Remove	Directly under line.
T161	T3	103N	347838	328586	SJ4783828586	Oak	9.6	650	N4 S4 E4 W4	M	C1	Short		Basal cavity evident , far enough away to not affect line

T162	T2	132	348809	327512	SJ4880927512	Oak	3.6	200	N2 S2 E2 W2	Y	B2	Long		Healthy
T163	T1	132	348838	327505	SJ4883827505	Oak	4.6	430	N2 S2 E3 W3	Y	B2	Long		Dense foliage, healthy
T164	T2	67	348624	328517	SJ4862428517	Ash	9	800	N5 S5 E5 W5	m	B1,3	Long		
T165	T1	67	348627	328519	SJ4862728519	Oak	14	840	N6 S10 E8 W8	M	A1,2	Medium		Cavity within main stem, tree is 20m away therefore not a threat to the line
T166	T3	67	348630	328555	SJ4863028555	Sycamore	17	850	N7 S7 E7 W7	M	B1,3	Long	Cut back side branches to allow clearance for line	Good condition, no significant defects
T167	T4	67	348714	328591	SJ4871428591	Goat Willow	9	650	N9 S9 E9 W9	M	C1,2	Long		Decay within main stem
T168	T5	67/126	348744	328602	SJ4874428602	Oak	11	680	N6 S6 E6 W6	SM	B1	Long		No significant defects
T169	T6	67/126	348748	328587	SJ4874828587	Oak	9	430	N5 S5 E5 W5	M	B1	Long		No significant defects
T17	T7 ID5314	120	333731	329489	SJ3373129489	Oak	13	800	N6 S6 E6 W6	M	B1	Long		
T170	T7	67/126	348762	328574	SJ4876228574	Oak	11	530	N5 S8 E5 W6	SM	B1,2	Long	Prune back branches (south) closest to line	No significant defects
T171	T8	67/126	348797	328531	SJ4879728531	Oak	13	820	N8 S8 E8 W8	MV	A2	Long		No significant defects
T172	T12	126	348839	328607	SJ4883928607	Alder	9	520	N5 S5 E5 W5	M	B3	Long		Good habitat value
T173	T11	126	348857	328589	SJ4885728589	Alder	10	430	N6 S6 E6 W6	M	B2	Long		Dual stemmed
T174	T9	126	348872	328573	SJ4887228573	Alder	9	350	N3 S5 E4 W5	SM	B1	Long		Multistemmmed from 1m, decay in smallest stem
T175	T10	126	348870	328573	SJ4887028573	Alder	7	420	N5 S2 E5 W4	M	B1	Long	Remove	Obstructing pole
T18	T8 ID5315	120	333755	329494	SJ3375529494	Oak	11	850	N6 S6 E6 W6	M	B1	Long		
T180	T3	132	349413	328223	SJ4941328223	Poplar	11.8	360	N4 S4 E4 W4	SM	B1	Long		Good example.
T182	T4	132	349498	328366	SJ4949828366	Ash	7.5	450	N6 S6 E6 W6	M	C	Short		Decay present, leaning north
T183	T1	157	349658	328417	SJ4965828417	Ash	12	700	N6 S6 E6 W6	M	B2	Medium		Damage to crown, bore holes and cavities evident. Distance to line 19m
T184	T2	157	349807	328538	SJ4980728538	Oak	11	1050	N6 S7 E6 W5	M	A1	Long	Crown reduction	Good example. Adjacent to line.
T185	T9	157	349692	328647	SJ4969228647	Willow	13	Multi stemmed	N10 S10 E10 W10	SM	C2	Long	Pollard	Fragile tree could affect line
T186	T5	157	349668	328660	SJ4966828660	Oak	6	500	/	D	U	/	Remove	Dual stemmed approx diameter (dead)
T187	T6	157	349675	328669	SJ4967528669	Alder	6	700	N2 S2 E2 W2	M	U	Short	Remove	Evidence of extensive decay. Potential risk to pole.
T188	T7	157	349661	328672	SJ4966128672	Alder	9	600	N3 S3 E2 W5	M	C	Short	Remove	Poor health, clad in Ivy leaning towards line.
T189	T8	157	349663	328686	SJ4966328686	Oak	15	923	N7 S7 E7 W7	M	A1	Long		Large tree, good specimen
T19	T9 ID5316	120	333836	329486	SJ3383629486	Oak	15	*900	N6 S6 E6 W7	M	A1,3	Long		
T190	T3	157	350166	328730	SJ5016628730	Alder	9.5	650	N5 S5 E5 W5	SM	B	Long	Remove	Directly under line.
T191	T4	157	350270	328928	SJ5027028928	Ash	9	500	N4 S4 E4 W4	Y	C	Medium	Pollard to hedge height	Multi stemmed, in hedge line.
T2	T1	130	331435	329923	SJ3143529923	Oak	13	1219	N6 S6 E6 W6	M	A1	Long		
T20	T10 ID5317	120	334185	329500	SJ3418529500	Oak	10.2	900	N4 S4 E4 W4	M	A1	Long	Remove	
T21	T2	40	334272	329552	SJ3427229552	Oak	9.2	800mm	N6 S6 E5 W5	M	A1,3	Long		
T22	T1	40	334273	329543	SJ3427329543	Oak	11	1000mm	N6 S6 E6 W5	MV	A1,3	Long		
T23	T4	40	334270	329517	SJ3427029517	Oak	9.2	400mm	N5 S5 E5 W5	M	B1	Long	Remove conflicting with line	
T24	T3	40	334270	329504	SJ3427029504	Ash	9.4	400mm	N4 S4 E4 W4	Y	B1	Medium		
T25	T5	40	334269	329484	SJ3426929484	Oak	9.6	700mm	N4 S4 E4 W4	M	B1	Long		
T26	T8	40	334692	329611	SJ3469229611	Ash	14.8	1300	N6 S5 S6 S6	V	B1	Medium	Has sustained damage to limbs	
T27	T7	40	334728	329599	SJ3472829599	Crack Willow	13.4	400mm x6	N5 S4 E6 W6	M	B1	Medium	Pollard	Signs of previous failure and within falling distance
T28	T6	40	334737	329568	SJ3473729568	Oak	13	1019mm	N7.5 S4 E6 W5	MV	A1	Long	Prune back northern branches adjacent to vicinity zone	
T29	T9	40	335382	329594	SJ3538229594	Sycamore	8.4	380	N3 S3 E3 W3	Y	C2	Medium		
T3	T2	130	331453	329831	SJ3145329831	Oak	11.2	1105	N6 S6 E6 W6	M	A1	Long		
T30	T10	40	335549	329553	SJ 35549 29553	Hawthorn	3	200	N2 S2 E2 W2	M	C2	Medium	Remove will obstruct pole and is in decline	
T31	T11	40	335545	329537	SJ3554529537	Hawthorn	3	multi	N1 S1 E1 W1	Y	C2	Medium		
T32	T1	106	336260	329527	SJ3626029527	Oak	14	1000	N9 S9 E9 W9	MV	A2,3	Long	Remove	Good habitat value
T33	T2	106	336256	329502	SJ3625629502	Oak	13	1200	N8 S8 E8 W8	V	A1,2,3	Long		Habitat value, large cavity, clad in Ivy
T34	T3	106	336504	329476	SJ3650429476	Oak	14	1000	N5 S5 E5 W5	M	A1,3	Long		Good condition
T35	T4	106	336526	329515	SJ3652629515	Oak	14	900	N9 S9 E9 W9	M	A1,3	Long	Prune back branches on south side closest to line	Good condition
T36	T7	106	336770	329467	SJ3677029467	Oak	11	859	N3 S3 E3 W3	M	U	NA	Remove	In decline and adjacent to line
T37	T6	106	336756	329438	SJ3675629438	Oak	16	1147	N9 S9 E9 W9	MV	A1,3	Long		Well balanced canopy
T38	T5	106	336740	329420	SJ3674029420	Oak	16	1147	N 9 S9 E9 W9	MV	A1,3	Long		Good Conservation value
T39	T8	108	337332	329466	SJ3733229466	Ash	17	1000	N9 S9 E9 W9	M	B2	Long		Dual limbed

T4	T3	130	331649	329878	SJ3164929878	Oak	9	600	N4 S4 E4 W4	M	C2	Medium		cavity in trunk
T40	T7	108	337459	329397	SJ3745929397	Alder	11	400	N4 S4 E4 W4	SM	B2	Long		In line of Alders adjacent to river
T41	T4	108	337461	329391	SJ3746129391	Alder	11	400	N4 S3 E3 W3	SM	B2	Long		In line of Alders adjacent to river
T42	T3	108	337478	329389	SJ3747829389	Alder	11	300	N3 S3 E3 W3	SM	B2	Long		In line of Alders adjacent to river
T43	T2	108	337490	329392	SJ3749029392	Alder	12	200	N2 S2 E2 W2	SM	B2	Long		In line of Alders adjacent to river
T44	T1	108 ne	337522	329309	SJ3752229309	Sweet Chestnut	6.6	300	N3 S3 E3 W3	Y	C2	Short		Mechanical damage to trunk
T45	T2	108 ne	337640	329316	SJ3764029316	Oak	6	250	N2 S3 E2 W2	Y	C2	Short		Small amount of mechanical damage to trunk
T46	T3	108 ne	337753	329313	SJ3775329313	Sweet Chestnut	6	398	N2 S3 E3 W3	Y	C2	Short		Small amount of mechanical damage evident
T47	T4	108nev	337797	329308	SJ3779729308	Sweet Chestnut	5	220	N0 S2 E2 W2	Y	C2	Short		Small amount of mechanical damage evident
T48	T5	108 ne	337900	329301	SJ3790029301	Sweet Chestnut	6	220	N3 S3 E3 W3	Y	C2	Short	Remove	Could obstruct pole. Wound evident on trunk
T49	T1	108	337920	329385	SJ3792029385	Oak	14	1171	N6 S6 E6 W6	MV	A1,3	Medium		Bore hole, Bat potential, evident fissure/cracks
T49a	T1	126 ne	348830	328489	SJ4883028489	Oak	12	450	N5 E5 S3 W4	SM	B1	Medium	Remove	Obstructing line
T49b	T2	126 ne	348842	328473	SJ4884228473	Oak	14	900	N7 S7 E7 W7	M	A1	Long		Good example.
T49c	T3	126 ne	348956	328444	SJ4895628444	Ash	15.5	1178	N8 S8 E8 W8	M/V	B1	Medium	Remove	Transition veteran with habitat value for bats/birds/Obstructing line
T49d	T4	132nev	349363	328259	SJ4936328259	Poplar	11	300	N2 S2 E2 W2	Y	B1	Medium		On north side of river on the bank
T49e	T1	157 ne	349496	328365	SJ4949628365	Ash	7	684	N4 S1 E2 W3	M	C1	Short		Decay evident in trunk
T4a	T7	112	332440	329915	SJ3244029915	Hawthorn	5	multi	N2 S2 E2 W2	Y	B1	Long		Good condition
T5	T5	112	332616	329903	SJ3261629903	Damson	5.5	400	N3 S3 E3 W3	Y	B1	Medium		
T50	T1	38	338590	329259	SJ3859029259	Alder	7	330mm	N2 S5 E1 W5	Y	C1	Short		
T51	T9	50	338741	329340	SJ3874129340	Elder	5	Multistemmed	N1 S2 E2 W2	Y	C2	Short		Multi stemmed Low growing species
T52	T8	50	338764	329360	SJ3876429360	Oak	11	530mm	N7 S7 E6 E6	M	B1,3	Long	Prune back north- western branches to suitable prur	Habitat Value
T53	T2	50	339170	329553	SJ39170 29553	Oak	5	100mm	N1 S1 E1 W1	Y	C2	Medium		
T54	T3	50	329169	329556	SJ2916929556	Horse Chestnut	5	100mm	N3 S3 E3 W3	Y	C2	Medium		
T55	T4	50	339170	329560	SJ3917029560	Poplar	11	225mm	N3 S3 E3 W3	Y	B2	Medium	Reduce crown to prevent conflict with line	Fast growing species
T56	T5	50	339167	329566	SJ3916729566	Lime	4.5	120mm	N2 S2 E2 W2	Y	B2	Medium		
T57	T6	50	339168	329569	SJ3916829569	Horse Chestnut	4.5	160mm	N2 S2 E2 W2	Y	B2	Medium		
T58	T7	50	339172	329554	SJ3917229554	Poplar	14.2	430mm	N4 S4 E4 W4	SM	B2	Medium	Reduce crown to prevent conflict with line	Fast growing species
T59	T1	50	339458	329531	SJ39458 29531	Horse Chestnut	4	140mm	N1 S1 E1 W1	Y	C2	Medium	Remove	Direct obstruction for pole
T6	T6	112	332636	329874	SJ3263629874	Oak	13	800	N6 S6 E6 W6	M	B1	Long		Good condition
T60	T10	50	339822	329458	SJ3982229458	Ash	3.5	80mm	N1 S1 E1 W1	Y	C2	10+		
T60	T11	50	339825	329462	SJ3982529462	Ash	6	140mm	N2 S2 E2 W2	Y	C2	10+	Remove	
T62	T12	50	339834	329483	SJ3983429483	Ash	6	300mm	N3 S3 E3 W3	Y	C2	10+	Remove	
T63	T13	50	339841	329486	SJ3984129486	Oak	4	300mm	N3 S3 E3 W3	Y	B2	Medium	Apple tree galls	
T64	T14	50	339847	329485	SJ3984729485	Ash	4	200mm	N2 S2 E2 W2	Y	C2	Medium		
T65	T16	50	340048	329346	SJ4004829346	Oak	9.4	940mm	N4 S4 E4 W4	V	B2,3	Medium	Prune back die back	Veteran tree crown is reducing , retrenchment evident. Removal of die back will prevent confliction with conductor lines
T66	T17	50	340060	329329	SJ4006029329	Oak	9	530mm	N3 S3 E3 W3	M	B2	Long	Prune back branches on north side	
T67	T18	50	340103	329304	SJ4010329304	Ash	6.2	500mm	N2 S2 E2 W2	M	C2	Short		Cavity in base of trunk in decline
T68	T15	50	340196	329302	SJ4019629302	Ash	7.6	565mm	N2 S2 E2 W2	M	C2	Medium	Remove	
T69	T20	50	340210	329330	SJ4021029330	Oak	12	950mm	N5 S10 E8 W8	M	A2	Long		
T7	T4	112	332782	329864	SJ3278229864	Oak	14	1092	N5 S5 E6 W5	MV	A2	Medium		
T70	T19	50	340222	329315	SJ4022229315	Oak	13	1020mm	N2 S2 E2 W2	V	A2,3	Long	Prune back branches on south side	
T71	T21	50	340241	329303	SJ4024129303	Field Maple	5	300mm	N2 S2 E2 W2	Y	B2	Long		
T72	T22	50	340253	329300	SJ4025329300	Oak	6	260mm	N2 S2 E2 W2	Y	B2	Long		
T73	T23	50	340272	329247	SJ4027229247	Oak	9.5	950mm	N6 S6 E6 W6	M	B1,3	Long	Prune back branches on south west side of crown to avoid vicinity zone	
T74	T24	50	340288	329236	SJ4028829236	Oak	15	1300mm	N8 S8 E8 W8	V	A1,3	Long		

T75	T25	50	340276	329220	SJ4027629220	Oak	11	880mm	N4 S4 E4 W4	M	B1,3	Medium	Remove	Oak apple galls and ganoderma present
T76	T1	82	340284	329192	SJ4028429192	Oak	13	302	N6 S6 E6 W6	M	B2	long	Remove	
T77	T2	82	340302	329174	SJ4030229174	Ash	13	680	N6 S7 E6 W6	M	B2	long	Remove	adjacent to pole
T78	T3	82	340338	329158	SJ4033829158	Oak	12	580	N4 S4 E4 W4	M	B1	long		
T79	T4	82	340343	329152	SJ4034329152	ASh	14	640	N3 S4 E4 W4	M	C1	Medium		
T8	T3	112	332795	329841	SJ3279529841	Oak	12	687	N6 S6 E6 W5	M	A2	Long	Remove	Adjacent to pole
T80	T5	82	340357	329149	SJ4035729149	Oak	11.5	780	N5 S5 E5 W6	M	B1	Long		Tree in good health
T81	T6	82	340380	329126	SJ4038029126	Oak	9	680	N6 S7 E7 W7	M	B1	Long		Good condition
T82	T7	82	340445	329074	SJ4044529074	Oak	12	990	N7 S7 E7 W7	M	B1	Long		Good condition
T83	T8	82	340381	328991	SJ4038128991	Oak	13.5	850	N7 S7 E7 W7	M	B2	Long		Good condition
T84	T27	50	340345	328952	SJ4034528952	Oak	10.3	1100mm	N6 S6 E6 W6	V	A1,3	Long		
T85	T26	50	340321	328917	SJ4032128917	Oak	13	1200mm	N7 S7 E7 W7	V	B1,3	Medium	Remove	Adjacent to pole 81
T86	T9	82	340518	328862	SJ4051828862	Oak	6.5	636	N3 S3 E3 W3	Y	B2	Long		Good condition
T87	T12	82	340713	328757	SJ4071328757	Oak	9	850	N6 S8 E6 W6	M	B2	Long	crown reduction	Large cavity in trunk, leaning over pond (South)
T88	T10	82	340722	328738	SJ4072228738	Oak	6.5	550	N7 S5 E5 W5	SM	B2	Long		low lying
T89	T11	82	340742	328742	SJ4074228742	Oak	10	1150	N6 S6 E8 W6	M	B2	Long		Good condition
T9	T2	112	332944	329793	SJ3294429793	Ash	12	565	N4 S4 E4 W4	SM	B2	Long	Reduce height by approx 3mtrs	To avoid vicinity zone
T90	T13	82	340877	328685	SJ4087728685	Oak	8.6	570	N4 S6 E6 W6	SM	B2	Long		Good condition
T91	T1	42	341374	328435	SJ4137428435	Holly	4	Multi stemmed	N2 S2 E2 W2	M	C2	Medium	Remove	Obstructing pole
T92	T2	42	341567	328383	SJ4156728383	Oak	13	1066	N6 S6 E 6 W6	M	A1	Long	Remove	Primary branches within vicinity zone
T93	T3	42	341620	328406	SJ4162028406	Oak	12	1210	N4 S6 E5 W5	V	A1,3	Long		
T94	T4	42	341917	328307	Sj4191728307	Oak	12	923	N6 S6 R6 W6	M	A1	Long	Remove	Too close to line
T95	T5	42	341923	328314	SJ4192328314	Oak	12	764	N6 S6 R6 W6	M	A1	Long	Remove	Too close to line
T96	T6	42	341929	328317	SJ4192928317	Oak	11	668	N6 S4 E5 W5	M	A1	Long	Remove	Too close to line
T97	T7	42	341937	328304	SJ4193728304	Oak	11	636	N2 S5 E2 W2	M	C2	Medium	Crown Reduction	adjacent to pole
T98	T8	42	341957	328289	SJ4195722289	Oak	12	955	N2S5 E2 W2	M	A2	Long	Crown Reduction	close to line
T99	T9	42	341984	328273	SJ4198428273	Oak	12	764	N4 S4 E4 W4	M	A2	Long	Crown Reduction	

