



Guidance on Ecological Survey and Assessment in the UK During the Covid-19 Outbreak

Version 3

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Acknowledgements

This guidance document has been drafted by experienced ecologists as a tool to help CIEEM members continue to undertake ecological survey and assessment during the restrictions necessitated by the Covid-19 outbreak, where they can do so safely. We recognise it does not cover all taxa but concentrates on those for which alternative approaches are most urgently required. We may produce further guidance for additional taxa in due course. We also recognise that it has been produced swiftly, in response to an extreme situation and urgent need. We therefore welcome feedback and suggested improvements.

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INTRODUCTION

This document provides guidance on temporary alternative approaches to ecological survey and assessment in scenarios where field surveys cannot be undertaken for a given site or area, or only limited survey effort is achievable, as a result of the Covid-19 pandemic. It has been produced under the highly constraining environment necessitated by movement restrictions and is **not** intended to replace existing guidance and best practice. This guidance is aimed at parties:

- undertaking ecological surveys and assessments, particularly in relation to planning applications (ecological consultants in most cases);
- tasked with reviewing the adequacy of the ecological information provided in relation to a planning application (such as Local Planning Authorities and Statutory Nature Conservation Bodies);
- compiling and reviewing species licence applications; and
- undertaking or relying on pre-construction surveys.

Movement restrictions designed to contain the spread of Covid-19 are likely to change over time which means that access for surveys will alter. There are also different limitations on travel, and access to the countryside across the UK. Despite these, ecological surveys are still possible in many cases. This guidance necessarily takes a generic approach and must be interpreted with reference to the most up-to-date information on Covid-19. Public health safeguarding, CIEEM's advice¹ and country-specific government and government agency advice² provide further clarification on any restrictions in place which need to be considered when planning and undertaking field surveys.

This guidance applies to the UK only. We have published a separate guidance document for members working in Ireland.

This document does not provide guidance on health and safety or replace the need for a thorough health and safety risk assessment. However, any risk assessments need to consider both the risks of transmitting Covid-19 and the risks of undertaking field work. One of the obvious outcomes of the restrictions is the limited availability of overnight accommodation (closed or reserved for key workers). To reduce the consequent risk from undertaking longer return journeys in a day, there may need to be an increased reliance on local sub-contractors. CIEEM's Sub-contractors Directory³ will assist members in finding suitably experienced sub-contractors.

In some cases, Covid-19 restrictions have constrained the collection of field data during spring 2020 (and potentially for significantly longer). This document provides guidance on alternative approaches to address the challenge a lack of field data will present. It suggests strategies to ensure that biodiversity is not overlooked or undervalued in the planning decision-making process, based on the important requirements for any field survey or alternative approaches to evidence collection which include:

- the safety and well-being of our members;
- the protection of citizens, society and biodiversity;
- supporting the government's position and the different emphasis in the different UK jurisdictions on travel and working; and

¹ <https://cieem.net/resource/advice-cv19-undertaking-site-based-ecological-work/>

² <https://cieem.net/i-am/covid-19/cv19-advice-for-members/>

³ <https://events.cieem.net/SubContractorDirectory/Sub-Contractor-Directory.aspx>

- ensuring that any alternative approach to evidence collection for decision-making meets legislative requirements and any limitations and mitigation strategies for these limitations are clearly identified and communicated.

Developing Alternative Approaches

Decisions need to be informed by ecological assessments based on sufficient and appropriate data⁴. The approach to data collection should follow relevant good practice guidance documents, with any departures from such guidance clearly identified and justified.

The presence or likely absence of protected species, and the extent to which they could be affected by a proposed development, is a material consideration in determining a planning application and should be established before planning permission is granted. Planning conditions should only be used to secure ecological surveys after planning permission has been granted in exceptional circumstances⁵. The British Standard BS42020 (Section 9.2.4) gives examples of exceptional circumstances; none of these relate to the sort of restrictions on survey effort that might occur as a result of the Covid-19 outbreak.