TREE GROUPS

Final Label		Ref	Parcel	Easting	Northing	Grid Ref	Species	Height	Stem Diameter (average)mm average	Edge of group canopy nearest line)	Life Stage	Category Grading	Estimated Remaining Contribution	Work Recommendation	Comments
TG28	G1	G1	38	339458	329531	N SJ3945829531 S SJ3945429521 E SJ3946229524 W SJ3944929529	Hawthorn/Elm	7.6m	200	2m South	Y	C	Long	Reduce in height to hedge height	overgrown
				339454	329521										
				339462	329524										
				339449	329529										
TG29	G2	G1	50	339810	329498	N SJ3981029498 S SJ3981729460 E SJ3982129481 WSJ3980229493	Hawthorn/Blackthorn	4m	300	2m West	Y	C	Long	/	
				339817	329460										
				339821	329481										
				339802	329493										
TG30	G3	G2	50	340272	329277	N SJ 4027229277 S SJ4027729250 E SJ4028529259 W SJ4027229267	Oak/Field Maple/Hawthorn/Alder	5m	300	2m West	Y	C	Long	/	
				340277	329250										
				340285	329259										
				340272	329267										
TG31	G4	G3	50	340276	329248	N SJ4027629248 S SJ4027429222 E SJ4024629239, W SJ2026529236	Goat Willows	5.2m	200	3m West	M	C	Medium		
				340274	329222										
				340246	329239										
				320265	329236										
TG6	G5	G1	40	334759	329591	N SJ3475929591 S SJ3474829581 E SJ3478529574 W SJ3473729593	Hawthorn and Elder	5.5m	200	1m North	Y	C	Medium		
				334748	329581										
				334785	329574										
				334737	329593										
TG7	G6	G2	40	335333	329579	N SJ 3533329579 S SJ3533329572	Hawthorns	6.3m	300	1m North	M	C	Medium		
				335333	329572										
TG10	G7	G3	40	335536	329521	N SJ 3553629521 S SJ3553229513	Hawthorns	6.5m	200	1m north	M	C	Medium		
				335532	329513										
TG9	G8	G4	40	335543	329548	N SJ 3554329548 S SJ 3554129540	Hawthorns	7.5m	300	2m South	M	C	Medium	Reduce to hedge height	
				335541	329540										
TG11	G9	G5	40	335803	329551	N SJ 3580329551 S SJ3579229524 E SJ3580429537 W SJ3578929538	Alder/Oak/Ash	14m	400	4m East	SM	B	Long	Remove section of group nearest conductor lines	
				335792	329524										
				335804	329537										
				335789	329538										
TG8	G10	G6	40	335419	329568	N SJ 3541929568 S SJ 3542029562	Hawthorns	3m	300	1m north	M	C	Medium		
				335420	329562										
TG1	G11	G7	83	331149	329892	N SJ3114929892 S SJ3113629864 E SJ3115029875 W SJ 3114329879	Hazel/Elm/Field Maple	7m	200	2m West	M	B	Medium		4 Pole Cable terminal at 15m gives enough height clearance
				331136	329864										
				331150	329875										
				331143	329879										
TG2	G12	G1	130	331284	329844	NSJ3128429844 SSJ3128329824 E SJ3129529837 WSJ3127629830	Alder, Blackthorn , Hazel, Hawthorn	11m	200	2m North	M	B	Medium		
				331283	329824										
				331295	329837										
				331276	329830										
TG55	G13	G1	103N	347838	328576	SJ4783828576 (centre of v. small group)	2 x Ash	19m	700	4m south	M	B	Long		
TG56	G14	G2	103N	348072	328562	NSJ48072 28562 SSJ4807628545 ESJ4808628551 WSJ4806628555	Ash, Oak , Sycamore	17m	500	4m south	M	B	Long	Fell section of group	Line of trees within boundary, small amount of dieback
				348076	328545										
				348086	328551										
				348066	328555										

TG57	G15	G3	103N	348096	328540	NSJ4809628540 SSJ4809628527 ESJ4810828533 WSJ4809228535	Ash and Willow	12m	500	5m west	M	C	Short	Fell section of group	Trees on edge of woodland
				348096	328527										
				348108	328533										
				348092	328535										
TG61	G16	G1	157	350159	328748	NSJ5015928748 SSJ5015828743 E5016528744 W5015028747	Alder x4	6m	200	2m East	Y	B	Long		Young trees in hedge line.
				350158	328743										
				350165	328744										
				350150	328747										
TG37	G17	G1	26	343680	328161	NSJ43680 28161 SSJ43680 28147 ESJ43686 28156 WSJ43675 28160	Ash	12m	300	2m North	Y	C	Medium	Fell section of group	
				343680	328147										
				343686	328156										
				343675	328160										
TG38	G18	G2	26	343664	328122	NSJ43664 28122 SSJ4366428115 ESJ43669 28118 W SJ4366028119	Elms	7m	200	2m North	Y	C	Medium		
				343664	328115										
				343669	328118										
				343660	328119										
TG48	G19	G1	6	346489	327895	NSJ4648927895 SSJ4649027887 ESJ4648627891 WSJ4648327891		10.5	200	2m South	Y	C	Medium		
				346490	327887										
				346486	327891										
				346483	327891										
TG49	G20	G2	6	346464	327857	NSJ4646427857 SSJ4646727841 ESJ4647527856 WSJ4645727850		10.5	250	N3	M	C	Medium		
				346467	327841										
				346475	327856										
				346457	327850										
TG50	G21	G3	6	346471	327862	NSJ4647127862 SSJ4647327855 ESJ4647527858 WSJ4646727861		14	500	4m North	M	C	Short	Remove Ash closest to line	Large cavity in trunk and basal cavity, could fail
				346473	327855										
				346475	327858										
				346467	327861										
TG51	G22	G4	6	346591	327818	NSJ4659127818 SSJ4658627794 ESJ4660427812 WSJ4658127802		10	250	2m North	M	C	Medium	Crown reduction of group and removal of tree obstructing pole position	hedgeline trees
				346586	327794										
				346604	327812										
				346581	327802										
TG52	G23	G5	6	346684	327781	NSJ4668427781 SSJ4670227759 ESJ4670227759 WSJ4667827769		14	300	3m South	M	C	Medium		hedgeline trees
				346702	327759										
				346702	327759										
				346678	327769										
TG39	G24	G1	12A	344425	328186	NSJ4442528186 SSJ4442928178 ESJ4443328182 WSJ4442428180		9	400	3m North	M	B2	Medium		
				344429	328178										
				344433	328182										
				344424	328180										
TG41	G25	G2	12A	344780	328380	NSJ4478028380 SSJ4478728358 ESJ4479128362 WSJ4477928365		10	300	2m North	M	B2	Medium		10 x Alders
				344787	328358										
				344791	328362										
				344779	328365										
TG40	G26	G3	12A	344767	328404	NSJ4476728404 SSJ4477128391 ESJ4477528399 WSJ4476828397		6	200	1m North	y	C2	Short	Remove small section to accommodate pole	
				344771	328391										
				344775	328399										
				344768	328397										

TG36	G27	G1	42	342107	328208	NSJ4210728208 SSJ4211528183 ESJ4212028197 WSJ4210728193		12.5	500	4m East	M	B2	Long	Fell section	
				342115	328183										
				342120	328197										
				342107	328193										
TG32	G28	G1	82	340281	329246	NSJ4028129246 SSJ4027429207 ESJ4029629230 WSJ4026229237		13	600	3m South	M	B2	Long	Fell section	Fell section of woodland
				340274	329207										
				340296	329230										
				340262	329237										
TG33	G29	G2	82	340297	329186	NSJ4029729186 SSJ4029829175 ESJ4030329182 WSJ4029029182		6	Multi	3m East	M	C2	Medium		Under line but low enough to not affect
				340298	329175										
				340303	329182										
				340290	329182										
TG34	G30	G3	82	340363	328988	NSJ4036328988 SSJ4036828968 ESJ4037628979 WSJ4035628983		13	av 850	8m East	M	B2	Long		Out of range
				340368	328968										
				340376	328979										
				340356	328983										
TG35	G31	G4	82	340718	328760	NSJ4071828760 SSJ4072428734 ESJ4074328738 WSJ4070628750		5.1	av 40	2m South	M	B2	Medium		Under line but low enough to not affect
				340724	328734										
				340743	328738										
				340706	328750										
TG42	G32	G1	114	344926	328475	NSJ4492628475 SSJ4491628456 ESJ4492928466 WSJ4491528467	Hazel	3.8	200	1m South	M	B2	Medium	Fell section of group	Obstructing pole 113
				344916	328456										
				344929	328466										
				344915	328467										
TG43	G33	G2	114	345013	328523	NSJ4501328523 SSJ4500528506 ESJ4500328512 WSJ4499328515	Elms	7	200	2m South	Y	B2	Long	Reduce to hedge height	Young Elms
				345005	328506										
				345003	328512										
				344993	328515										
TG44	G34	G3	114	345061	328515	NSJ4506128515 SSJ4505728495 ESJ4507528503 WSJ4504828504	Ash/Oak/Hawthorn	9.4	300	2m South	Y	B2	Long	Reduce height closest to line	Edge of woodland
				345057	328495										
				345075	328503										
				345048	328504										
TG45	G35	G4	114	345121	328482	NSJ4512128482 SSJ4512828445 ESJ4514828452 WSJ4511528470	Goat Willow/Hawthorn/ Elder	7	200	2m South	Y	B2	Long		Low growing species
				345128	328445										
				345148	328452										
				345115	328470										
TG46	G36	G5	114	345310	328377	NSJ4531028377 SSJ4531628368 ESJ4532428370 W4530528376	Spruce/Ash	12	300		SM	C	Medium	Remove section closest to line	Some of these trees are in decline
				345316	328368										
				345324	328370										
				345305	328376										
TG47	G37	G6	114	345529	328312	NSJ4552928312 SSJ4553128296 ESJ4553328308 WSJ4552528307	Field Maple/ Hawthorn	7	250	1m South	SM	B2	Long		Low growing species
				345531	328296										
				345533	328308										
				345525	328307										
TG53	G38	G1	103S	347039	327589	NSJ4703927589 SSJ4702927554 ESJ4704527576 W4701927575	Alder	6	Multi	2m West	SM	B2	Long	Remove section to accommodate pole	
				347029	327554										
				347045	327576										
				347019	327575										
TG58	G39	G2	103S	348122	327440	NSJ4812227440 SSJ4800427416 ESJ4801527434 WSJ4800127434	Hawthorn	4	Multi	1m South	M	B2	Long		Low growing species
				348004	327416										
				348015	327434										
				348001	327434										

TG5	G40	G1	112	333339	329645	NSJ3333929645 SSJ3333929645 ESJ3334329660 WSJ3333329660	Elm, Blackthorn and Field Maple	8	av 200	N/A	SM	B2	Long	Reduce section to hedge height	
				333339	329645										
				333343	329660										
				333333	329660										
TG4	G41	G2	112	333323	329676	NSJ3332329676 SSJ3332529648 ESJ3332729667 WSJ3331929665	Elm, Blackthorn and Field Maple	7	av 300	N/A	SM	B2	Long	Reduce section to hedge height	
				333325	329648										
				333327	329667										
				333319	329665										
TG3	G42	G3	112	332794	329830	NSJ3279429830 SSJ3280229817 ESJ3280729831 SSJ3279429828	Hawthorn	5	multi	1m North	M	B2	Long		
				332802	329817										
				332807	329831										
				332794	329828										
TG54	G43	G1	67	348661	328560	NSJ4866128560 SSJ4866628544 ESJ4867228554 WSJ48653328551	Crack Willow	12	1000	6m South	M	B,3	Long	Fell section	South section of group conflicts with line
				348666	328544										
				348672	328554										
				348653	332855										
TG59	G44	G2	67	348661	328560	NSJ4866128560 SSJ4867828558 ESJ4868128562 WSJ4867428561	Goat Willow/Alder	6.5	250	3m South	M	C,2	Long		Boundary trees
				348678	328558										
				348681	328562										
				348674	328561										
TG60	G45	G3	126	348861	328579	NSJ4886128579 SSJ4886328570 ESJ4886428576 WSJ4885628572	Alder	9	450	3m South	M	C2	Long	Reduce crown of group nearest line	Good condition
				348863	328570										
				348864	328576										
				348856	328572										
TG12	G46	G1	106	335846	329566	NSJ3584629566 SSJ3583329537 ESJ3584529552 WSJ3583029551	Alder, Willow	16	500	2m North	SM	C2	Long	Fell section of group	Copse, Woodland
				335833	329537										
				335845	329552										
				335830	329551										
TG13	G47	G2	106	336137	329545	NSJ3613729545 SSJ3612829520 ESJ3612729538 WSJ3613829531	Alder	13	400	2m North	M	C2	Long	Reduce crown of group nearest line	Boundary trees
				336128	329520										
				336127	329538										
				336138	329531										
TG14	G48	G3	106	336251	329524	NSJ3625129524 SSJ3626229504 ESJ3626729514 WSJ3624529519	Alder	12	300		Y	C2	Long	most northern,	
				336262	329504										
				336267	329514										
				336245	329519										
TG15	G49	G4	106	336301	329540	NSJ3630129540 SSJ3630029514 ESJ3635729531 WSJ3625729536	Ash, Sycamore, Larch	17	400		SM	C2	Long	Fell large section	Woodland
				336300	329514										
				336357	329531										
				336257	329536										
TG16	G50	G5	106	336539	329495	NSJ3653929495 SSJ3653929477 ESJ3654729487 WSJ3652529491	Goat & Osier Willow, Alder, Oak	9	200		SM	C2	Long		
				336539	329477										
				336547	329487										
				336525	329491										
TG17	G51	G6	106	336667	329456	NSJ3666729456 SSJ3666429437 ESJ3667529444 WSJ3665529416	Oak	16	800	4m North	M	B1,2	Long	Fell north section	condition
				336664	329437										
				336675	329444										
				336655	329416										
TG18	G52	G7	106	337080	329428	NSJ3708029428 SSJ3708329415 ESJ3709029419 WSJ3707729424	Alders	11	300	2m East	SM	B2	Medium		hawthorn hedgerow
				337083	329415										
				337090	329419										
				337077	329424										
TG27	G53	G1	108	338274	329281	NSJ3827429281 SSJ3827929248 ESJ3828529263 WSJ3827229262	Sycamore	14	500		SM	B2	Long		medium Sycamore
				338279	329248										
				338285	329263										
				338272	329262										
TG26	G54	G2	108	338275	329317	NSJ3827529317 SSJ3827529311 ESJ3827729317 WSJ3827229317	Sycamore	5	150		Y	B2	Long		line
				338275	329311										
				338277	329317										
				338272	329317										
TG22	G55	G3	108	337556	329391	NSJ3755629391 SSJ3755929372 ESJ3757429388 WSJ3752929378	Oak, Alder, Sycamore, Willow	10	300		Y	B2	Long	trees nearest line	Line of boundary trees
				337559	329372										
				337574	329388										
				337529	329378										

TG21	G56	G4	108	337503	329393	NSJ3750329393 SSJ3751029365 ESJ3755029389 WSJ3748229378	Sycamore, Field Maple & Hazel, Wilow	10	300		Y	B2	Long	trees nearest line	Hedgerow
				337510	329365										
				337550	329389										
				337482	329378										
TG20	G57	G5	108	337324	329407	NSJ3732429407 SSJ3732829395 ESJ3735129395 WSJ3731929401	Goat Willow, Ash & Alder	10	300		SM	B2	Long		
				337328	329395										
				337351	329395										
				337319	329401										
TG19	G58	G6	108	337236	329451	NSJ3723629451 SSJ3723629427 ESJ3727429424 WSJ3722429446	Ash, Willow	11	200		SM	B2	Long	Fell section	Trees in hedge line
				337236	329427										
				337274	329424										
				337224	329446										
TG23	G59	G1	108 new	337566	329322	SJ3756629322	Hollies	9	200	2m South	Y	C2	Short - Medium	Reduce to hedge height	Overgrown group of Hollies within hedgeline
				337567	329315	SJ3756729315									
				337571	329318	SJ3757129318									
				337562	329319	SJ3756229319									
TG24	G60	G2	108 new	337651	329329	SJ3765129329	Holly and Elm	6	200	3m South	Y	C2	Short		Small amount of mechanical damage
				337650	329325	SJ3765029325									
				337654	329326	SJ3765429326									
				337647	329328	SJ3764729328									
TG25	G61	G3	108 new	337881	329323	SJ3788129323	Hollies	6	100	1m South	Y	C2	Short - Medium		Overgrown within hedge - line
				337880	329312	SJ3788029312									
				337888	329319	SJ3788829319									
				337867	329316	SJ3786729316									

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.5: Ornithological Appendix

avianecology

Document Control				
Project Name:	132kV Electrical Circuit from Oswestry to Wem			
Project Number:	Gille-391-746			
Report Title	Appendix 8.5: Ornithological Appendix			
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	01/10/2017	Draft	N. Robinson *MSc BSc (Hons) ACIEEM*	U Maginn *MCIEEM*
V2	10/11/2017	Final	N. Robinson *MSc BSc (Hons) ACIEEM*	U Maginn *MCIEEM*

CONTENTS

1 INTRODUCTION

1.1 Background

1.1.1 This Technical Appendix presents the results of ornithology field surveys, desk study and consultation undertaken to inform Chapter 8 'Ecology' of the North Shropshire Reinforcement Project Preliminary Environmental Information Report (PEIR).

1.1.2 Only common bird species names are referred to within the main text of this Appendix. Annex 1 provides a summary of all bird species referred to herein and within Chapter 8 of the PEIR, including both common and species names and a summary of their conservation status.

1.2 Study Area Overview

1.2.1 The Study Area is shown on Figure 8.1 'Proposed Line Route – Ecological Study Area'. The Study Area is largely dominated by open arable/pastoral farmland with woodland copses, networks of hedgerows and watercourses including the Rivers Roden and Perry, and the Montgomery Canal.

2 DESK STUDY

2.1 Methodology

2.1.1 A desk study was undertaken in 2016 and sought to identify any known or likely bird populations occurring along and in proximity to the route corridor, their likely sensitivity to the proposed development and the requirements for detailed field surveys.

2.1.2 The desk sought to collate existing information on the presence of designated sites for nature conservation with ornithological interests and existing records of protected or notable bird species along the route corridor. The suitability of habitats present along the corridor to support sensitive species was also considered.

2.1.3 The following key sources were consulted:

- Multi-Agency Geographical Information for the Countryside (MAgic) http://magic.defra.gov.uk/MagicMap.aspx;
- Joint Nature Conservation Committee (JNCC) website http://jncc.defra.gov.uk/;
- Natural England website https://designatedsites.naturalengland.org.uk/; and,
- Wetland Bird Survey (WeBS) Report Online interface https://blx1.bto.org/webs-reporting/ (Frost *et al*., 2017).

2.1.4 In addition, the following key organisations were consulted:

- Shropshire Ecological Data Network (SEDN);
- Royal Society for the Protection of Birds (RSPB);

- Shropshire Ornithological Society (SOS); and,
- British Trust for Ornithology (BTO).

2.1.5 Full details of consultations undertaken are provided in Chapter 4 'Consultation' of the PEIR.

2.2 Results

Designated Sites for Nature Conservation

2.2.1 This section should be read with reference to Figures 8.4, 8.5 and 8.6.

2.2.2 A review of the MAGIC confirmed that the route corridor does not intersect any statutory designated site for nature conservation with ornithological qualifying interests.

Existing Ornithological Records

SEDN

2.2.3 The Shropshire Wildlife Trust (Shropshire Environmental Data Network) returned records of the following species as breeding or potentially breeding within 2km of the Proposed Line Route:

Barn Owl	Magpie
Blackbird	Mallard
Blackcap	Marsh Tit
Black-headed Gull	Meadow Pipit
Blue Tit	Mistle Thrush
Brambling	Moorhen
Bullfinch	Mute Swan
Buzzard	Nuthatch
Canada Goose	Oystercatcher
Carrion Crow	Pheasant
Chaffinch	Pied Wagtail
Chiffchaff	Pintail
Coal Tit	Quail
Collared Dove	Raven
Coot	Red-legged Partridge
Cormorant	Redstart
Corn Bunting	Redwing
Cuckoo	Reed Bunting
Curlew	Reed Warbler
Dunnock	Ringed Plover
Fieldfare	Robin
Garden Warbler	Rook
Garganey	Sand Martin
Goldcrest	Sedge Warbler
Golden Plover	Shelduck
Goldfinch	Siskin
Grasshopper Warbler	Skylark

Great Spotted Woodpecker	Snipe
Great Tit	Song Thrush
Green Sandpiper	Sparrowhawk
Green Woodpecker	Spotted Flycatcher
Greenfinch	Starling
Grey Heron	Stock Dove
Grey Partridge	Stonechat
Grey Wagtail	Swallow
Greylag Goose	Swift
Herring Gull	Tawny Owl
House Martin	Teal
House Sparrow	Tree Sparrow
Jackdaw	Treecreeper
Jay	Tufted Duck
Kestrel	Turtle Dove
Kingfisher	Wheatear
Lapwing	Whitethroat
Lesser Black-backed Gull	Willow Tit
Lesser Spotted Woodpecker	Willow Warbler
Lesser Whitethroat	Woodpigeon
Linnet	Wren
Little Egret	Yellow Wagtail
Little Owl	Yellowhammer
Long-tailed Tit	

RSPB

2.2.4 RSPB were consulted in August 2016 as part of the formal scoping and consultation process.

2.2.5 As part of their consultation response RSPB provided existing breeding lapwing records for the Baggy Moor area, which were collated by RSPB Midlands Region as part of the "Breeding Wader Survey of Shropshire Wetlands (Weald Moor and Baggy Moor). Subsequently a formal information request was submitted to RSPB to obtain details of existing breeding lapwing records along the route corridor. Several records were located within 500m of the route corridor, and their general distribution is illustrated in Figure 8.6.

SOS

2.2.6 The Shropshire Ornithological Society (SOS) were consulted in January 2017 as part of the formal scoping. At the time of consultation SOS advised that all their records were submitted to SEDN and as such no additional records were sought from the group.

BTO

2.2.7 The BTO were consulted in March 2017 to obtain existing records of heronries along the route corridor.

2.2.8 Existing records included two heronries: Halston Hall and The Mere, Oteley Hall. A summary of Apparently Occupied Nests (AONs) for the most recent five-year period is provided in Table 8.5.1.

Table 8.5.1: Heronries records (BTO).

Site	Year	AON
Halston Hall	2011	12
	2012	11
	2013	8
	2014	10
	2015	11
The Mere, Oteley Hall	2011	12
	2012	11
	2013	15
	2014	13
	2015	13

WeBS Report Online Interface

2.2.9 The Wetland Bird Survey (WeBS[1]) monitors non-breeding waterbirds in the UK. A review of WeBS Core Count sites was undertaken to identify any existing waterbird count data within 1km of the route corridor.

2.2.10 No such sites fell within the study area and as such, no records were sought.

3 FIELD SURVEYS

3.1.1 Detailed information on bird population distributions and flight activity has been derived from field surveys.

3.1.2 The following ornithology surveys were completed between November 2016 and July 2017:

- Wintering Bird Surveys;
- Vantage Point (VP) Surveys;
- Breeding Bird Survey;

[1] WeBS is a partnership between the BTO, the RSPB and the Joint Nature Conservation Committee (the last on behalf of the statutory nature conservation bodies: Natural England, Natural Resources Wales and Scottish Natural Heritage and [1] The Department of Agriculture, Environment and Rural Affairs, Northern Ireland) in association with the Wildfowl and Wetlands Trust (WWT).

- Grey heron surveys; and
- Kingfisher surveys.

3.1.3 The scope of surveys undertaken has been informed through desk study, the suitability of habitats to support sensitive species, consultation responses obtained from relevant stakeholder organisations and with reference to the following key pieces of guidance:

- *"Assessing the effects of onshore wind farms on birds* (Natural England, 2010);
- *Recommended bird survey methods to inform impact assessment of onshore wind farms* (Scottish Natural Heritage, 2014); and,
- *Assessment and mitigation of impacts of power lines and guyed meteorological masts on birds* (SNH, 2016).

3.2 Target Species

3.2.1 Target species for which detailed knowledge upon their distribution and activity within the study area was sought, were identified on the basis of their likely sensitivity to the proposed development, legislative protection and conservation status.

3.2.2 Primarily, target species have therefore included those species included on/as:

- Annex 1 of the EC Birds Directive;
- Schedule 1 of the Wildlife & Countryside Act 1981;
- Red-listed Birds of Conservation Concern (Eaton *et al*., 2015); and,
- Shropshire Biodiversity Action Plan (SBAP) species[2].

3.2.3 Broadly this includes all waterfowl (including all wildfowl and waders), raptors, owls and game birds as relevant to the locale. Notable flocks of gulls were also recorded.

3.2.4 Passerines were not a focus for survey as they are not normally of concern for overhead line developments.

3.3 Field Survey Personnel

3.3.1 All field surveys were undertaken by Mr P. Antrobus (PA), Mr C. Davies MSc MCIEEM (CD) and Mr Z. Hinchcliffe BSc (ZH); all of whom are experienced professional ornithologists.

[2] https://new.shropshire.gov.uk/environment/biodiversity-ecology-and-planning/biodiversity-action-plan/

3.4 Methodologies

Wintering Bird Surveys

3.4.1 Wintering Bird Surveys were undertaken between November 2016 and March 2017 and primarily aimed to record the presence of any regular and/or notable aggregations of waterfowl and non-breeding raptors along the route corridor.

3.4.2 Observations were undertaken by way of windshield surveys and targeted walkover surveys along defined sections of the route corridor (i.e. those sections most likely to be used by target species on the basis of habitat suitability).

3.4.3 The study area included areas out to 600m either side of the route corridor (Figure 8.1). Surveys were primarily undertaken along the local road network and public rights of way and on private land with landowner consent.

3.4.4 Survey effort and coverage is summarised in Table 8.5.2 below.

3.4.5 Full details of all survey times, conditions and field surveyors are presented in Annex 1.

Table 8.5.2: Wintering bird survey effort summary.

Date	Start	End
17/11/2016	11:30	15:30
18/11/2016	10:00	12:00
28/11/2016	09:00	11:00
29/11/2016	10:00	14:00
21/12/2016	08:30	12:30
22/12/2016	10:00	12:00
30/12/2016	11:00	13:00
10/01/2017	10:00	14:30
11/01/2017	11:00	15:00
07/02/2017	12:00	13:30
08/02/2017	10:30	15:00
15/03/2017	14:30	16:00
29/03/2017	13:15	15:00

Vantage Point Surveys

3.4.6 VP surveys were undertaken between November 2016 and March 2017 and aimed to record target species flight activity along the route corridor. The primary focus being on identifying any notable movements of waterfowl across the route corridor and which may be susceptible to collision.

3.4.7 The VP survey methodology was undertaken with reference to SNH (2014 & 2016) and Natural England (2010) guidance. Three VP locations were established along the route corridor. Their locations are shown on Figure 8.5 and described in Table 8.5.3

below. Each VP gave a visual coverage of a 180º 2km wide viewshed along the route corridor.

3.4.8 The locations of VPs were selected on the basis of habitat features identified through aerial imagery and the likelihood of target species activity occurring.

Table 8.5.3: VP survey locations

VP	Grid Reference	Radius	Description
1	SJ352289	2,000m	The area around the Montgomery Canal in Section 1
2	SJ391295	2,000m	Land around the River Perry in Section 2
3	SJ459278	2,000m	Land around Loppington in Section ¾.

3.4.9 VP Survey effort completed between November 2016 and March 2017 is summarised in Table 8.5.4. Each VP survey session was up to 2 hours in duration.

Table 8.5.4: VP survey effort summary

VP	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Total
1	15	6	6	6	8	**41**
2	12	6	6	6	6	**36**
3	12	6	6	6	4	**34**
Total	**39**	**18**	**18**	**18**	**18**	**111**

3.4.10 Survey times were dispersed throughout the day, but were generally concentrated on the periods around sunrise and sunset when bird activity is generally at its highest and to account for the potential flighting of geese and wader species. Surveys were completed in a range of weather conditions but conductive to survey.

3.4.11 Full details of all survey times, conditions and field surveyors are presented in **Annex 1**.

3.4.12 In accordance with the SNH guidance (2014), flight lines were mapped for all target species passing through the VP survey area. Details of species, number of birds, flight height (in bands), duration and direction were noted on standardised recording forms.

Breeding Bird Survey

3.4.13 A Breeding Bird Survey (BBS) was undertaken along the route corridor between March and June 2017. Areas for survey were identified on the basis of the likelihood of target species occurring, primarily breeding waders identified through desk study.

3.4.14 The survey methodology was based upon a scaled-down version of the Common Bird Census (CBC), as outlined in Gilbert *et al*. (1998), and comprised three staggered survey visits between April and June 2017. During each visit a standardised route was walked through the survey area and the locations and breeding behaviours of all target species encountered recorded.

3.4.15 Survey effort and coverage is summarised in Table 8.5.5 and illustrated in Figure 8.4.

3.4.16 Full details of all survey times, conditions and field surveyors are presented in Annex 1.

Table 8.5.5: BBS survey effort summary

Date	Start Time	End Time
30/03/2017	08:20	10:20
31/03/2017	08:20	10:30
26/04/2017	06:30	09:00
27/04/2017	06:00	08:30
12/05/2017	06:30	08:30
17/05/2017	05:30	07:30
07/06/2017	06:30	08:30
16/06/2017	06:30	08:30

Grey Heron Surveys

3.4.17 There are two heronries located to the north of the route corridor and notable levels of grey heron activity were recorded during VP and Wintering Bird Surveys, particularly near to VP1. Species-specific VP survey effort was therefore conducted for grey herons during spring 2017 to gather further evidence of activity levels and potential risk in relation to the proposed overhead line.

3.4.18 VP surveys were conducted to the south of Halston Hall, one of their two known colonies, on Berghill Lane at grid reference SJ346302 (**Figure 8.6**).

3.4.19 Each survey lasted two hours, with a total of eight hours survey effort completed between May and June 2017. Survey effort was focused on peak activity times; grey heron activity leaving and entering the colony is greatest at dusk and dawn.

3.4.20 Survey effort is summarised in Table 8.5.6 below. Full details of all survey times, conditions and field surveyors are presented in Annex 1.

Table 8.5.6: Grey heron survey effort summary

Date	Start Time	End Time
10/05/2017	19:15	21.15
11/05/2017	06.30	08.30
06/06/2017	19.45	21.45
15/06/2017	19:45	21:45

Kingfisher surveys

3.4.21 Additional surveys for kingfisher were undertaken in August 2017 as a result of the habitat appraisal and incidental observations made during the wintering and breeding

bird surveys. These observations suggested that suitable habitat for kingfisher was present within the survey area along the River Perry west of Lower Hordley and east of Babbinswood. This potential for this species to be present and breeding along sections of watercourse crossed by the Preferred Line Route was therefore assessed through further survey approximately 100m up and downstream of proposed crossing points. This was considered to be a reasonable survey distance given that construction works would maintain a minimum 10m standoff from banksides and there would be no in-stream works required.

3.4.22 Both banks upstream and downstream of proposed crossing points were walked by suitably experienced ecologists searching for evidence of kingfisher presence/breeding burrows and to assess the breeding habitat potential. Exposed earth banks or mud or sand were searched for and any possible burrows or excavations were noted.

3.5 Results

Wintering Bird Survey

3.5.1 Target species activity recorded during wintering bird surveys is summarised in Table 8.5.7. Birds recorded during surveys in flight are also summarised in Table 8.5.8.

Table 8.5.7: Wintering bird survey results – birds on the ground

Species	No. Observations	No. Birds
Black-headed gull	5	77
Buzzard	11	15
Canada goose	3	9
Common gull	8	131
Greylag goose	2	25
Golden plover	1	1
Grey heron	3	3
Lapwing	10	655
Mallard	7	35
Mute swan	1	5
Pintail	1	1
Redwing	1	10
Snipe	4	6
Shoveler	1	5
Teal	8	121
Tufted duck	1	1
Wigeon	4	240

Table 8.5.8: Wintering bird survey results – birds in flight

Species	No. Observations	No. Birds
Buzzard	18	20
Cormorant	1	1
Canada goose	1	2

Species	No. Observations	No. Birds
Goosander	1	1
Greylag goose	1	2
Grey heron	5	5
Herring gull	1	3
Kestrel	6	6
Kingfisher	5	5
Lapwing	4	24
Lesser black-backed gull	2	5
Mallard	2	6
Mute swan	2	3
Peregrine	1	1
Pink-footed goose	1	100
Snipe	6	16
Teal	1	5
Wigeon	1	5

Vantage Point Surveys

3.5.2 Target species activity is summarised in Table 8.5.9. The total number of flights and birds per VP is presented.

Table 8.5.9: VP Results – target species flight activity.

Vantage Point	Species	No. Flights	N. Birds
VP1	Cormorant	2	2
	Goosander	1	3
	Greylag goose	1	1
	Grey heron	20	22
	Kingfisher	1	1
	Lapwing	3	14
	Marsh harrier	1	1
	Merlin	1	1
	Mute swan	2	4
	Snipe	4	13
	Teal	1	8
	Woodcock	2	2
VP2	Grey heron	10	10
	Snipe	1	1
	Shelduck	1	1
	Teal	1	3
VP3	Canada goose	1	20
	Goosander	1	1
	Greylag goose	1	3

	Grey heron	6	6
	Lapwing	1	16
	Mallard	1	4
	Peregrine	3	3
	Pink-footed goose	1	310
	Snipe	2	2
	Shelduck	1	7
	Shoveler	1	2
	Teal	4	54
	Wigeon	5	156
	Whooper swan	1	4

3.5.3 The following Table 8.5.10 summarises records of birds on the ground during VP surveys.

Table 8.5.10: VP Results – birds on ground

Vantage Point	Species	No. Observations	No. Birds
VP1	Canada goose	2	20
	Coot	2	3
	Greylag goose	2	30
	Grey heron	2	3
	Lapwing	1	12
	Mallard	2	10
	Snipe	1	3
VP2	Grey heron	1	1
VP3	Canada goose	2	39
	Goosander	1	1
	Greylag goose	1	3
	Mallard	1	4
	Shelduck	1	7
	Shoveler	1	8
	Teal	2	23
	Wigeon	1	75

Breeding Bird Survey

3.5.4 The majority of the survey area comprised relatively open arable and improved grassland fields bounded by hedgerows or post and wire fences readily observable during the surveys. Around woodland copses, any target species that would breed in woodland were noted from aerial display nearby.

3.5.5 Target species recorded along the route corridor included a small range birds of prey, farmland waders, wildfowl and additional Schedule 1 listed species. Numbers of breeding territories recorded are detailed in Table 8.5.11.

3.5.6 Breeding surveys recorded 13 target species and an estimated 39-40 pairs in total.

3.5.7 A single fieldfare was recorded singing and displaying territorial behaviour on 26th April 2017, although the species was not subsequently seen and the likelihood of a breeding record within western England is limited. Fieldfare is listed as a Schedule 1 breeding species under the Wildlife and Countryside Act 1981, as well as red listed under BoCC.

Table 8.5.11: BBS survey results

Species	Territories	Species	Territories
Greylag goose	4	Grey Heron	2
Canada goose	9	Coot	1-2
Shelduck	3	Common Buzzard	4
Mallard	7	Lapwing	5-6
Teal	1	Kestrel	1
Cormorant	1	Fieldfare	0-1
Little Grebe	1		

3.5.8 Incidental observations during habitat and bat surveys also observed the following target species likely to be breeding in the area: common quail, barn owl and tawny owl. These were recorded as single birds close to the River Perry to the north of Rednal on 27th June 2017.

Grey Heron Survey

3.5.9 There are two heronries located to the north of the proposed route corridor. These are located at Halston Hall, Babbinswood, and Ellesmere (Figure 8.6). Additional heron observations were undertaken to determine the level of flights across the preferred line route in the vicinity of known heronries.

3.5.10 Grey heron flight activity and additional target species activity recorded during species specific VP surveys in spring 2017 is summarised in Table 8.5.12. Flight lines are illustrated in Figure 8.6.

3.5.11 A total of seven heron flights were observed during survey with the majority of activity on the morning of 11th May 2017, to and from the Halston Hall colony. A single flight from what was presumed the Ellesmere heronry was also recorded on the 11th May flying along the Shropshire Union Canal.

3.5.12 All flight records of grey herons during the survey were above 15 metres and therefore over the proposed height of the overhead line.

3.5.13 Incidental observations were also recorded of other target species included greylag goose, red kite and lapwing. Greylag goose were recorded in small flocks flying to and from the fields around Halston Hall, lapwing was recorded flying south and over the fields near to Babbinswood and a single red kite observation was noted on 11th May 2017 hunting to the north west of Halston Hall before drifting south east.

Table 8.5.12: Grey heron survey result.

Species	Number of flights				
	10/05/2017	11/05/2017	06/06/2017	15/06/2017	Total
Greylag goose	2	1	0	0	3
Grey heron	0	5	2	0	7
Red kite	0	1	0	0	1
Lapwing	2	1	0	0	3

Kingfisher Survey

3.5.14 Habitat identified as being potentially suitable for nesting kingfisher in proximity to where the preferred line route crossed watercourses was surveyed in August, as shown on Figure 8.6.

3.5.15 Although kingfishers were recorded flying along the River Perry during the breeding bird surveys, no kingfishers were observed during additional kingfisher surveys along watercourses. There was, however, suitable breeding habitat north of the preferred line route to the east of Lower Hordley in exposed sandy banks along the River Perry. Several holes were observed within the cliff face that could have been excavated by Kingfisher. Alternatively these holes could have been created by Sand Martin *Riparia riparia*.

3.5.16 Where the preferred line route crosses the River Perry, there was thick Willow *Salix* scrub lining the banks and therefore these bankside areas did not provide suitable kingfisher habitat.

3.5.17 Kingfishers were also observed along the River Perry to the east of Babbinswood and north of the proposed route. The observed birds were likely a family group, suggesting local breeding.

3.5.18 No suitable kingfisher nesting habitat was present where the preferred line route crossed the Montgomery Canal or River Roden.