Natural England has recently published guidance⁶ stating that *“where there is insufficient information available to rule out significant risks to the natural environment, we may advise that a precautionary approach is needed by developers or local authorities, and/or a decision deferred until sufficient evidence is available.”*

Scottish Natural Heritage has also published guidance stating that they *“... are keen to find pragmatic ways forward where possible within the limits of the EIA and Habitats Regulations. The degree of flexibility and the options available will depend on the circumstances of each case.”*⁷

CIEEM does not consider it appropriate to condition further ecological surveys to determine the presence or likely absence of protected species, and the extent to which they could be affected by a proposed development. Alternative means of collecting sufficient information need to be considered (i.e. methods that differ from those set out in current good practice guidance or are adapted in terms of level of survey effort for example) and a precautionary approach to assessment and mitigation may be necessary.

The scope for flexibility in approach will depend on the environmental significance of, and risk to, ecological features. In some cases, it might be possible to avoid the need for a survey, such as where adequate and accurate desk study information and a habitat assessment exist, which allow the presence of a given species to be assumed. However, absence of a given species should not be assumed where suitable habitat is present and a site is within the known or likely range of that species. Regardless, presence alone may be insufficient to inform the design a scheme to avoid, mitigate or compensate for impacts adequately.

⁴ See Section 8.1 of the British Standard BS42020 Biodiversity – Code of practice for planning and development.

⁵ In England: ODPM Circular 06/2005: Biodiversity and geological conservation – Statutory obligations and their impact within the planning system, paragraphs 98 and 99. In Wales: WGC 016/14 The Use of Planning Conditions for Development Management. In Scotland: Planning Circular 4/1998: the use of conditions in planning permissions. In Northern Ireland: Department of the Environment (2015) Development Management Practice Note 20 Use of Planning Conditions

⁶ Coronavirus – Guidance on implications for Natural England’s development management advice and wildlife licensing.

⁷ <https://www.nature.scot/coronavirus/planning-development-services>

In other cases, it may be possible to adapt a survey approach by using different methods or different levels of survey effort.

Where presence is assumed on a precautionary basis, this should be clearly stated in any assessment. Method Statements can be used to secure working practices that avoid potentially significant effects.

A protected species licence from the relevant Statutory Nature Conservation Body (SNCB) may be required in some cases. The level of survey effort needed to secure a licence will need to be advised by the relevant SNCB and is not covered by this guidance.

In England, precautionary mitigation or compensation, in line with Natural England's Licensing Policy 4⁸ may be sufficient to address shortcomings in available data for EPS licensing.

It may be possible to avoid the need for licences in some cases by taking steps to minimise the likelihood of possible breaches of the legislation. The ecological consultant would need to be confident that offences would be reasonably unlikely even if the species were to be present. These approaches should be supported by Method Statements. However, Method Statements must not be used as a way of avoiding a licence where an offence is likely to occur.

A recommended template for Method Statements is provided in an appendix. This can also be used for species which are not protected, or where there is no licensing route.

A number of technical notes for ecological features have been provided as appendices. These have been compiled by suitable experts in each discipline to help less experienced ecologists and to provide a consistent approach for our members. Technical notes for certain species have been prioritised over others, focusing on those most frequently surveyed and those most likely to be affected by a lack of surveys in spring; technical notes for other species will be developed as necessary. Seasonality and geographical variation will necessitate adapting approaches to local conditions and geographies. Professional judgement⁹ and consultation with stakeholders will be key to ensuring that any alternative approaches applied will generate data that are fit for purpose.

It should be noted that existing guidance documents are written to assist those with some experience to undertake surveys and design effective mitigation in normal circumstances. A greater level of expertise/competence with a given species or habitat is likely to be required in certain circumstances than would normally be the case, in relation to interpreting the results of alternative approaches that do not strictly accord with good practice guidance, and with the preparation of Method Statements. All ecologists and environmental managers using alternative approaches will need to consider staff competence levels and these should be justified in any ecological survey or assessment reports, or Method Statements produced.