ANNEX 1

Table A1.1 VP Survey Effort

Date	VP	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
07/11/2016	1	PA	09.15	11.15	3	NE	0	6	1	2
07/11/2016	1	PA	13.30	14.30	4	N	0	4	1	2
19/11/2016	1	CD	15.15	17.15	3	SW	0	8/7	2	2
20/11/2016	1	CD	11.00	13.00	4	N/NW	0	8	2	2
23/11/2016	1	CD	07.30	09.30	3	N	0	8	2	2
25/11/2016	1	CD	14.30	16.30	1	NE	0	0	NA	2
26/11/2016	1	CD	11:00	13:00	NA	NA	0	0	NA	2
27/11/2016	1	CD	07:30	09:30	1	NE	0	8	2	1
24/12/2016	1	CD	14:00	16:00	5	SW	2	8/8	2	2
28/12/2016	1	CD	11:00	13:00	2	SW	0	4/8	2	2
29/12/2016	1	CD	08:00	10:00	2	SW	0	2/8	2	2
12/01/2017	1	CD	14:40	16:40	4	NW	3	8	2	1
23/01/2017	1	CD	10:30	12:30	2	SW	0	4	2	2
25/01/2017	1	CD	07:45	09:45	3	S	0	7	2	2
09/02/2017	1	CD	15:30	17:30	3	E	0-1	8	2	2-1
10/02/2017	1	CD	07:15	09:15	3	NE	0	8	2	2
24/02/2017	1	CD	11:00	13:00	3	SW	0	8	2	2
15/03/2017	1	ZH	12:00	14:00	2	W	0	0	NA	2

Date	VP	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
16/03/2017	1	ZH	05:50	07:50	2	W	0	7-8	2	2
16/03/2017	1	ZH	08:15	10:15	2	W	0	8	2	2
30/03/2017	1	ZH	18:15	20:15	2	S	0	3	2	2
19/11/2016	2	CD	07.30	09.30	2	SW	0/2	0/4/8	0/2	2
20/11/2016	2	CD	14.30	16.30	3	NW	0	4/1	2	2
23/11/2016	2	CD	11.00	13.00	3	NE	0	8	2	2
26/11/2016	2	CD	14:30	16:30	1	NA	0	2/8	2	2
27/11/2016	2	CD	11:00	13:00	1	NE	0	7/8	2	2
24/12/2016	2	CD	08:00	10:00	4	W	3	8/8	2	1
28/12/2016	2	CD	14:00	16:00	2	SW	0	8/8	2	2
29/12/2016	2	CD	11:00	13:00	2	SW	0	2/8	2	2
12/01/2017	2	CD	8:00	10:00	3	W	2	8	2	1
23/01/2017	2	CD	15:10	17:10	3	SW	0	8	2	2
25/01/2017	2	CD	10:30	12:30	3	S	0	0	NA	2
09/02/2017	2	CD	07:15	09:15	2	E	0	6	2	2
10/02/2017	2	CD	10:15	12:15	3		0	8	2	2
24/02/2017	2	CD	16:00	18:00	3	SW	0	8	2	2
29/03/2017	2	ZH	10:45	12:45	3	SSE	0	6-8	2	2
29/03/2017	2	ZH	18:00	20:00	2	S	1-3	8	1-2	1-2
31/03/2017	2	ZH	06:15	08:15	3		0	8	3	3
25/11/2106	2	CD	07:45	09:45	1	NE	0	0	NA	2
19/11/2016	3	CD	12.00	14.00	3	SW	0	6	2	2
20/11/2016	3	CD	07.15	09.15	4	N	3	8	2	2
23/11/2016	3	CD	14.30	16.30	3	NE	0	8	2	2
25/11/2016	3	CD	11:00	13:00	1	NE	0	0	NA	2

Date	VP	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
26/11/2016	3	CD	07:30	09:30	NA	NA	0	0	NA	1
27/11/2016	3	CD	14:30	16:30	2	NE	0	6/8	2	2
24/12/2016	3	CD	11:00	13:00	6	SW	0	7/8	2	2
28/12/2016	3	CD	08:00	10:00	2	SW	0	8/8	2	1
29/12/2016	3	CD	14:15	16:15	2	SW	0	4/8	2	2
12/01/2017	3	CD	11:00	13:00	3	W	3	8	2	2
23/01/2017	3	CD	07:45	09:45	2	SW	0	4	2	1
25/01/2017	3	CD	15:15	17:15	3	S	0	3	2	2
09/02/2017	3	CD	10:00	12:00	2-3	SE	0	6-8	2	2
10/02/2017	3	CD	15:45	17:45	3	NE	0	8	2	2-1
24/02/2017	3	CD	06:45	08:45	3	SW	0	8	2	2
15/03/2017	3	ZH	16:30	18:30	1	W	0	0	NA	2
30/03/2017	3	ZH	06:15	08:15	2	S	0-1	8	2	2

Table A1.2 Winter Walkover Survey Effort

Date	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
17/11/2016	CD	11:30	13:30	6	SW	3	6/8	2	2
17/11/2016	CD	14:00	15:30	6	SW	3	6/8	2	2

18/11/2016	CD	10:00	12:00	4	SW	2	4/8	2	2
28/11/2016	CD	09:00	11:00	1	SW	0	4/8	2	2
29/11/2016	CD	12:00	14:00	1	SW	0	2/8	2	2
29/11/2016	CD	10:00	12:00	0	NA	0	0	N/A	2
21/12/2016	CD	08:30	10:00	4	SW	0	7/8	2	2
22/12/2016	CD	10:00	12:00	2	W	0	0	N/A	2
21/12/2016	CD	11:00	12:30	4	SW	0	8/8	2	2
30/12/2016	CD	11:00	13:00	3	SW	0	2/8	2	2
10/01/2017	CD	10:00	12:00	4	NW	1	8	2/1	2
10/01/2017	CD	12:30	14:30	3	NW	1	8	2/1	2
11/01/2017	CD	11:00	13:00	6-7	NW	2	6	2	2
11/01/2017	CD	14:00	15:00	6-7	NW	0	6	2	2
08/02/2017	CD	13:00	15:00	2	SE	0	8/8	2	2
08/02/2017	CD	10:30	12:30	2	SE	0	8/8	2	2
07/02/2017	CD	12:00	13:30	2	SE	0	3/8	2	2
15/03/2017	ZH	14:30	16:00						
29/03/2017	ZH	13:15	15:00	2	S	1	8	2	2

Table A1.3 Breeding Bird Survey Effort

Date	Surveyor	Start Time	Finish Time	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
30/03/2017	ZH	08:20	10:20	2	S	2	8	2	2
31/03/2017	ZH	08:20	10:30	2		0	7	2	2
26/04/2017	ZH	06:30	09:00	2	NE	0	0		2
27/04/2017	ZH	06:00	08:30	1		0	6	2	2
12/05/2017	ZH	06:30	08:30	1	N	1	7	2	2
17/05/2017	ZH	05:30	07:30	3	W	0	3	2	2
07/06/2017	ZH	06:30	08:30	3	W	0	3	2	2
16/06/2017	ZH	06:30	08:30	2	W	0	7	2	2

Table A1.4 Grey Heron Survey Effort

Date	Surveyor	Start Time	Finish Time	VP Hours	Wind Speed	Wind Direction	Rain	Cloud Cover	Cloud Height	Visibility
10/05/2017	ZH	19:15	21;15	2	0		0	1	2	2
11/05/2017	ZH	06:30	08:30	2	1	NE	0	1	2	2
06/06/2017	ZH	19:45	21:45	2	3	W	0	5	2	2
15/06/2017	ZH	19:45	21:45	2	3		0	8	2	2

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.6: Amphibian Surveys

avian ecology

Document Control				
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Project Number:	Gille-391-746			
Report Title	Appendix 8.6: Amphibian Surveys			
Issue	**Date**	**Notes**	**Prepared**	**Reviewed**
V1	01/10/2017	Draft	T Winter *GradCIEEM*	U Maginn MCIEEM
V2	10/11/2017	Final	T Winter *GradCIEEM*	U Maginn MCIEEM

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1 INTRODUCTION

1.1.1 This Technical Appendix presents the results of amphibian surveys undertaken to inform the Preliminary Environmental Information Report (PEIR) for the 132kV electrical Circuit from Oswestry to Wem.

2 METHODOLOGY

2.1 Desk Study

2.1.1 A data request was submitted to SEDN and Shropshire Wildlife Trust (SWT) for amphibian records within 1km of the preferred line route.

2.2 Habitat Suitability Index

2.2.1 Pond locations are shown on Figure 8.7**.** Ponds were identified within a 100m wide survey corridor, with additional ponds noted in the wider area. Ponds were accessed and subject to a Habitat Suitability Assessment. The survey covered all ponds within a 100m wide corridor plus additional ponds related to route options considered during the evolving line design.

2.2.2 In total, 34 ponds were subject to a Habitat Suitability Index (HSI) assessment in 2017 in order to provide an indication of their potential suitability for great crested newts (Annex 1). Potentially suitable ponds were highlighted for follow up survey.

2.2.3 The assessment methodology followed the Amphibian and Reptile Groups of the United Kingdom (ARG UK) methodology (ARG UK, 2010[1]), which is a refined version of the Oldham et al. (2000[2]) method. The assessment calculates a habitat suitability score for each pond based on a series of indices generated from variables including pond size and the presence/absence of wildfowl. Final scores relate to suitability and range from 'poor' to 'excellent' suitability.

2.2.4 The HSI assessment involves the measurement of ten different indices which, when combined, have been found to provide a good indication of the general suitability of ponds for great crested newts. Each of the indices is scored (between 0.01-1) using a series of graphs and figures within the guidance notes (ARG UK, 2010). These scores are then used to calculate an overall Habitat Suitability Score for each pond. Final scores relate to pond suitability for great crested newt and range from 'poor' to 'excellent'.

2.2.5 The results of the HSI assessment can be used to provide a useful indication of potential newt presence and help assess any likely impacts of a development, but do not represent a substitute for full surveys. In some cases, ponds that were identified from HSI assessment early in the year to have potential were found to be dry by the spring breeding season and therefore unsuitable for great crested newt breeding or for presence/absence survey.

[1] ARG UK (2010) ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index. Amphibian and Reptile Groups of the United Kingdom.

[2] Oldham R.S., Keeble J., Swan M.J.S. and Jeffcote M. (2000) Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal, 10(4), pp. 143-155.

2.3 Environmental DNA Survey

2.3.1 Environmental DNA (eDNA) is nuclear or mitochondrial DNA that is released from an organism into the environment. Sources of eDNA include secreted faeces, mucous, gametes, shed skin and carcasses. In aquatic environments, eDNA is diluted and distributed in the water where it persists for 7–21 days, depending on the conditions (Biggs *et al*., 2014a[3]). The technique for determining presence/absence of great crested newt uses Polymerase Chain Reaction (PCR) laboratory techniques to detect the species eDNA within water samples.

2.3.2 Recent research by the Department for Environment Food and Rural Affairs (Defra) Project WC1067, concludes that the sampling of waterbodies collecting eDNA appears to be a highly effective method for determining whether great crested newts are present or absent during the breeding season, even where eDNA is present in very low concentrations (Biggs *et al.,* 2014).

2.3.3 Natural England accepts the use of environmental DNA surveys as evidence of presence or absence of great crested newts, provided samples are taken when newts are likely to be present (this depends on location and conditions like the weather). Generally this is considered to be between mid-April and 30th June; however in ponds which have been used for breeding there is also some potential to record efts/larvae in July and August. Surveys in these months cannot prove absence, but can provide useful information for confirmation of breeding.

Field Sampling Technique

2.3.4 Amphibian surveys were undertaken by suitably trained and experienced surveyors Ms C Baldock MRes ACIEEM (Licence No. 2016-19849-CLS-CLS), Mr T Winter BSc Grad CIEEM (Licence no. 2017-27525-CLS-CLS), Mr A Hulme BSc, Mr Graham Burns and Mr Z Hinchcliffe BSc. Surveys were undertaken in May and June 2017. Photographs of typical ponds are provided in Annex 2.

2.3.5 The protocol for sampling followed that outlined within Biggs *et al*., 2014b[4] , which required the collection of 20 x 30ml subsamples from each pond, spaced as evenly as possible around the pond margin.

2.3.6 Each sample was then placed within a Whirl-Pak bag and shaken for 10 seconds, before a 15ml sample was pipetted from the bag and placed in a specimen tube for laboratory analysis. Samples were refrigerated prior to laboratory dispatch.

2.3.7 This process was repeated for each sampled pond.

[3] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Defra Project WC1067. Freshwater Habitats Trust: Oxford.

[4] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA.

Laboratory Analysis

2.3.8 Laboratory analysis was undertaken by SureScreen Scientifics. The laboratory follows the analysis methodology outlined within the Defra Project WC1067 research note (Biggs *et* al., 2014) using the q-PCR test conducted in two phases.

2.3.9 The sample first goes through an extraction process to acquire as much eDNA as possible to produce a pooled sample. The pooled sample is then tested via 1-PCR.

2.3.10 Each pooled sample is replicated 12 times to ensure results are accurate. If one of the twelve replicates tests positive the sample is declared positive. The sample is only declared negative if no replicates show amplification. Inhibition and degradation checks are also carried out on each sample using a known DNA marker. Results of these quality control tests are recorded with each sample.

Survey Limitations

2.3.11 No significant survey limitations were encountered.

3 RESULTS

3.1 Desk Study

3.1.1 Very few records were returned for amphibians, restricted to four records for frog *Rana temporaria* and two for toad *Bufo bufo*, and 13 records for great crested newt *Triturus cristata*. This scarcity is considered to reflect a lack of survey information for the area.

3.2 Habitat Suitability Index

3.2.1 The results of the HSI assessment are presented in Annex 1 of this appendix.

3.3 Environmental DNA

3.3.1 eDNA survey results are summarised in Table 8.6.1. Laboratory reports are provided in Annex 3.

Table 8.6.1: Pond eDNA results.

Pond Number	Summary description	eDNA tested: Presence (P)/ Likely absence (A)
0a	Oxbow shaped pond in corner of field.	A
0b	Shallow pond filled with macrophyte linked to P0a. Good refuge habitat of stone piles and potential hibernacula nearby.	A
1	Pond on edge of improved grassland field.	A
2	Turbid, shallow but looks to fill regularly. Good vegetation cover.	A
3	Open, well vegetated pond. Willows, alder and oak around the perimeter but plenty of light reaching water. Marginal vegetation included flag iris, branched bur-reed and water milfoil	P
3a	Shallow field pond, dry at time of survey	N/A
4	Open pond fringed with *Typha* and rushes.	No access*
5	Shaded pond surrounded by mature oaks, hawthorn, sycamore.	No access
6/7	Adjoining shaded ponds with a deep layer of mud and debris, overhanging scrub and alder oak and hawthorn. Water turbid and lacking macrophytes	A
8/9	Two ponds linked by a central channel. Bank edges were either heavily poached or steep sided. Bank vegetation comprised mainly common grasses and several large mature oaks.	A
10	Pond surrounded by mature trees and scrub. A large percentage of the margin overhung by willow scrub. Limited macrophtye presence in water.	A
11	Field pond (dry by early April 2017))	N/A DRY
12	Pond situated on the field edge with dense hedgerow surrounding it, as well as tall oaks which left the entire bank in shade.	P
13	An open shallow waterbody with no defined banks located centrally within an improved grassland field. The pond was heavily poached by cattle.	A
14	Heavily shaded pond, overhung by large area of dense scrub including hazel, willow, aspen.	P
15	Pond in arable field. Large stand of marginal vegetation with water horsetail, willow, hawthorn shrubs around edge.	A
16	Open lagoon. Marginal vegetation included water mint, spike rush and soft rush	A
17	Pond surrounded by hawthorn, dogrose, ash scrub. Enclosed by vegetation but plentiful light penetration. Plentiful invertebrates including dragonflies.	P

18	Adjacent to roadway and well shaded by oak, alder, blackthorn, ash. Pond shallow and largely lacking aquatic vegetation.	P
19	Partially shaded pond with livestock access and surrounded by alder shrubs. Marginal vegetation included hard rush.	P
20	Large ornamental / fishing pond in small woodland. Irregular shape with central island. Shaded with deep layer of leaf litter and limited marginal vegetation (flag iris). Trees around pond included oak, alder, ash, hazel, willow.	No access
21	Field pond	No access
22	Field pond	No access
23/24	Ponds combine to form a large pond located on the edge of an arable field with heavily shaded areas by alder and oak. Some areas along its banks were heavily poached by cattle	P
25	Dry pond situated within an arable field adjacent to Pond 26	N/A DRY
26	Dry pond situated within an arable field. Small area of bulrush denotes occasional flooding. Adjacent to Pond 25	N/A DRY
27	A pond situated within an arable field with heavy poaching on one end. 2/3 of the pond is shaded by alder, hawthorn and bramble.	P
28	A large reservoir surrounded by improved grassland. Very little shading around its banks and very little macrophytes.	A
29	Dry impression with a dense growth of grasses. May flood occasionally.	N/A DRY
30	Large pond situated within a dense woodland. The entirety of the pond was shaded by the dense woodland canopy	A
31	Field pond	No access
32	Field pond	No access

**No access permission to undertake eDNA survey*

Annex 1– Habitat Suitability Index Parameters

Pond Number																
Indices	**P0a**	**P0b**	**P1**	**P1a**	**P1b**	**P1c**	**P2**	**P3**	**P3a**	**P4**	**P5**	**P6**	**P7**	**P8 & P9**	**P10**	**P11**
S1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S2	0.2	0.2	0.8	0.8	0.2	0.2	0.8	0.4	0.2	0.9	0.4	0.4	0.4	1	1	1
S3	0.1	0.1	1	0.9	0.1	0.1	1	0.9	0.1	0.9	1	1	1	1	0.9	1
S4	1	1	1	1	0.33	0.67	1	1	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
S5	0.6	1	1	1	1	1	0.6	0.6	0.6	1	0.6	1	1	0.6	0.6	1
S6	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
S7	1	1	1	1	1	1	1	1	1	0.67	1	1	1	0.67	0.67	1
S8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S9	0.67	0.33	0.67	0.67	1	1	1	0.33	0.33	0.33	0.33	0.33	0.33	0.67	0.67	0.67
S10	1	1	1	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Suitability	Below Average	Below Average	Excellent	Excellent	Good	Good	Excellent	Good	Below Average	Below Average	Average	Good	Good	Average	Below Average	Good

Pond Number															
Indices	**P12**	**P13**	**P13a**	**P14**	**P15**	**P16**	**P17**	**P18**	**P19**	**P20**	**P21**	**P22**	**P23**	**P24**	**P25**
S1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S2	0.8	0.4	0.2	1	1	0.9	1	1	1	1	0.8	0.8	0.8	1	0.8
S3	0.9	0.9	0.9	1	1	0.9	1	1	1	0.9	0.9	0.9	0.9	0.1	0.1
S4	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.33	0.33
S5	0.6	0.6	1	1	0.6	0.6	1	1	0.6	1	1	0.6	0.6	0.6	0.6
S6	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
S7	1	1	1	1	0.67	0.33	1	1	1	0.67	1	1	0.67	0.67	1
S8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S9	0.67	0.33	0.33	1	0.33	0.1	0.67	1	0.33	1	0.33	0.33	0.67	0.67	0.1
S10	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7	0.7	0.5
Suitability	Poor	Poor	Poor	Excellent	Average	Poor	Good	Excellent	Excellent	Average	Good	Below Average	Good	Good	Below Average

Pond Number							
Indices	**P26**	**P27**	**P28**	**P29**	**P30**	**P33**	**P34**
S1	1	1	1	1	1	1	1
S2	0.8	1	0.9	0.8	1	0.8	1
S3	0.9	1	0.9	0.9	0.9	1	1
S4	0.67	0.67	0.67	0.67	0.67	0.67	0.67
S5	1	0.6	1	0.6	0.6	0.6	1
S6	0.67	0.67	0.67	0.67	0.67	0.67	0.67
S7	0.67	1	1	1	0.67	1	1
S8	1	1	1	1	1	1	1
S9	0.1	0.67	0.1	0.67	1	0.33	0.33
S10	0.5	0.9	0.5	0.5	1	0.5	0.5
Suitability	Poor	Good	Good	Poor	Excellent	Excellent	Excellent

Annex 2 – Selected Pond Photographs

		
P1	P1a	P1b
		
P2	P3	Shrubs around P3

		
P4	P4a DRY	P5
		
P6	P7	P8 & P9

		
P10	P13	P15
		
Scrub around P15	P16	P17

		
P18	P19	P20
		
P25 DRY	P28	P30

ANNEX 3 – eDNA Laboratory Reports

SureScreen Scientifics

Folio No: E0515
Report No: 1
Order No: [No PO Received on Paperwork]
Client: Avian Ecology
Contact: Tom Winter
Contact Details: tom.winter@avianecology.co.uk
Date: 10/05/2017

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 03/05/2017
Date Reported: 10/05/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
31392	Pond 889 Inked	N/A	Pass	Pass	Pass	Negative	0
31394	Pond 12	N/A	Pass	Pass	Pass	Positive	1
31396	P2	N/A	Pass	Pass	Pass	Negative	0
31397	P1	N/A	Pass	Pass	Pass	Negative	0
31398	Pond 13	N/A	Pass	Pass	Pass	Negative	0
31399	Pond 10	N/A	Pass	Pass	Pass	Negative	0
31403	P0a	N/A	Pass	Pass	Pass	Negative	0

SureScreen Scientifics

Folio No:	E0816
Report No:	1
Order No:	AE17_012
Client:	Avian Ecology
Contact:	Zac Hinchcliffe, Catherine Baldock
Contact Details:	zac.hinchcliffe@avianecology.co.uk, cathy.baldock@avianecology.co.uk
Date:	25/05/2017

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 23/05/2017
Date Reported: 25/05/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
31401	North Shropshire Line	-	Pass	Pass	Pass	Negative	0

SureScreen Scientifics

Folio No:	E0969
Report No:	1
Order No:	AE-17-040
Client:	Avian Ecology
Contact:	Tom Winter, Catherine Baldock
Contact Details:	tom.winter@avianecology.co.uk, cathy.baldock@avianecology.co.uk
Date:	07/06/2017

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 05/06/2017
Date Reported: 07/06/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
31828	North Shropshire	-	Pass	Pass	Pass	Positive	1
32894	Pond 23 & 24, Shropshire Lines	-	Pass	Pass	Pass	Positive	8

SureScreen Scientifics

Folio No: E0968
Report No: 1
Order No: AE-17-043
Client: Avian Ecology
Contact: Tom Winter
Contact Details: tom.winter@avianecology.co.uk
Date: 16/06/2017

TECHNICAL REPORT

ANALYSIS OF ENVIRONMENTAL DNA IN POND WATER FOR THE DETECTION OF GREAT CRESTED NEWTS

Date sample received at Laboratory: 05/06/2017
Date Reported: 16/06/2017
Matters Affecting Results: None

RESULTS

Lab Sample No.	Site Name	O/S Reference	SIC	DC	IC	Result	Positive Replicates
32889	Pond 16, Shropshire Lines	-	Pass	Pass	Pass	Negative	0
32890	Pond 15, Shropshire Lines	-	Pass	Pass	Pass	Negative	0
32893	Pond 27, Shropshire Lines	-	Pass	Pass	Pass	Positive	12
32895	Pond 28, Shropshire Lines	-	Pass	Pass	Pass	Negative	0
32896	Pond 14, Shropshire Lines	-	Pass	Pass	Pass	Positive	10
32897	Pond 30, Shropshire Lines	-	Pass	Pass	Pass	Negative	0

SureScreen Scientifics

32898	Pond 19, Shropshire Lines	-	Pass	Pass	Pass	Positive	1
32899	Pond 17, Shropshire Lines	-	Pass	Pass	Pass	Positive	11
32900	Pond 18, Shropshire Lines	-	Pass	Pass	Pass	Positive	5

SUMMARY

When Great Crested Newts (GCN); Triturus cristatus inhabit a pond, they deposit traces of their DNA in the water as evidence of their presence. By sampling the water, we can analyse these small environmental DNA (eDNA) traces to confirm GCN habitation, or establish GCN absence.

The water samples detailed below were submitted for eDNA analysis to the protocol stated in DEFRA WC1067 (Latest Amendments). Details on the sample submission form were used as the

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unique sample identity.

RESULTS INTERPRETATION

Lab Sample No.- When a kit is made it is given a unique sample number. When the pond samples have been taken and the kit has been received back in to the laboratory, this sample number is tracked throughout the laboratory.

Site Name- Information on the pond.

O/S Reference – Location/co-ordinates of pond.

SIC- Sample Integrity Check. Refers to quality of packaging, absence of tube leakage, suitability of sample (not too much mud or weed etc.) and absence of any factors that could potentially lead to results errors. Inspection upon receipt of sample at the laboratory. To check if the Sample is of adequate integrity when received. Pass or Fail.

DC- Degradation Check. Analysis of the spiked DNA marker to see if there has been degradation of the kit since made in the laboratory to sampling to analysis. Pass or Fail.

IC- Inhibition Check- PCR inhibitors can cause false results. Inhibitors are analysed to check the quality of the result. Every effort is made to clean the sample pre-analysis however some inhibitors cannot be extracted. An unacceptable inhibition check will cause an indeterminate sample and must be sampled again.

Result- NEGATIVE means that GCN eDNA was not detected or is below the threshold detection level and the test result should be considered as no evidence of GCN presence. POSITIVE means that GCN eDNA was found at or above the threshold level and the presence of GCN at this location at the time of sampling or in the recent past is confirmed. Positive or Negative.

Positive Replicates- To generate the results all of the tubes from each pond are combined to produce one eDNA extract. Then twelve separate analyses are undertaken. If one or more of these analyses are positive the pond is declared positive for the presence of GCN. It may be assumed that small fractions of positive analyses suggest low level presence but this cannot currently be used for population studies. In accordance with Natural England protocol, even a score of 1/12 is declared positive.

METHODOLOGY

The laboratory testing adheres to strict guidelines laid down in WC1067 Analytical and Methodological Development for Improved Surveillance of The Great Crested Newt, Version 1.1

The analysis is conducted in two phases. The sample first goes through an extraction process where all six tubes are pooled together to acquire as much eDNA as possible. The pooled sample is then tested via real time PCR (also called q-PCR). This process amplifies select part of DNA allowing it to be detected and measured in 'real time' as the analytical process develops. qPCR combines PCR amplification and detection into a single step. This eliminates the need to detect products using gel electrophoresis. With qPCR, fluorescent dyes specific to the target sequence are used to label PCR products during thermal cycling. The accumulation of fluorescent signals during the exponential phase of the reaction is measured for fast and objective data analysis. The point at which amplification begins (the Ct value) is an indicator of the quality of the sample. True positive controls, negatives and blanks as well as spiked synthetic DNA are included in every analysis and these have to be correct before any result is declared so they act as additional quality control measures.

The primers used in this process are specific to a part of mitochondrial DNA only found in GCN ensuring no DNA from other species present in the water is amplified. The unique sequence appropriate for GCN analysis is quoted in DEFRA WC 1067 and means there should be no detection of closely related species. We have tested our system exhaustively to ensure this is the case in

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our laboratory. We can offer eDNA analysis for most other species including other newts.

Analysis of eDNA requires scrupulous attention to detail to prevent risk of contamination. Kits are manufactured by SureScreen Scientifics to strict quality procedures in a separate building and with separate staff, adopting best practice from WC1067 and WC1067 Appendix 5. Kits contain a 'spiked' DNA marker used as a quality control tracer (SureScreen patent pending) to ensure any DNA contained in the sampled water has not deteriorated in transit. Stages of the DNA analysis are also conducted in different buildings at our premises for added

SureScreen Scientifics Ltd also participate in Natural England's proficiency testing scheme and we also carry out inter-laboratory checks on accuracy of results as part of our quality procedures.

Reported by: Sam Humphrey **Approved by:** Harry Neal

End Of Report

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.7 - Bat Surveys

avian ecology

Document Control	
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CONTENTS

FIGURE

Figure 8.8 –Bat Activity Survey Areas

1 INTRODUCTION

1.1 Background

1.1.1 This Technical Appendix presents the result of bat activity surveys undertaken to inform the PEIR and Environmental Statement (ES) for the 132kV Electrical Circuit from Oswestry to Wem.

1.1.2 The surveys encompassed representative habitats along the route, and their purpose was to identify bat species present, and the distribution and activity levels of bats at the time of survey.

1.1.3 The survey locations are presented on Figure 8.8 'Manual Bat Activity Results'.

1.2 Study Area Overview

1.2.1 The Study Area generally comprised the Preferred Line Route and a 100m wide buffer across the North Shropshire countryside. For the bat activity surveys the study area was extended in places to allow transect routes to sample representative habitats in the vicinity. The study area is dominated by open arable farmland with scattered woodland copses, networks of hedgerows, ponds and watercourses.

1.3 Study Aims

1.3.1 Surveys were undertaken in order to:

- Provide an indication of bat utilisation across the Study Area;
- Identify potential roosting features within trees and structures in the Study Area;
- Obtain information on likely presence/absence of roosting bats;
- Identify potential ecological effects resulting from the proposed development; and,
- Outline any appropriate mitigation measures, where required.

2 METHODOLOGY

2.1 Overview

2.1.1 The following surveys were completed:

- Preliminary Roost Assessment of trees; and
- Activity surveys and automated monitoring surveys.

2.1.2 For the activity surveys, the survey effort and layout was informed through desk study and habitat appraisal from a review of Phase 1 Habitat data (Appendix 1) to provide a representative sample of bat activity across the Preferred Line Route corridor. Subsequently, the Preferred Line Route was split into five survey sections (1-5) whereby each section included one transect route combined with an automated monitoring detector.

2.2 Relevant Guidance

2.2.1 Bat survey methodology and subsequent interpretation of results made reference to the following guidance documents:

- Collins, J. (ed.) (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition). The Bat Conservation Trust, London.
- Mitchell-Jones, A. J. & McLeish, A. P. (2004*). Bat Workers Manual. 3rd Edition*. Joint Nature Conservation Committee, Peterborough.
- Russ, J. (2012). *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.

2.3 Personnel

2.3.1 All surveys were undertaken by suitably qualified and experienced personnel.

2.3.2 Preliminary Roost Assessments and activity surveys were carried out by T. Winter BSc Grad CIEEM, S. Turner MRes Grad CIEEM, U Maginn MSc MCIEEM, A Powell BSc, A. Hulme BSc, Z Hinchcliffe and C. Baldock MRes ACIEEM.

2.3.3 Bat sound analysis has been undertaken by Stacey Whiteley BSc MCIEEM, assisted by Zac Hinchcliffe MSc.

2.4 Desk Study

2.4.1 A desk study was undertaken, comprising:

- A data request to SEDN and Shropshire Wildlife Trust for:
    - Bat species within a 2km radius of the Proposed Line Route;
- Non-statutory designated sites with qualifying bat interests within a 2km radius of the Proposed Line Route;
- A search was also made via the Multi Agency Geographic Information for the Countryside (MAGIC) (http://natureonthemap.gov.uk) for Special Areas of Conservation (SAC) Statutory designated sites within a 10km radius of the study area, for which bats are a qualifying interest feature; and
- Aerial images were inspected to identify areas of high and low bat potential and enable adequate sampling of habitats within the study area.

2.5 Habitat Appraisal

2.5.1 A habitat appraisal was undertaken as part of an Extended Phase 1 habitat survey. This appraisal entailed identifying potential roost features and habitats that are known to be favoured by bats such as woodland, rivers and other water bodies, as well as assessing the connectivity of habitats on site with those within the wider landscape in accordance with Bat Conservation Trust (BCT) guidance, (Collins *et al*. 2016).

2.6 Preliminary Roost Assessment

2.6.1 The preliminary roost assessment (PRA) comprised a ground-based inspection of trees present within the Study Area.

2.6.2 The survey methodology was based on the Bat Conservation Trust's (BCT) guidance (Collins, 2016[1]), with features classified as having negligible, low, moderate or high suitability. Roost suitability of structures and trees are classified as follows:

- Negligible: Negligible habitat features on site likely to be used by roosting bats;
- Low: A structure with one or more potential roost sites that could be used by individual bat opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions (in terms of temperature, humidity, height above ground, light levels, or levels of disturbance) and / or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation);
- Moderate: A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roosting high conservation status (with respect to roost type (irrespective of species conservation status which is established after presence is confirmed);
- High: A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.

2.7 Manual Transect Surveys

2.7.1 The methodology followed that for activity surveys outlined in BCT guidance[2]. The Study Area was sampled by five separate transect routes, as shown on Figure 8.8**,** which illustrates each of the transect routes separately.

2.7.2 The surveys are summarised in Table 8.7.1 and were carried out during June, July and September 2017.

2.7.3 The transects were designed to cover sections of the route corridor with the highest bat interest such as close to watercourse crossing points or within areas where the densest aggregations of mature trees were present within hedgerows. Transect routes covered a range of habitats representative of those within the route corridor including hedgerows, ditches, and ponds.

[1] Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London.

[2] Collins, J. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). The Bat Conservation Trust, London

2.7.4 Each transect was interspersed with between 10 and 12 listening points (LP). Five minutes of static monitoring was undertaken at each of these listening points. Habitat types at each LP are detailed within Table 8.7.2.

2.7.5 Each transect was walked and activity recorded on to an Anabat SD2 or Echometer EM3 bat detector. All activity either observed or heard via audio output from the bat detector was noted, along with observations relating to the number of bats and their activity type (i.e. foraging or commuting).

2.7.6 Weather conditions on these evenings were generally conducive to bat activity, being mild and mostly dry with low wind speeds.

Table 8.7.1: Manual activity survey dates and timing

Date	Starting LP	Surveyor	Sunrise/set	Start	Finish	Rain	Temperature (degrees)	Wind
Transect 1								
15/06/17	10	TW / ZH	21:26	21:25	23:08	None		-
27/07/17	10	TW	21:00	21:00	23:00	Light	14-16	-
07/09/17	1	TW	06:30	04:33	06:32	None	10	-
Transect 2								
19/06/17	1	TW	21:35	21:35	22:57	None	22	None
19/07/17	1	TW / ZH	21:33	21:36	22:47	None	20	Light
14/09/17	10	TW				None		Light
Transect 3								
22/06/17	1	UM / MR	21:42	21:47	23:32	None	16	Light
20/07/17	1	TW	21:15	21:00	22:34	None	14-16	Light
07/09/17	6	UM / AP	06:33	04:15	06:45	None	11-10	None
Transect 4								
27/06/17	1	ZH / ST	21:39	21:37	22:42	Light	16	-
27/07/17	1	UM / MD	21:15	21:00	23:00	Light	14-16	Light
N/A	Final (dawn) survey could not be completed due to H&S constraints caused by the presence of cows and a bull in the transect fields.							

Date	Starting LP	Surveyor	Sunrise/set	Start	Finish	Rain	Temperature (degrees)	Wind
Transect 5								
30/06/17	1	TW	21:21	21:21	22:58	None	14	-
02/07/17	1	TW	21:41	21:26	23:01	None	14	-
06/09/17	1	TW	16:30	04:50	06:30	None	11	None

2.7.7 Table 8.7.2 summarises the habitats present at each Listening Point.

Table 8.7.2: Habitat features at Listening Points

Transect	Listening Point	Habitat Features
1	1	Tree line, hedgerow, arable field.
	2	Tree line, hedgerow, arable field.
	3	Pond, arable field.
	4	Hedgerow, arable.
	5	Hedgerow, ditch, trees, arable.
	6	Woodland, hedgerow, arable.
	7	Hedgerow, arable.
	8	Woodland, hedgerow, arable.
	9	Hedgerow, pond, trees, improved grassland.
	10	Hedgerow, improved grassland.
	11	Hedgerow, trees, improved grassland field, arable.
	12	Pond, trees, arable.
2	1	Plantation, dry ditch, improved grassland.
	2	Trees, improved grassland.
	3	Hedgerow, wet ditch, improved grassland.
	4	Tree line, ditch, improved grassland.
	5	Tree line, ditch, improved grassland.
	6	Improved grassland.
	7	Improved grassland.
	8	Tree line, ditch, hedgerow, improved grassland.
	9	Tree line, dry ditch, tall ruderal, improved grassland.
	10	Improved grassland.

Transect	Listening Point	Habitat Features
	11	Improved grassland, single tree.
3	1	Improved grassland.
	2	Hedgerow, improved grassland.
	3	Hedgerow.
	4	Improved grassland.
	5	Edge of broad-leaved plantation woodland.
	6	Improved grassland.
	7	Mature tree, improved grassland.
	8	Hedgerow.
	9	Trees, lane.
	10	Hedge-lined lane.
	11	Hedge-lined lane.
4	1	Arable field.
	2	Arable field, riparian habitat/tree line by river.
	3	Arable field, beside farm.
	4	Improved grassland.
	5	Wooded copse, improved grassland.
	6	Riparian habitat along river, tree line, improved grassland.
	7	Riparian habitat along river, tree line, improved grassland.
	8	Riparian habitat along river, tree line, improved grassland.
	9	Wooded copse, improved grassland.
	10	Hedgerow, improved grassland.
	11	Wooded copse, hedgerow.
	12	Track.
5	1	Hedgerow, improved grassland, road.
	2	Improved grassland.
	3	Hedgerow, trees, improved grassland.
	4	Ditch, improved grassland.
	5	Improved grassland.
	6	Improved grassland.
	7	Hedgerow, improved grassland.
	8	Ditch, hedgerow, improved grassland.
	9	Improved grassland.
	10	Improved grassland.

2.8 Automated Surveys

2.8.1 Five automated detector monitoring stations (MS) were deployed. The location of detectors and a description of habitats is presented in Table 8.7.3 and illustrated in Figure 8.8.

Table 8.7.3: Monitoring Station Locations

Monitoring Station (MS)	Approximate Grid Reference	Habitat
MS1	SJ 409286	Located near pond (Pond 9) surrounded by arable fields.
MS1b	SJ 413284	Located along semi natural deciduous woodland.
MS2	SJ 466278	Located along tree lined hedgerow amongst grazed cattle fields.
MS3	SJ 337296	Along edge of semi-natural natural deciduous woodland.
MS4	SJ 383294	Next to Willow by River Perry and improved grassland.
MS5	SJ 499292	Located beside hedgerow on edge of improved grassland field.

2.8.2 Detectors were set to record between June and August 2017. Survey effort is summarised in Table 8.7.4. Monitoring was undertaken between the time period spanning approximately half an hour before sunset and half an hour after sunrise on each night.

2.8.3 Table 8.7.4 presents the dates and total hours of automated survey effort completed at each monitoring station. Survey effort at each monitoring station exceeds that set out in the BCT guidance.

Table 8.7.4: Total recording hours and nights per month

Hours	June	July	August	Total
MS1a	90	32	0	122
MS1b	63.75	40	56	159.75
MS2	67.5	88	32	187.5
MS3	45	40	40	125
MS4	15	112	28	155
MS5	15	148	0	163
Total	**296.25**	**460**	**156**	**912.25**
Nights	**June**	**July**	**August**	**Total**
MS1a	12	4	0	16
MS1b	8.5	5	7	20.5

MS2	9	11	4	24
MS3	6	5	5	16
MS4	2	14	3.5	19.5
MS5	2	18.5	0	20.5
Total	**39.5**	**57.5**	**19.5**	**116.5**

2.8.4 Each monitoring station comprised a single SM2 bat detector attached to a wooden stake and fitted with a single omnidirectional microphone positioned at approximately 1m height.

2.9 Data Analysis and Assumptions of Bat Activity

2.9.1 Data analysis and interpretation of results followed the principles presented in the BCT guidance *Bat Surveys- Good Practice Guidelines 3rd Edition* (Collins, J. 2016).

2.9.2 The automated surveys recorded data to digital media for subsequent analysis using Kaleidoscope (Wildlife Acoustics) and 'Analook' (Titley Electronics) software. Bat species have been identified using characteristic features associated with species echolocation calls. Diagnostic features used in this analysis include characteristic frequency, slope, call duration, time between calls, minimum length of the body of the call and smoothness.

2.9.3 All sonograms were manually viewed and species identified using characteristics detailed above, with the use of species-specific filters where appropriate. A library of known species sonograms was also used to compare call characteristics and provide further confidence in assigning a recorded call to species.

2.9.4 Bat detectors record the passage of echolocating bats during surveys, enabling an estimation of relative bat activity levels for assessment. It is recognised, however, that there are limitations to the use of this method for determining bat activity levels.

2.9.5 An individual bat can pass a particular feature on several occasions while foraging and therefore it was not possible to estimate the number of individual bats or to allow a fair comparison where survey time differs. As such, bat activity is recorded as an index. The Bat Activity Index (BAI), based on BCT guidance (Collins, 2016), is defined as follows:

BAI (per hour) = Total number of bat 'registered calls' / number of hours of recording

2.9.6 For analysis purposes, bat activity is recorded as the number of 'bat registered calls' (a sequence of echolocation calls consisting of two or more call notes (pulse of frequency) from one bat, not separated by more than one second (White and Gehrt, 2001[3], Gannon *et al*., 2003[4]) with a minimum call note length of >= two milliseconds

[3] White, E. & Gehrt, S. (2001). *Effects of recording media on echolocation data from broadband bat detectors*. Wildlife Society Bulletin 29: 974-978.

[4] Gannon, W., Sherwin, R. & Haymond, S. (2003). *On the importance of articulating assumptions when conducting acoustic studies of habitat use by bats*. Wildlife Society Bulletin 31: 45-61.