When selecting an alternative approach to evidence collection, there are a number of aspects to consider (Figure 1).

⁸ <https://www.gov.uk/government/news/new-licensing-policies-great-for-wildlife-great-for-business>

⁹ See 'Pragmatism, Proportionality and Professional Judgement' *In Practice* **91**, pp57-60.

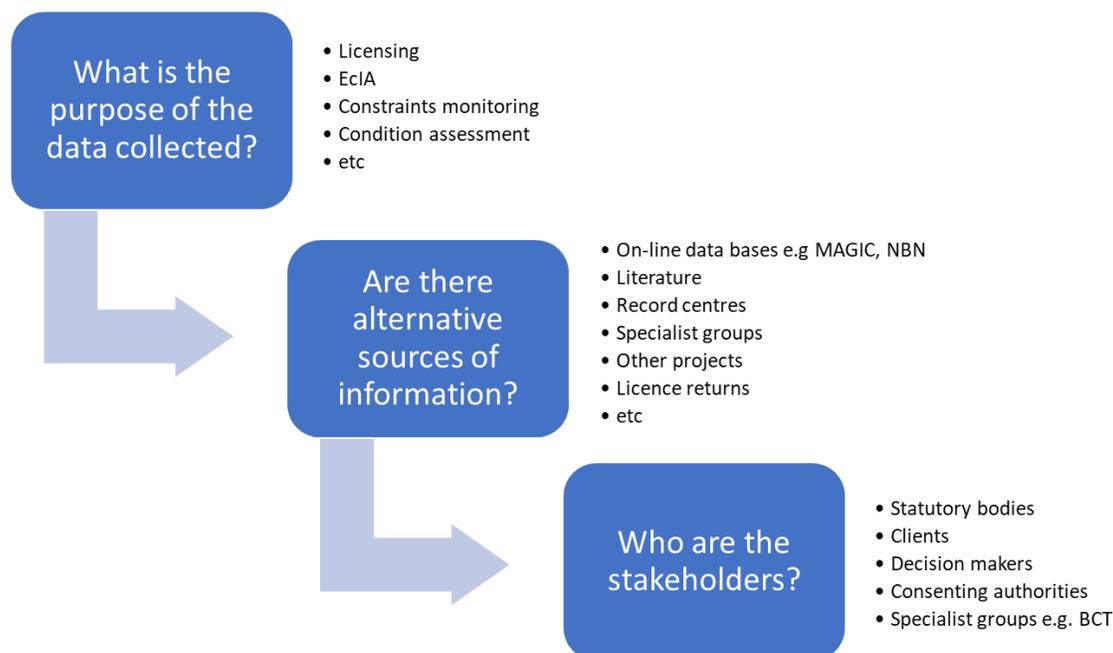


Figure 1. Steps needed to arrive at alternative approaches to evidence collection.

It is good practice to undertake a desk-study for any project (CIEEM, 2020), and the technical sections below direct practitioners to a wider range of resources than might be needed in ‘normal’ circumstances. As there may be an increase in requests (and potentially a shortage of staff running the organisations that provide data), it will be important to allow sufficient time to obtain the data, and sufficient expertise to be able to analyse it properly.

The purpose of the data to be collected will inform the alternative approach to be used, which should be based on professional judgment and consultation with stakeholders. Early consultation with the planning authority and specifically the ecologist will help to identify what would be acceptable, what mitigation for any limitations is required, and avoid delays/issues with the application at the time. In some circumstances, it may not be possible to agree an acceptable alternative approach, resulting in delay.

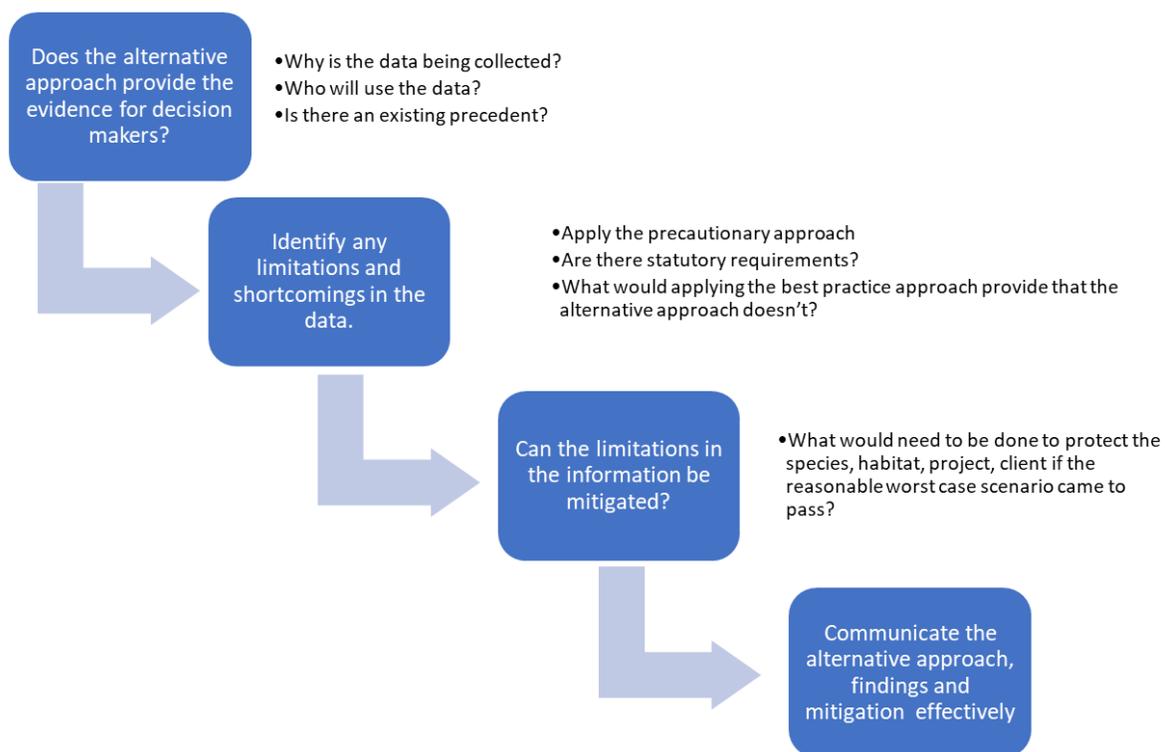


Figure 2. Key considerations for the data collected using an alternative approach.

References and Data Sources

CIEEM (2020). *Guidelines for Accessing, Using and Sharing Biodiversity Data in the UK*. Chartered Institute of Ecology and Environmental Management, Winchester, UK.

Appendices

Guidance on individual taxa and topics follows.

APPENDIX 1 – HABITATS

The following guidance provides a way forward where botanical and field-based habitat surveys are limited during the 2020 field season. It is not intended as a replacement for current guidance on survey methods, but to provide examples of an approach for an enhanced desk-based habitat baseline that may assist with project design, mitigation design, biodiversity enhancements (e.g. net gain) and ecological impact assessment for development projects.

It is essential to note that, as a general principle, the identification and assessment of habitats and flora is always best completed by an experienced botanist working in the field. The alternative methods outlined below cannot fully replace field surveys. The creation of an enhanced desk-based habitat baseline should only be completed by an experienced and competent habitat surveyor and it should be subject to a quality assurance review by an ecologist of at least equivalent experience.