(Weller, Cryan and O'Shea, 2009[5])) from which the activity index is calculated. In the absence of any recognised criteria to define levels of bat activity (e.g. what quantifies low, medium or high activity) professional judgement has been used, taking into consideration geographical location and knowledge and experience gained through conducting similar surveys at other sites.

2.10 Survey Limitations

2.10.1 Transect route 4 was not surveyed in September on the basis of health and safety due to the presence of a bull and cows within the transect fields. This transect was also modified slightly during the July survey due to the presence of the bull, however the majority of the Study Area was covered by the modified transect and this is not considered to entail a significant constraint to survey. No constraints were encountered on any other transect surveys.

2.10.2 Automated monitoring was not undertaken at MS1a or MS5 during August. Monitoring during July and August at MS3 did not record any bats and equipment failure is considered likely. Overall, however, monitoring data was obtained for 14 of the 16 surveys over a total of 116 nights, which are well above the levels recommended in the BCT guidance, and are considered to provide a representative indication of bat activity across the Study Area and therefore meet the survey aims.

2.10.3 All bat surveys provide only a snapshot of bat activity and are intended to provide an overview to inform the assessment of the proposed development.

2.10.4 Although the use of bat detectors is the most widely used method for undertaking automated monitoring, it is naturally biased: frontal detection distances vary between species due to differences in the frequency and loudness (amplitude) of the bat echolocation calls. Species which call quietly ('whispering bats') are less likely to be recorded from a distance. Additionally, higher frequency bat calls do not travel as far as calls emitted at lower frequencies and species with highly directional calls are also less likely to be detected.

2.10.5 All bats have been identified by their echolocation calls. It should be noted that physical and environmental factors (e.g. weather conditions, habitat type) as well as a bats age, sex or behaviour can all influence the echolocation calls (e.g. a social call of a soprano pipistrelle *Pipistrellus pygmaeus* has been known to display similar characteristics to a low clarity noctule *Nyctalus noctula* call). Therefore, professional judgement has been used and in some cases it is not possible to safely assign an individual bat call to a species. To this end, species have been grouped where appropriate, in keeping with normal protocols. The identification of those calls assigned to individual species is done so on the basis of judgement and experience.

2.10.6 Recorded activity levels of different species are not directly comparable, due to differences in frontal detection distances (these distances are dependent on the frequency and amplitude of emitted calls, which differ markedly between species). Although not formally published, initial estimates based on research undertaken by

[5] Weller, T., Cryan, P. & O'Shea, T. (2009). *Broadening the focus of bat conservation and research in the USA for the 21st century. Endangered Species Research*. 8: 129-145

BSG Ecology in collaboration with Bristol University suggest the following mean frontal detection ranges:

- Noctule- 47m
- Soprano pipistrelle - 17m
- *Myotis* species - 6m

3 RESULTS

3.1 Habitat Overview

3.1.1 The habitats across the preferred line route comprise mainly agricultural land – arable and improved grassland fields. A network of hedgerows, ditches and watercourses provides habitat connectivity, foraging and commuting habitats for bats. Hedgerow trees, tree lines and scattered trees as well as occasional small broadleaved woodland copses provide additional connectivity and foraging opportunities as well as potential roost locations.

3.2 Desk Study

3.2.1 The records request Shropshire Wildlife Trust provided records of the following species within 2km of the Preferred Line Route:

- Daubenton's;
- Whiskered;
- Natterers;
- Noctule (UKBAP);
- Common pipistrelle;
- Soprano pipistrelle (UKBAP); and
- Brown long-eared (UKBAP).

3.2.2 Table 8.7.5 below summarises bat records returned.

Table 8.7.5: Desk Study Results

Species	Records	Location
Daubenton's	2 records in 2009	Rednal and Loppington Church
Whiskered	2 records in 2009	Rednal and Tilley Farm
Natterer's	3 records between 2008 and 2009	Rednal, Tilley Farm and Loppington Church.
Noctule	6 records between 2008 and 2011	Rednal, Tilley Farm, Babbinswood and Lower Hordley

Species	Records	Location
Common pipistrelle	15 records between 2008 and 2013	Wem, Tilley Farm, Babbinswood, Rednal, Hordley, Lower Hordley Loppington Church and 'Shropshire'
Soprano pipistrelle	11 records between 2008 and 2011	Rednal, Tilley Farm, Wem, Babbinswood, Lower Hordley, Loppington Church, Hordley and 'Shropshire'.
Brown long-eared	3 records between 2008 and 2011	Rednal, Tilley Farm and Babbinswood.

3.2.3 No SACs with bats listed as a qualifying interest feature were identified within a 10km radius of the Preferred Line Route.

3.3 Preliminary Roost Assessment

3.3.1 Trees within the route corridor were classified as having negligible, low, moderate or high roost potential, as illustrated in the extended Phase 1 habitat survey Figure 8.2. Potential roost features present for surveyed trees are detailed within Annex 1.

3.3.2 The surveys identified 259 trees with bat roosting potential ranging from Low to High suitability. Twenty-nine trees were considered to offer 'High' roost suitability.

3.4 Manual Transect Surveys

3.4.1 The number of call registrations recorded for each transect on each of the dates of survey, and the species recorded are presented in Table 8.7.6.

Table 8.7.6: Transect survey results for each transect. Figures represent the number of call registrations.

Transect	Species	June	July	September
T1	Myotis species	4	0	0
	Noctule	1	3	0
	Common pipistrelle	6	0	0
	Pipistrellus species	0	1	0
	Soprano pipistrelle	6	4	1
T2	Myotis species	0	1	n/a
	Noctule	1	39	
	Common pipistrelle	5	21	
	Soprano pipistrelle	3	12	
T3	Myotis species	0	0	1
	Noctule/Nyctalus sp.	4	0	1
	Common pipistrelle	0	2	0

Transect	Species	June	July	September
	Soprano pipistrelle	0	1	0
T4	Myotis species	1	1	0
	Noctule	2	2	0
	Common pipistrelle	4	0	4
	Soprano pipistrelle	1	10	3
T5	Myotis species	0	2	0
	Noctule	1	8	2
	Common pipistrelle	15	0	3
	Pipistrellus species		2	0
	Soprano pipistrelle	49	12	2

Charts 1-5 summarise the number of bat registrations recorded per species, per transect each month.

Chart 1: Myotis call registrations.

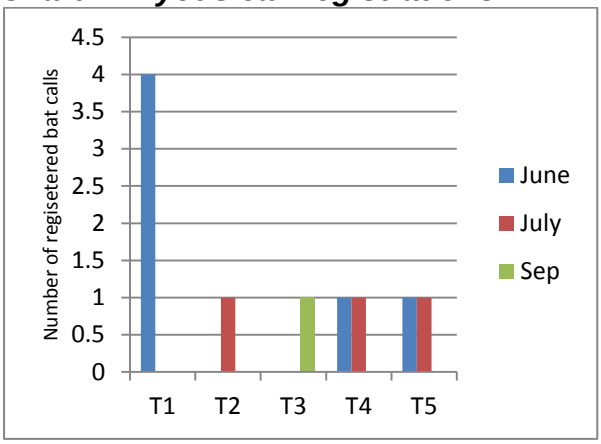


Chart 2: Noctule call registrations.

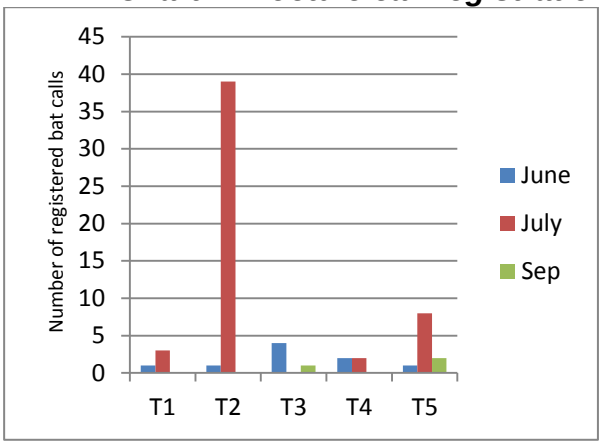


Chart 3: Common pipistrelle call registrations.

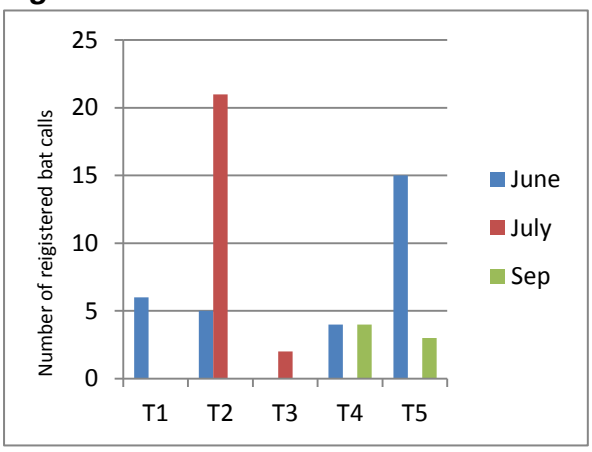


Chart 4: Soprano pipistrelle call registrations.

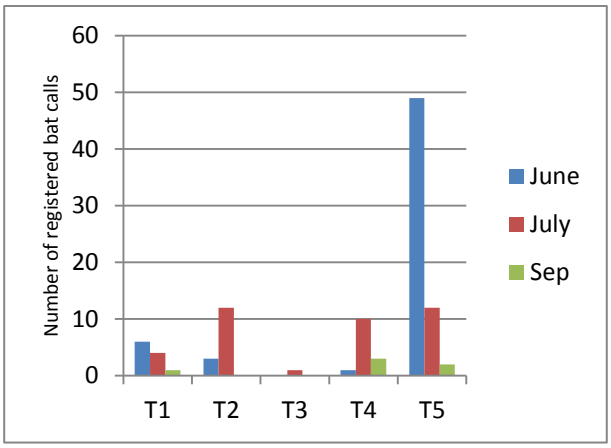
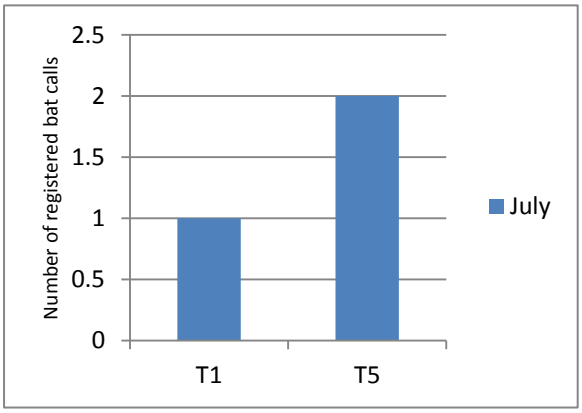


Chart 5: Pipistrellus call registrations.



3.4.2 The locations of the main concentrations of bat activity along each transect are shown in Figure 8.8. Bat activity was generally no more than moderate even in the highlighted areas. The pattern of activity noted along each transect is discussed briefly below.

3.4.3 **Transect 1** – The transect was generally quiet, with some focused activity at LP2 beside a hedgerow with trees and along the walk between LP3 and LP4, beside a

hedgerow with trees and a ditch which would provide a linear habitat feature offering localised foraging interest for bats.

3.4.4 **Transect 2** – The highest levels of activity were located in the eastern area of the transect, along tree lines and pasture (LP4 to LP8). The activity levels along these features was the highest of any of the transects. LPs 4 to 6 were also beside/in close proximity to a series of small fields bound by old tree-lined field boundaries, which would provide shelter and enhanced foraging opportunities for bats compared to the wider farmland which was more open in nature.

3.4.5 **Transect 3** – Bat activity was generally focused around the broadleaved plantation woodland edge (LP9, LP5 and the walk between LP3 and 4), with some activity along the section of the transect to the south (LP4) and beside a mature oak and hedgerow to the west (LP7). The woodland edge may attract commuting and foraging bats as it would provide a sheltered flyway and connectivity between hedgerow features in the wider landscape although activity levels along this feature were not considered high.

3.4.6 **Transect 4** – Bat activity was recorded beside two small planted copses which were present within the open pasture (LP5 and LP11), along the River Perry (between LP7 and LP8) where the activity included some *Myotis* call registrations, and at LP12, beside a hedgerow. The woodland copses provide small areas of enhanced foraging in otherwise large open fields and watercourses tend to support a high density of invertebrate prey for bats, therefore attracting focused foraging and provide a linear feature along the landscape. Again activity levels along the watercourse were not notably high on any date of survey.

3.4.7 **Transect 5** – Bat activity was patchy in occurrence, with calls registered at LP7 (pasture and trees), and LPs 10 and 9 (beside trees and hedgerow) which would provide features of local interest for foraging bats.

3.5 Automated Surveys

3.5.1 A total of 32,615 bat registrations were recorded, across the monitoring stations; with 3,923 recorded at MS1, 2,674 at MS1b, 3,792 recorded at MS2, 5,081 recorded at MS3, 9,935 recorded at MS4 and 7,210 at MS5.

3.5.2 In total five bat species/species groups were recorded during the automated bat activity surveys; common pipsitrelle, soprano pipistrelle, *Myotis* species, noctule and *Nyctalus* species.

3.5.3 **Chart 6** presents the species recorded during the automated surveys, from all Monitoring Stations combined.

CHART 6: Species composition

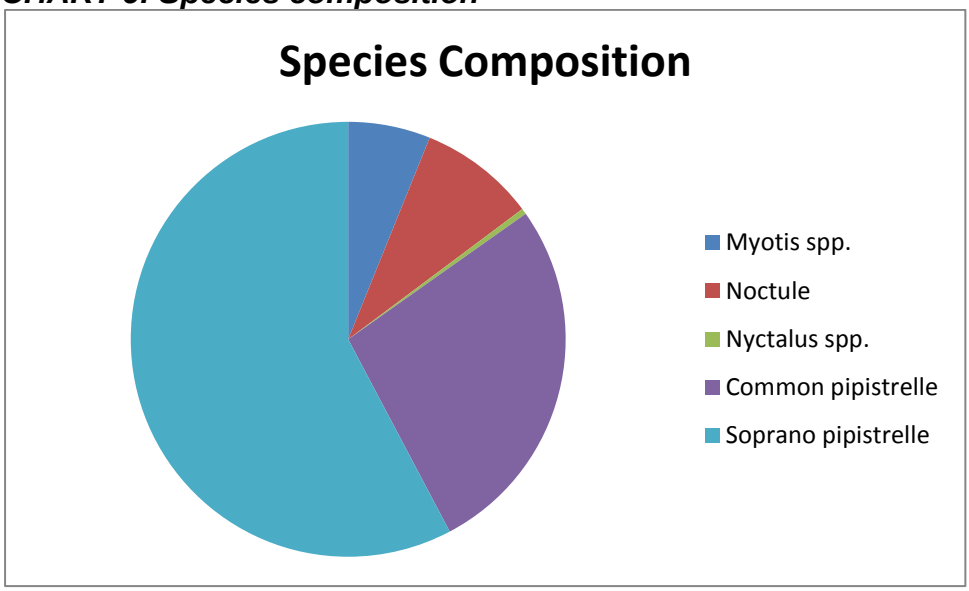


Table 8.7.7: Bat Activity Index (registered calls per hour), by Monitoring Station.

Species	MS1	MS1b	MS2	MS3	MS4	MS5	Total
Myotis spp.	8.89	1.96	0.34	2.84	0.90	0.24	2.19
Noctule	0.00	0.12	1.94	17.45	0.20	1.42	3.10
Nyctalus spp/	0.00	0.00	0.49	0.36	0.00	0.01	0.15
Common pipistrelle	15.16	9.12	13.38	8.51	2.30	9.75	9.67
Soprano pipistrelle	8.11	5.54	4.08	11.49	60.69	32.80	20.64
Total	**32.16**	**16.74**	**20.22**	**40.65**	**64.10**	**44.23**	**35.75**

3.5.4 The highest bat activity index was recorded for MS4, mostly due to higher soprano pipistrelle activity levels recorded at this station, followed by MS3 and MS5. MS4 was located along the River Perry, which provides a valuable habitat corridor through the local landscape and would likely attract a good density and diversity of invertebrate prey. Monitoring stations MS3 and MS5 were located along the edge of semi-natural deciduous woodland and beside hedgerow, respectively.

3.5.5 Survey results are discussed for each species separately, below.

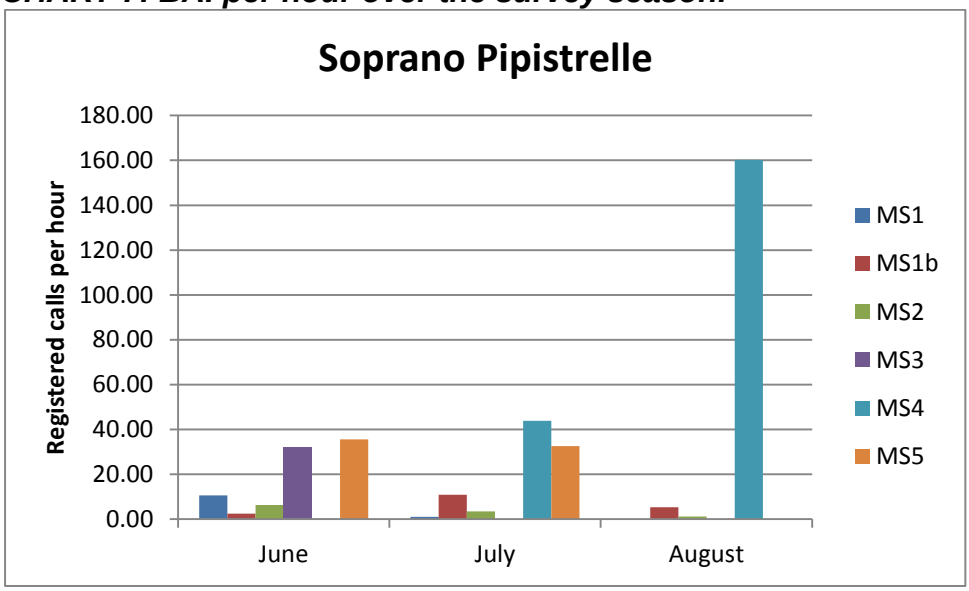
<u>Soprano pipistrelle</u>

3.5.6 Soprano pipistrelle was the most commonly recorded species, representing approximately 58% of all activity recorded. **Table 8.7.8** presents the soprano pipistrelle bat activity index (BAI) for each monitoring station.

Table 8.7.8: Soprano pipistrelle bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

MS	June	July	August	Grand Total
MS1	10.63	1.03	-	8.11
MS1b	2.40	10.83	5.34	5.54
MS2	6.27	3.45	1.19	4.08
MS3	31.91	0.00	0.00	11.49
MS4	0.20	43.90	160.25	60.69
MS5	35.53	32.53	-	32.80
Grand Total	**11.83**	**22.83**	**30.92**	**20.64**

CHART 7: BAI per hour over the survey season.



3.5.7 Soprano pipistrelle activity was recorded at low to moderate levels across the Study Area, with moderate levels of activity recorded at MS3 in June, at MS4 in July and MS5 in June and July. By far the highest level of activity was recorded at MS4 in August (BAI of c. 160 registered calls per hour). This detector was located beside the River Perry. This pattern of activity would be expected as the species is known to specialise in riparian habitats. The higher levels at this location in August, as opposed to other months may relate to seasonal fluctuations in insect availability along the river.