Current Standard Approaches and Sources

Habitat Surveys and Classification

There are a number of different habitat classification systems that may be appropriate for use in ecological assessment, depending upon the geographic location and objectives of the particular study. CIEEM provides a useful list in Guidelines for Preliminary Ecological Appraisal. NBN also lists classification types for which it holds data¹⁰.

Some examples of classification systems in regular use include:

UK Habitat Classification – UKHab is a hierarchical classification applicable across the UK that integrates Broad Habitat, Priority Habitat and Annex 1 Habitats into a single unified system.

Phase 1 Habitat Survey – Appropriate for use across Great Britain, especially suited as a rapid survey tool in semi-natural habitat types in open countryside.

Integrated Habitat System (v2.0) – HIS integrates UK Broad Habitat Types, Priority Habitat Types, Annex 1 Habitats and JNCC Phase 1 and provides a translation tool between different classifications.

EUNIS Habitat Classification and CORINE Biotopes Project Habitat Classification – EU-wide habitat classifications widely used across EU states and in the UK, especially marine and coastal areas.

UK Biodiversity Action Plan Broad and Priority Habitats – This is a UK-habitat classification prepared by the UK Biodiversity Group that classifies all terrestrial and freshwater habitats in the UK into 37 broad habitat types. A suite of Priority Habitat types nest into the defined Broad Habitat Types.

Scottish Biodiversity List – the list of species and habitats considered to be of principal importance for biodiversity conservation in Scotland.

National Vegetation Classification – UK-wide classification and description of plant communities, widely used to describe semi-natural habitats in the UK.

Rapid Botanic Survey and Measurement of Vegetation Bioquality – Primarily used for vegetation surveys in tropical habitats, but also applicable to UK landscapes.

¹⁰ <http://habitats.nbn.org.uk/habitatClassList.asp>

Detailed Botanical Survey

Methods for detailed botanical baseline surveys are typically designed for specific research purposes and the majority require field-collected data. This guidance does not cover such survey methods.

Suggested Adaptations to Methods

Data Collection and Sources

A wide range of resources is available to ecologists to establish a habitat baseline in the absence of a recent field survey. Undertaking a comprehensive desk study, i.e. beyond the usual LERC and statutory sites data searches, to collate existing biodiversity and environmental data for a project site is an important first step. GIS is an extremely valuable tool for collating and reviewing environmental data from various sources.

Different sites are likely to require differing effort to determine habitat types, and therefore it is likely the data sources listed below are more appropriate for some sites than others. The ecologist should list the sources used and be clear about any limitations where certain data may not be available. For example, larger sites that are likely to support Habitats of Principal Importance, species of importance (including assemblages of breeding waders) or Designated Sites are likely to require a more rigorous approach to data collection and to need multiple cross-referenced data sources to guide interpretation than smaller sites supporting ubiquitous habitats of lower biodiversity value.

Sources of data include:

- Existing habitat survey and species data, for example:
 - County or national habitat surveys (e.g. habitat data from Local Environmental Records Centres).
 - Designated site habitat survey data, e.g. SSSI/ASSI, LWS and SNCI/SLNCSI surveys.
 - Records of indicator species, e.g. Ancient Woodland Indicators, that are suggestive of the presence of habitats of principal importance.
 - Previous consultancy reports (with appropriate acknowledgement), e.g. accessible from local planning portals, for the project site or neighbouring areas.
- Aerial photographs, e.g. Google, ESRI or Bing imagery or data from commercial suppliers. Aerial data from different years and seasons can be valuable.
- Site-specific aerial data, e.g. collected from drone surveys.
- Google Streetview.
- OS/OSNI mapping for land parcels, boundaries and topography, including identification of ponds.
- Site photographs from previous visits.
- Data.Gov.UK (thousands of environmental data sets).
- Tree canopy cover and stem datasets; both commercial and free to access datasets are available.
- Plant distribution atlases.