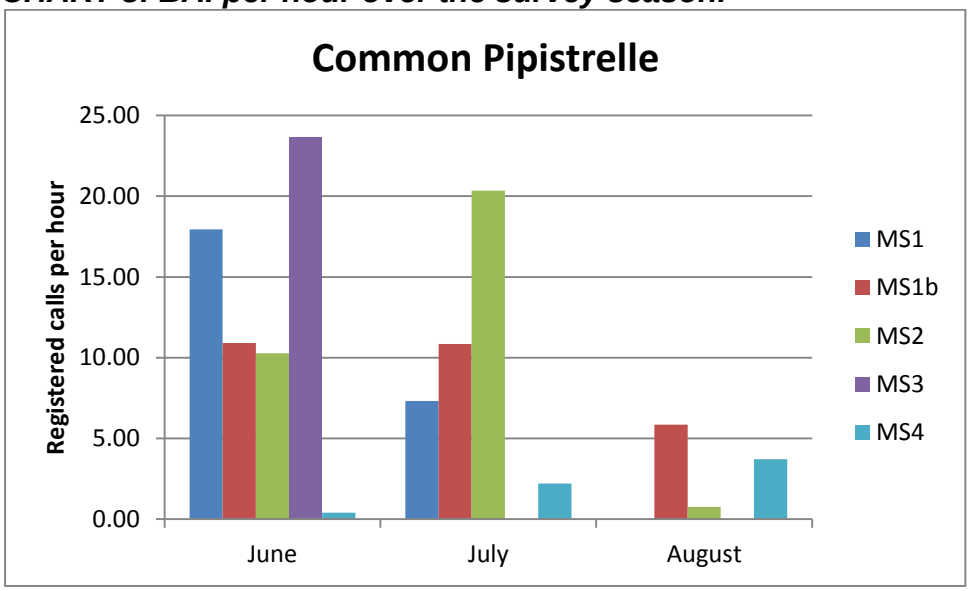
Common pipistrelle

3.5.8 Table 8.7.9 presents the common pipistrelle bat activity index (BAI) for each monitoring station.

Table 8.7.9: Common pipistrelle bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

MS	June	July	August	Grand Total
MS1	17.94	7.31	-	15.16
MS1b	10.90	10.85	5.86	9.12
MS2	10.28	20.35	0.75	13.38
MS3	23.64	0.00	0.00	8.51
MS4	0.40	2.21	3.71	2.30
MS5	2.40	10.50	-	9.75
Grand Total	**13.87**	**9.26**	**2.92**	**9.67**

CHART 8: BAI per hour over the survey season.



3.5.9 Common pipistrelle activity was generally low across the Study Area, with moderate levels recorded at MS1 in June, MS2 in July and MS3 in June. These monitoring stations were located near to a pond, along a tree-lined hedgerow and along the edge of semi-natural deciduous woodland, respectively.

3.5.10 Recorded common pipistrelle activity was low at MS4, located along the River Perry, during the months of monitoring recorded.

Myotis species

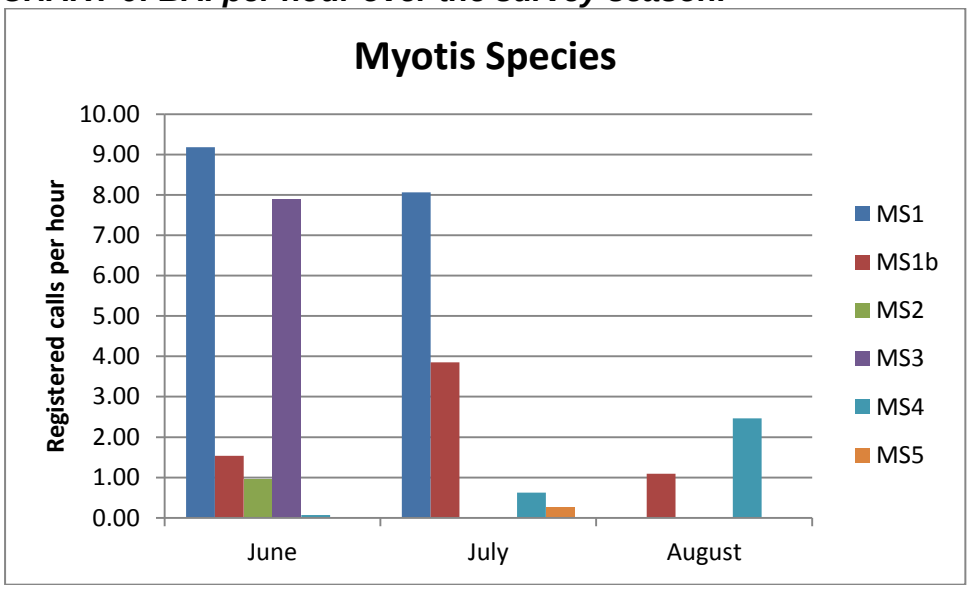
3.5.11 *Myotis* species refers to bats from the *Myotis* genus. There are five species from this genus occurring in the UK which display similar call characteristics: Natterer's *Myotis nattereri*, Daubenton's *M. daubentonii*, whiskered *M. mystacinus*, Brandt's *M. brandtii*, Bechstein's *M. bechsteinii* and Alcathoe's *M. alcathoe* bat.

3.5.12 Table 8.7.10 presents the *Myotis* species bat activity index (BAI) for each monitoring station.

Table 8.7.10: Myotis bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

MS	June	July	August	Grand Total
MS1	9.18	8.06	-	8.89
MS1b	1.54	3.85	1.09	1.96
MS2	0.95	0.00	0.00	0.34
MS3	7.89	0.00	0.00	2.84
MS4	0.07	0.63	2.46	0.90
MS5	0.00	0.26	-	0.24
Grand Total	**4.5**	**1.13**	**0.83**	**2.19**

CHART 9: BAI per hour over the survey season.



3.5.13 *Myotis* species activity was generally low; however activity levels at MS1 (beside a pond) during June and July and MS3 (along the edge of semi-natural deciduous woodland) during June were considered moderate for this group of species, which also calls fairly quietly and has low mean frontal detection distances relative to pipistrelle and noctule bats.

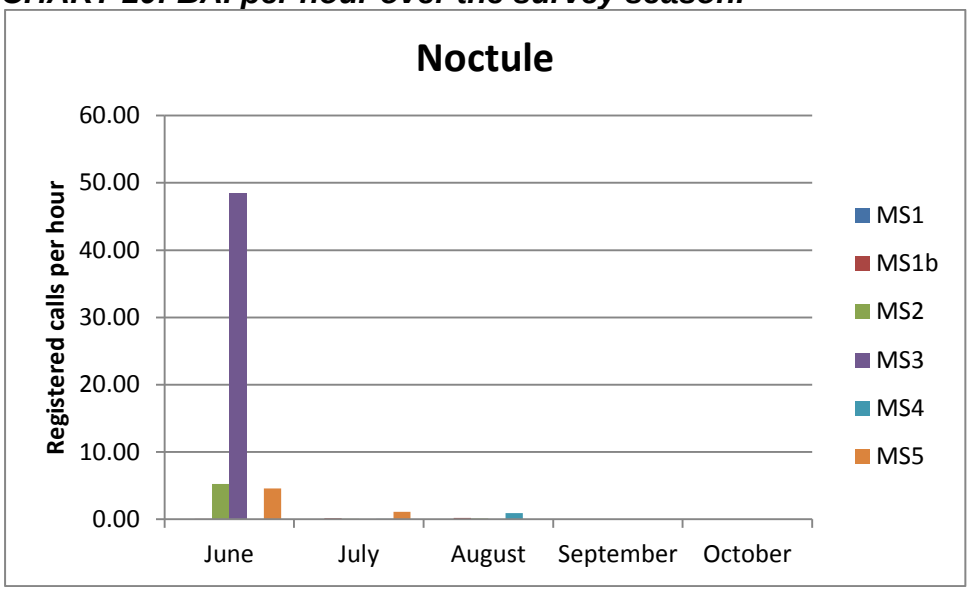
Noctule

3.5.14 Table 8.7.11 presents the noctule bat activity index (BAI) for each monitoring station.

Table 8.7.11: Noctule bat activity. BAI: Bat Activity Index (registered calls per hour). MS: Monitoring Station

MS	June	July	August	Grand Total
MS1	0.00	0.00	-	0.00
MS1b	0.02	0.15	0.21	0.12
MS2	5.26	0.05	0.13	1.94
MS3	48.47	0.00	0.00	17.45
MS4	0.00	0.05	0.89	0.20
MS5	4.60	1.10	-	1.42
Grand Total	**8.80**	**0.39**	**0.26**	**3.10**

CHART 10: BAI per hour over the survey season.



3.5.15 Noctule activity was highest during the June surveys, with very limited activity recorded during July and August. Moderate to high activity levels were recorded at MS3 in June (BAI of c. 48.5 registered calls per hour). This MS was stationed along the edge of semi-natural deciduous woodland which may provide enhanced foraging opportunities relative to the wider landscape.

3.6 Additional Data

3.6.1 In addition to the above, 138 bat registrations were classified under *Nyctalus* species. The sonograms of these registrations were not typical of noctule and could have potentially represented Leisler's bat. These registrations was recorded at MS2 (91), MS3 (45) and MS5 (2). Leisler's bat is relatively uncommon across the UK. The numbers of registrations that may be attributed to this species were however considered to be low.

4 SUMMARY

4.1.1 Trees within the route corridor were classified as having negligible, low, moderate or high roost potential, with 259 trees with bat roosting potential ranging from Low to High suitability. Of these 29 trees were considered to offer 'High' roost suitability. None of the trees identified as having High roost potential are affected by the Preferred Line Route.

4.1.2 A total of five bat species/species groups were recorded during the manual and automated bat activity surveys; common pipsitrelle, soprano pipsitrelle, *Myotis* species, noctule and *Nyctalus* species. This assemblage of bat species is considered typical of the region. Some of the sonograms were not typical of noctule and potentially represented Leisler's bat, which is a relatively uncommon species within the UK; however activity levels of this species were low across the Study Area.

4.1.3 Manual transect surveys found bat activity to be focused alongside linear bat habitat features of localised interest such as hedgerows with trees, tree lines, woodland edge and watercourses. The highest levels of activity were recorded in close proximity to a series of small fields bound by old tree-lined field boundaries, which would provide

shelter and enhanced foraging opportunities for bats comparative the to the wider farmland which was more open in nature.

4.1.4 The automated surveys generally recorded low to moderate levels of bat activity across the Study Area and the levels of activity and species composition recorded was generally considered typical of that anticipated to occur within the agricultural landscapes of the region. The data suggests that the use of the landscape by bats varies considerably through the year.

4.1.5 Notable levels of soprano pipistrelle activity were recorded along the River Perry during August. This species is known to specialise in riparian habitats and the high levels of activity may reflect a peak in insect availability along the watercourse during this month.

4.1.6 Overall, the bat activity surveys suggest that bat utilisation of the Study Area, both in terms of species composition and activity levels, is typical of agricultural habitats within the region, with some focused foraging and commuting activity recorded along linear landscape features (hedgerows, tree lines, woodland edge and watercourses) that offer shelter and enhanced feeding opportunities for bats.

ANNEX 1: TREES WITH BAT ROOST POTENTIAL

Table A1.1 below lists trees within the study area with bat root potential. Trees supporting 'High' bat roosting potential are highlighted.

Table A1.1: Trees with bat roost potential

Tree Number	Species	Description	Tree Category
T1	Ash	Dead wood, cracks in bark.	Low
T2	Oak	Some small linear crevices were a limb has come away.	Low
T3	Elm	Dead wood, cracks in bark.	Low/negligible
T4	sycamore	Large hollow in trunk.	Moderate
T5	Oak	Splintered limbs, cracked dead wood and flaking bark.	Low/moderate
T6	Oak	Large oak	Low
T7	Oak	Small oak within hedgerow, cracked deadwood and flaking bark.	High
T8	Oak	Dead limbs and crevices.	High
T9	Oak	Dead wood, cracks in bark.	Low
T10	Oak	Dead limbs, cracks, holes, peeling bark.	Low/moderate
T11	Oak	Dead limbs, cracks.	Low
T12	Oak	Dead limbs, cracks and crevices, holes, splits and peeled bark. Two old corvid bird nests.	Moderate/high
T13	Ash	Small tree.	Low
T14	Ash	Small amount of ivy covering trunk, splits and peeling bark.	Moderate
T15	Oak	Dead wood, cracks in bark.	Low
T15	Ash	Decayed inside with large fissure.	High
T16	Ash	Large ash with snapped branches, dead limbs, cracks and crevices, hole and splitting bark.	High
T16	Poplar	Knarled old trunk with cracks, crevices and decayed inside. The top has fallen behind the trunk.	Moderate/high
T17	Willow	Split and broken branches have created cracks and crevices.	Moderate
T18	Oak	Few dead limbs.	Low
T19	Oak	Dead limbs and crevices.	High
T20	Oak	Dead wood, cracks in bark.	Low
T23	Oak	Dead limbs creating large cracks and crevices, peeled bark.	Moderate
T24	Oak	Dead limbs, cracks and crevices.	Low
T25	Oak	Few dead limbs, lifted bark and crevices.	Low
T26	Oak	Few dead limbs creating cracks and crevices.	Low/moderate
T27	Oak	Small oak on edge of field, with a small hollow, peeling bark, cracks, dead wood.	Low/moderate

Tree Number	Species	Description	Tree Category
T28	Oak	Dead wood, cracks in bark.	Low
T29	Oak	Dead wood, cracks in bark.	Low
T30	Oak	Dead wood, cracks in bark.	Low/ negligible
T31	Oak	Dead wood, cracks in bark.	Low
T32	Oak	Dead limb and deep crevices and holes.	High
T33	Oak	Crevice in dead branch.	Moderate
T34	Oak	Small crevices	Moderate
T35	Alder	Small holes and crevices in trunk.	Low
T36	Oak	Hollow, with a large hollow in a secondary branch.	High
T37	Oak	Spit wood and crevices where large limb has broken off.	Moderate
T38	Ash	Small crevices	Low
T39	Oak	Linear crevices/split wood and cavity at base of branch.	Low
T40	Ash	Hollow trunk with large cavity.	High
T41	Alder	Hollow, with large opening and some lifted park.	High
T42	Alder	Hollowed out main trunk, crevice in top branch, flaking bark.	Moderate
T43	Alder	Minimal cracks and crevices	Negligible
T44	Oak	Hole, snapped limb, cracks and crevices	Low
T45	Ash	Dead limbs, cracks and crevices	Moderate
T46	Oak	Holes, dead limbs, cracks and crevices	Moderate
T47	Oak	Dead limbs, cracks and crevices	Low
T48	Oak	Dead limbs, cracks and crevices	Low
T49	Oak	Holes, snapped/dead limbs, cracks and crevices	Low
T50	Oak	Dead limbs, cracks and crevices	Low
T51	Oak	Dead limbs, cracks and crevices	Low
T52	Dead	Trunk ivy covered, cracks in branches	Low
T53	Sycamore	Ivy covering most of trunk and branches	Low
T54	Alder	Ivy covering most of trunk and branches	Low
T56	Sycamore	Peeling bark on dead limbs.	Low
T57	Oak	Cracks, crevices, holes in dead trunk.	Moderate
T58	Sycamore	Peeling bark, holes, crevices in dead limbs.	Moderate
T59	Oak	Peeling bark, crevices, holes	Moderate
T60	Oak	Holes, peeled bark, crevices and dead limbs.	Moderate
T61	Oak	Lots of peeling bark and hole in cut off scar.	Moderate
T62	Oak	Mature; decaying wood & crevices in missing limb.	Moderate
T63	Oak	Mature, no specific features but potential for small crevices to be present and some split wood where branches lost.	Low
T64	Oak	Hole in branch.	Moderate

Tree Number	Species	Description	Tree Category
T65	Oak	some cracks and crevices	Low
T66	Oak	some cracks and crevices	Low
T67	Oak	Linear crevices where bark outer layer has come away.	Low
T68	Oak	Lifted bark & small crevices on limbs.	Low
T69	Oak	Some deadwood & cracks on smaller limbs.	Low
T70	Oak	Some deadwood & cracks on smaller limbs.	Low
T71	Oak	Dead outer crown. Linear crevices and holes in dead wood and where missing limbs.	High
T72	Oak	Hole on base of cut limb. Linear crevice and decaying wood.	High
T73	Ash	Woodpecker holes, probably hollow trunk, one hole with nesting birds. Top removed.	High
T74	Oak	Mature, nothing noticed but of suitable size and structure.	Low
T75	Ash	Minimal leaf cover, cracked bark, flaked bark	Low/Negligible
T76	Oak	Mature, cracked limbs, rot holes, woodpecker holes	Low/Medium
T77	Oak	Mature, cracked bark, some ivy covering	Low
T78	Oak	Mature, large holes, broken limbs, rot holes	Medium/high
T79	Oak	Mature, several rot holes, old woodpecker holes, cracks	Medium
T80	Oak	Mature, some cracked limbs, few large holes/gaps	Low
T81	Ash	No cracks, gaps, holes etc	Negligible
T82	Oak	Medium/mature, no cracks, holes etc	Negligible
T83	Ash	Mature, some woodpecker holes, rot holes	Low/Medium
T84	Oak	Mature, ivy covering, no cracked limbs, holes	Low
T85	Oak	No cracks, holes etc,	Negligible
T86	Oak	2 trees very close together, no cracks, holes etc	Negligible
T87	Oak	Mature, flaked bark	Negligible/low
T88	Oak	Mature, ivy covering, broken limbs, rot holes	Medium
T89	Oak	Mature, cracked bark, broken limbs	Low
T90	Oak	Dead wood, cracks in bark.	Low
T90	Oak	Mature, rot holes, cracked bark	Low/medium
T91	Oak	Large cavity in mature oak, and large dead limb with cracks.	Moderate
T91	Oak	Mature, rot holes, cracks, broken limbs	Medium/high

Tree Number	Species	Description	Tree Category
T92	Oak	Oak within hedgerow. Few deadwood limbs.	Low
T92	Sycamore	Ivy covering most of trunk and branches	Low
T93	Oak	Small oak with dead wood with cracks in it and large hollow. Owl potential.	Low
T94	Oak	Large oak with some dead wood and limbs and flaking bark.	Low
T95	Oak	Small oak with minimal deadwood, but flaking/peeling bark and cracks.	Low
T96	Oak	Small oak within hedgerow. Abundance of deadwood limbs with crevices and flaking bark.	Moderate
T97	Oak	Oak within hedgerow. Some deadwood limbs and large amount of ivy.	Moderate
T98	Oak	Oak within hedgerow. Some deadwood and limbs with cracks and peeling bark.	Low
T99	Oak	Small oak within hedgerow.	Negligible
T100	Oak	Large oak within hedgerow. Some deadwood limbs and cracks.	Low
T101	Oak	Oak within hedgerow. Cracks in bark and deadwood limb.	Low
T102	Ash	Within hedgerow. Cracks in limbs and flaking bark.	Low/negligible
T103	Oak	Within hedge and corner of small coppice. Some dead limbs.	Low
T104	Oak	Large oak on edge of coppice. Small amount of dead limbs.	Low/negligible
T105	Oak	Very large tree on corner of coppice. Large amount of dead limbs with cracks. Dense ivy cover.	Moderate
T106	Ash	Large tree in corner of coppice. Woodpecker holes & some cracks in bark.	Low/moderate
T107	Oak	Moderate size, next to coppice with cracks in bark and some broken limbs.	Negligible/low
T108	Oak	Large oak with several broken limbs & cracks. Tree where potential post erection.	Low/moderate
T109	Ash	Large ash with snapped branches, dead limbs, cracks and crevices, hole in trunk and splitting bark.	High
T110	Alder	Large cracks in trunk close to base	low
T111	Ash	Some dead limbs.	Negligible
T112	Oak	Some dead limbs.	Negligible
T113	Ash	Some dead limbs.	Negligible
T114	Oak	Some dead limbs.	Negligible
T115	Oak	Cracks in deadwood limbs, hollows in trunk.	High
T116	Oak	Some cracks in dead limb.	Low
T117	Oak	Some dead limbs with cracks.	Low

Tree Number	Species	Description	Tree Category
T118	Oak	Few dead limbs.	Low
T119	Oak	Dead limbs and crevices.	High
T120	Oak	Some dead limbs with cracks.	High
T121	Oak	Oak with large amount of dead limbs, cracks in bark and hollows.	High
T122	Oak	Small old oak with several large hollows, cracks in bark and limb.	High
T123	Oak	With dead limbs, cracks in bark and ivy cover.	Moderate
T124	Oaks	Some deadwood limbs with cracks and flaking bark	low
T125	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low
T126	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low
T127	Oak	Within Hedgerow. Some deadwood limbs and cracks in bark.	Low
T128	Oak	Located on ditch edge. Some deadwood limbs and flaking bark.	Low
T129	Alder	Dense ivy cover.	Low
T130	Oak	Some cracks in deadwood limbs.	Low
T131	Oak	Some cracks in deadwood limbs and flaking bark.	Low
T132	Oak	Large cracks in deadwood limbs and hollows in trunk	Moderate
T133	Oak	Three woodpecker holes, large hollow with nesting jackdaw and some deadwood limbs with cracks and pealing bark.	High
T134	Oak	Located on coppice edge with large crevices in deadwood and a hollow in the trunk	Moderate
T135	Oak	Abundance of crack deadwood limbs with flaking bark	low
T136	Oak	Cracks in deadwood limbs and flaking bark.	Low
T136	Oak	Deadwood limbs with cracks in bark	Negligible
T137	Oak	Dense ivy cover	Negligible
T138	Ash	Large cavity and hollow trunk	High
T139	Oak	Deadwood limbs with cracks	Negligible
T140	Ash	Small hollows	Moderate
T141	Oak	Woodpecker hollows and cracks in deadwood limbs	Moderate
T142	Oak	Woodpecker hollows and an abundance of deadwood limbs with cracks and flaking bark	Moderate
T143	Oak	Within hedgerow. small amount of deadwood limbs with cracks	Negligible
T144	Oak	Within hedgerow. Dense ivy cover	Low

Tree Number	Species	Description	Tree Category
T145	Oak	On roads edge. Some deadwood limbs with cracks	Negligible
T146	Ash	Abundant woodpecker hollow and cavity. Jackdaw nesting within cavity.	High
T147	Oak	Large deadwood limbs with large cracks. Hollow within trunk. Abundance of smaller deadwood limbs with cracks and flaking bark.	High
T148	Oak	Abundance of deadwood limbs with cracks and flaking bark. Dense ivy cover.	Moderate
T149	3 Oaks	Three oaks within a field without access.	Two oaks: low
T150		Centre tree has large dead limbs with visible cracks. Two flanking oaks have several small deadwood limbs centre tree.	Centre oak: Moderate/ High.
T151	Ash	On the edge of dry pond. Some small rot hollows.	Low/ moderate
T152	Oak	Some deadwood limbs with cracks and flaking bark	low
T153	Alder	Some hollows in dead branches	Moderate
T155	Alder	Some hollows in dead branches. Dense ivy cover	Moderate
T156	Alder	Several hollows and deadwood limbs with cracks.	Low
T157	Oak	Deadwood limbs with cracks	Negligible
T158	Oak	Deadwood limbs with cracks and small amount of ivy cover	Low
T159	Alder	Fallen limbs have left large hollow in trunk. Rest of trunk also hollow.	High
T160	Alder	Dense ivy cover	Low
T161	Alder	Dense ivy cover	Low
T162	Alder	Hollows in limbs	Low
T163	Oak	Ancient oak with hollow trunk and abundance of deadwood limbs with crevices	High
T164	Oak	Cracks in deadwood limbs	Low
T165	Oak	Cracks in deadwood limbs	Low
T167	Oak, Ash, Sycamore, hawthorn, Conifer	Dead limbs, cracks and crevices	Low
T168	Oak	Some hollows and cracks in deadwood limbs with flaking bark	Moderate
T169	Oak	Cracks in deadwood limbs	Low
T170	Oak	Tree line. Cracks in deadwood limbs	Low
T171	Oak	Tree line. Cracks in deadwood limbs	Low
T172	Oak	Tree line. Cracks in deadwood limbs	Low
T173	Oak	Tree line. Cracks in deadwood limbs	Low
T174	Oak	Tree line. Cracks in deadwood limbs and a small amount of ivy cover	Low

Tree Number	Species	Description	Tree Category
T174	Oak	Tree line. Cracks in deadwood limbs	Low
T176	Oak	Tree line. Cracks in deadwood limbs	Low
T177	Oak	Tree line. Abundance of in deadwood limbs with cracks in bark	Moderate
T178	Oak	Tree line. Abundance of in deadwood limbs with cracks in bark	Moderate
T179	Oak	Tree line. Cracks in deadwood limbs	
T180	Oak	Some deadwood limbs with cracks and flaking bark	low
T181	Oak	Some deadwood limbs with cracks and flaking bark	low
T182	Oak	Some deadwood limbs with cracks and flaking bark	low
T183	Ash	2 rot holes, 3-4 m. one on trunk the other on a limb south west side.	Medium
T184	Oak	Group of 8 mature oaks with numerous potential roost features including rot holes, large cavities, woodpecker hole, hollow trunks, split limbs, lifted bark.	High
T185	Alder	None, semi mature tree	Negligible
T186	Oak	None visible but large mature, ivy clad oak so likely to be present.	Low
T187	Oak	Dead limbs, cracks and crevices	Low
T188	Oak	Hollows in trunk and dead limbs with cracks and crevices	High
T189	Oak	Dead limbs, cracks and crevices	Low/Neg
T190	Ash	Hollows in limbs and cracks and crevices in bark	Moderate
T192	Ash	Hollow within trunk	Moderate
T193	Oak	Dead limbs, cracks and crevices	Low
T194	Oak	Dead limbs, cracks and crevices	Low
T195	Oak	Dead limbs, cracks and crevices	Low
T196	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T197	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T198	Oak, Alder, Ash, Salix sp	Dead limbs, cracks and crevices + Ivy	Moderate
T199	Oak	Dead limbs, cracks and crevices	Low
T200	Oak	Dead limbs, cracks and crevices	Low
T201	Oak	Dead limbs, cracks and crevices	Low
T202	Oak	Dead limbs, cracks and crevices	Low
T203	Oak	Some deadwood limbs with cracks and flaking bark	low
T204	Oak	Some deadwood limbs with cracks and flaking bark	low
T205	Oak	Dead limbs, cracks and crevices + Ivy	Moderate
T206	Alder	Woodpecker hollowed and cracks in deadwood	Moderate

Tree Number	Species	Description	Tree Category
T207	Alder	Woodpecker hollowed and cracks in deadwood	Moderate
T208	Ash	Tree under proposed line.	Negligible
T209	Oak	Cracks in deadwood limbs.	Low
T210	Oak	Within hedgerow. Cracks in deadwood limbs	Low
T211	Oak	Within hedgerow. Cracks in deadwood limbs	Low
T212	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T213	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T214	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T215	Oak	Cracks in deadwood limbs.	Low
T216	Oak	Cracks in deadwood limbs.	Low
T217	Oak, Hawthorn, Alder	Surrounding pond edge. Cracks in deadwood with some woodpecker hollows.	Moderate
T218	Oak	Cracks in deadwood limbs.	Low
T219	Oak	Within hedgerow. Cracks in deadwood limbs and ivy	Moderate
T220	Oak	Within hedgerow. Cracks in deadwood limbs and ivy	Low
T221	Ash	Some hollows in limbs	Low
T222	Oak	Hollows in trunk and dead limbs with cracks and crevices	Moderate
T223	Oak	Within hedgerow. Cracks in deadwood limbs.	Low
T224	Oak	Within hedgerow. Cracks in deadwood limbs with some hollows	Moderate
T225	Oak	Small cavity, some lifted bark, small crevices.	Low
T226	Oak	Cracks in deadwood limbs.	Low
T227	Ash	Small tree with hollow trunk, open but with small crevices.	Low
T228	Oak	Some deadwood where limb lost, lifted bark. Gap between branch and main trunk.	Moderate
T229	Sycamore	Some flaking bark	Negligible
T230	Crack willow	Large split trunk, full of cavities but open.	Moderate
T231	Crack willow	Tree with small cavities, large linear crevices where branches cut and lifted sections of bark.	Moderate-high
T232	Oak	Many cavities and woodpecker holes	High
T233	Oak	Small shallow holes.	Low-negligible
T234	Oak	Cracks & crevices beneath bark.	Low
T235	Oak	Dense ivy, some small crevices.	Low

Tree Number	Species	Description	Tree Category
T236	Alder	Small cavities.	Low
T237	Alder	Dense ivy.	Low
T238	Ash	Number of small rot holes and fissures	Moderate
T239	Crack willow	Very limited – lifted bark and splits	Low
T240	Oak	Very limited – lifted bark and splits	Low
T241	Ash	Large rot hole / hollow 3m high east side (obscured by foliage, may be open above)	Moderate
T242	Ash	Rot hole 6m north side	Moderate
T243	Ash	Large rot cavity in trunk 8m NE	High
T244	Oak	Split branch 6m north side	Low
T245	Alder	Large rot hole / hollow trunk 2-3m high south-east side. Dense ivy present.	Moderate
T246	White / crack willow	Split branch 3m high north side	Low
T247	Oak	Large rot hole 3m west side, woodpecker hole 5m south side, split branch 6m high north side, lifted bark 6m high south side	High
T248	Ash	None	Negligible
T249	Alder	Large rot hole 3m west side, knot / woodpecker hole 8m north side, rot holes in split trunk 7m east side.	High
T250	White willow	Split branch 5m south side.	Moderate
T251	Sycamore	None	Negligible
T252	Alder	Two alders, no features	Negligible
T253	Alder	Group of five alders, no visible bat roost features, some ivy present.	Low
T254	White willow	None visible	Low
T255	Ash	None visible, dense ivy on tree	Low
T256	Ash	None	Negligible
T257	Oak	Small cavity, some lifted bark, small crevices.	Low
T258	Oak	None visible, but mature tree with some dead limbs, so potentially present	Low
T259	Sycamore	None	Negligible

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.8: Otter and Water Vole Surveys

avian ecology

Document Control				
Project Name:	132kV Electrical Circuit from Oswestry to Wem			
Project Number:	Gille-391-746			
Report Title	Appendix 8.8: Otter and Water Vole Surveys			
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V1	01/10/2017	Draft	S Turner *GradCIEEM*	U Maginn *MCIEEM*
V2	10/11/2017	Final	S Turner *GradCIEEM*	U Maginn *MCIEEM*

CONTENTS

1 INTRODUCTION

1.1.1 This Technical Appendix presents the result of otter *Lutra lutra* and water vole *Arvicola amphibius* surveys undertaken to inform the Preliminary Environmental Information Report (PEIR) and Environmental Statement (ES) for the North Shropshire Reinforcement Project.

2 METHODOLOGY

2.1 Survey Area

2.1.1 The survey area was identified as part of the extended Phase 1 habitat survey and as part of the evolving alignment of the preferred line route, identifying potentially suitable watercourse and ditch habitats crossed by the proposed development where surveys should be undertaken. Otter and water vole surveys covered suitable watercourses and riparian habitat 100m upstream and 100m downstream of the Preferred Line Route crossing points. Bothe banks of each watercourse were surveyed where safe access was possible.

2.2 Approach

2.2.1 Otter and water vole surveys were undertaken between April and August 2017 by Ms C Baldock MRes ACIEEM, Mr T Winter BSc Grad CIEEM, Mr Z Hinchcliffe MSc, and Mr A Hulme BSc; all of whom are suitably competent ecologists.

2.2.2 The water vole survey methodology was in accordance with the Water Vole Mitigation Handbook (Dean *et al*., 2016[1]).

2.2.3 A general assessment of the relative suitability of each watercourse for otter and water vole was made. Both banks of the watercourses were also searched for field signs indicating otter and water vole presence, including otter spraints, holts and resting places and water vole feeding stations, latrines, and burrows.

2.2.4 The survey areas along suitable water courses are shown on Figure 8.9.

Limitations of Survey

2.2.5 Some sections of watercourse were very steep-sided with loose soil banks or surrounded by heavily overgrown vegetation and these were subject to survey at spot points, at locations where safe access was possible.

3 RESULTS

3.1 Otter and Water Vole Survey

3.1.1 The suitability of each watercourse for otter and water vole is detailed within Table 8.8.1.

[1] Dean, M., Strachan, R., Gow, D. & Andrews, R. (2016). *The Water Vole Mitigation Handbook*. Mammal Society Mitigation Guidance Series.

3.1.2 No otter field signs were observed during survey.

3.1.3 Signs of water vole were recorded at several locations included burrows, feeding stations and remains along the River Perry and possible feeding remains along ditches. These are detailed in Table 8.8.2.

3.1.4 Water voles have been recorded in ditches or watercourses in proximity to the following poles located along the Preferred Line Route:

P44 - P45 – water vole signs along ditch crossed by the line. Both P44 and P45 lie close to the ditch.

P64 – water vole signs in the vicinity of the crossing point at the River Perry….

P167 – water voles signs along the main ditch east of the River Roden. P167 lies close to a section of ditch with water vole activity.

P169 - P172 – lie near ditches connected to the main ditch where water vole signs were observed. Although no evidence of this species was observed along these connected ditches at the time of survey, it is possible that water voles could move along the ditch network and establish burrows nearby in the future.

Table 8.8.1: Watercourse Descriptions

Watercourse (shown on Figure 8.2 Extended Phase 1 habitat survey)	Width (m)	Depth (m)	Current	Bank profile	Disturbance / water level change?	Adjacent habitat	Aquatic vegetation	Bankside vegetation
D1	1	1		Steep	Water level change	Poor		
D2	1	1		Steep	Water level change	Poor		
D4, D10	1	0.5	Dry	Steep	Some water change		Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D5	1	1		Steep	Water level change	Poor		
D6	2	0.2	Mod SE	Steep	Water level change			
D7	1	1		Steep	Water level change	Poor		
D9	1	0.1	Still	Steep	Some water change		Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D13, D16	1	0.5	Slight N	Shallow	Some water change		Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D17	2-3	Bank 1m, water 0.1m	Sluggish	Steep	Water level change	Improved grassland	Hemlock water-dropwort, flag iris, lesser pond sedge	
Montgomery Canal	6		Slow	Vertical-stones bound by large mesh	Water level change	Improved grassland	Water plantain, branched bur-reed.	Line of trees both sides, more open on western bank.

D18	2	Banks 4m water 0.1m	Sluggish/still	Very steep	Water level change	Improved grassland	Fools watercress, duckweed	Red campion, tall ruderal.
D19	1	Dry	Dry	Steep	Water level change	Arable	Duckweed	Tall ruderal overgrown into ditch
D20	1	0.1	Damp, no current	Steep	Water level change	Improved grassland and arable	Reed canary-grass, floating sweetgrass.	Nettle, tall ruderal
River Perry	4.5	0.5-1	Slow	Steep	Minor, some water level change	Arable, cattle pasture	Water crowfoot, curled pondweed, perforate pondweed, reed sweet grass, fools watercress, hemlock water dropwort, branched bur-reed. Aquatic vegetation good density of marginal emergent vegetation, floating leaved and submerged.	Nettle, greater willowherb, nettles, water figwort. Dense.
D23	1.5	1	Slight N	Steep	Water level change		Species in ditches included great willowherb, soft rush, branched bur-reed, hemlock water dropwort, water starwort species.	Bankside vegetation included nettle, hogweed, meadowsweet, hawthorn, willow, alder shrubs, reed canary grass.
D25	2	2	Sluggish	Steep	Water level, cattle	Poor/ improved grassland	None.	Between two hedgerows. Hawthorn, elder, hazel, dogwood, bramble.
D27	3	3	Dry	Steep	Water level change	Poor	None.	Common grasses, nettle, dog's mercury, bramble.
D34	1.5	Dry	n/a	steep	Water level change	Improved grassland (paddock)	Duckweed. Fool's horsetail, fools watercress and redshank growing in channel.	Tall ruderal - false oat grass, great willowherb, dock, cock's-foot, nettle, meadowsweet.
D35, D36	1	2	Dry	steep	Water level	Good (wood)	None	Common grass and ruderals
D38	0.5	0.5	Dry	steep	Water level	Poor	Willow herb and rush	Common grass and ruderals
D39	0.5	2	None	steep	Water level	Good	Grass, star wort.	Common grass and ruderals
River Roden	3	2.5m banks 10-20cm water	Slow	Steep with muddy toe, c. 45 degrees	Water level change, otherwise fenced from livestock	Improved grassland and arable	Common reed, reed sweetgrass, vegetation fringing water	Dense tall ruderals
D40	2	<0.5	Slow	Steep	Water level change	Improved grassland and arable	Algae, reed canary grass and floating sweetgrass.	Tall ruderal with abundant false oat grass. Occasional hawthorn, alder and rose scrub on bank top.

D42	0.5	<0.5	Slow	Steep		Hedgerow / grazing	None	Tall ruderal with hedgerow in places. Great willowherb, hawthorn, cocksfoot, blackthorn, nettle, common hogweed, goosegrass. At western end no hedgerow and grass dominant – false oat grass, cocksfoot and Yorkshire fog.

Table 8.8.2: Water Vole Survey Results

Water vole									
Watercourse/ Water vole Map Ref Number	Survey length (m)	Grid ref.	Sightings	Latrines	Burrows	Footprints	Pathway in vegetation	Feeding remains	Cropped grass around burrow
D1	100	No water vole signs observed							
D2	100	No water vole signs observed							
D4, D10	100	No water vole signs observed							
D5	100	No water vole signs observed							
D6	100	No water vole signs observed							
D7	100	No water vole signs observed							
D9	100	No water vole signs observed							
D13, D16	100	No water vole signs observed							
D17	100	No water vole signs observed							
Montgomery Canal	100	Banks manmade; composed of stones and wire mesh which was of a large size. Holes between stones and large mesh size would allow burrow construction. No signs of presence observed.							
D18	100	No water vole signs observed							
D19	100	No water vole signs observed							

Water vole									
Watercourse/ Water vole Map Ref Number	Survey length (m)	Grid ref.	Sightings	Latrines	Burrows	Footprints	Pathway in vegetation	Feeding remains	Cropped grass around burrow
D20 (D8.1) **WV1**	100	SJ367003 294630						Yes, but no other signs	
River Perry- **WV2-WV5**	100	SJ38773 28868			3, near bank			Yes	
		SJ38626 29209			1, far bank				
		SJ38618 29232			3, far bank			Yes	
		SJ38517 29341							
River Perry **WV6**	100	SJ38544 29296						Yes	
D23	100	No water vole signs observed							
D25	100	No water vole signs observed							
D27	100	No water vole signs observed							
D34	100	No water vole signs observed							
D35, D36	100	No water vole signs observed							

Water vole									
Watercourse/ Water vole Map Ref Number	Survey length (m)	Grid ref.	Sightings	Latrines	Burrows	Footprints	Pathway in vegetation	Feeding remains	Cropped grass around burrow
D38	100	No water vole signs observed							
D39	100	No water vole signs observed							
River Roden		Banks soil, muddy toe of bank visible. Good cover of emergent vegetation, high suitability for water vole. No signs of presence observed.							
D40 (D13.1 & D14.1) **WV7 - WV11**	100	SJ49777 28432 (n bank)		1	2				
		SJ49842 28439 (n bank)				1			
		SJ49840 28446 (s bank)						1	
		SJ49666 28466 (e & w banks)			2				
		SJ49669 28494 (w bank)					1 (possible but no other signs)		

Annex 1 – Photographs

	Latrine Ditch 40
	Typical burrow Ditch 40
	D40 east of River Roden typical view

	River Roden
	View of River Perry
	Burrows along the River Perry

132kV Electrical Circuit from Oswestry to Wem

on behalf of SP Manweb

Appendix 8.9: Badger Surveys

CONFIDENTIAL APPENDIX

avian ecology

Document Control				
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