- Priority Habitat Inventory (England) – a spatial dataset that describes the geographic extent and location of Natural Environment and Rural Communities Act (2006) Section 41 habitats of principal importance and indicates additional areas that do not meet the current thresholds.
- National Habitat Networks (England) - a spatial dataset for 18 priority habitats with additional data added in relation to habitat creation and potential areas for restoration.
- Ancient Woodland Inventories (all UK) and the National Forest Inventory (England).
- Land Cover Map 2015 (CEH) - provides land cover information for the entire UK based on the Biodiversity Action Plan (BAP) Broad Habitats.
- Historical aerial photographs, e.g. Britain from Above or commercial sources.
- Historical maps, including estate maps, e.g. National Library of Scotland.
- Habitat types determined by auto-classification algorithms from remote sensed data, e.g. using Environment Agency LIDAR data or commercial products.
- Geological and Soils maps, e.g. British Geological Survey.
- Hydrology and catchment mapping, e.g. Environment Agency Catchment Data.
- Scotland’s Environment Map – a Scotland-wide spatial data resource. This includes the Habitat Map of Scotland available data.
- Natural Resources Wales – various environmental data, including the Interim SMNR Geospatial Portal.
- NIEA Natural Environment Map Viewer – mapped datasets of available information on peatland, heathland, grassland inventory, fens, woodland, lakes.
- Living Map, England (in preparation).
- Woody linear features framework. A map of hedgerows and tree lines based upon a predictive model using CEH data from NEXTMap and CS2007.
- Woodland Trust Ancient Tree Inventory (open source).
- Natural England Natural Capital metrics, available at 1km scale only.

CIEEM has recently published revised *Guidelines for Accessing, Using and Sharing Biodiversity Data in the UK*¹¹ and this document should be referred to for further information on the sources and applications for biodiversity data.

Establishing the Enhanced Desk-based Habitat Baseline

Combining a range of existing data into a habitat baseline should be completed by an experienced ecologist, supported by GIS analysts where appropriate. Assumptions and limitations of the data sources used and how each dataset has been used in the analysis should be clearly stated in the methods.

An example approach to establish the habitat baseline is outlined below:

1. Produce a broad habitat map, e.g. polygons based upon OS Mastermap (or equivalent, such as Spatial NI) data supplemented by data from sources outlined above, (e.g. recent aerial photography).
2. Prioritise the use of higher quality datasets during analysis. For example, pre-existing field surveys, landscape-scale field survey data and SNCO habitat inventory data, e.g. for of principal importance and ancient woodland.

¹¹ https://cieem.net/resource/guidelines_for_accessing_and_using_biodiversity_data/

3. Apply expert judgement to combine the initial habitat baseline with other datasets, as required, to validate the initial polygon data and identify point and line features, if required.
4. Where necessary, apply a correction or re-interpretation of existing data in a new GIS layer.

Hedgerow maps in Great Britain can be produced using various sources, including OS Mastermap data, aerial photographs and CEH’s Woody Linear Features Framework. Google Streetview provides a useful resource for assessing roadside habitats. Mapping other linear features, point features and other habitat features that occur under tree canopies or on steep slopes are likely to be severely constrained using this approach and any limitations should be clearly stated. Mapping individual trees may be possible with some datasets but is only likely to be appropriate to smaller scale projects.

Table 1 (below) provides a summary of typical levels of the UK Habitat Classification hierarchy that can be confidently predicted using data from various sources. Please note if in Scotland map polygons should be co-tagged with the relevant EUNIS code¹².

GIS mapped polygons should have attributes associated with each polygon to explain data source, data age and confidence limits for the habitat identified. Where appropriate, habitats with lower confidence limits should be annotated to recommend ground-truthing or an alternative validation process. Printed maps based upon enhanced desk-based habitat baselines should have a note in the legend to state the sources of data used to produce the map and, where necessary, caveats on the confidence limits that apply. For example, *“This map illustrates a habitat baseline derived from desk-based data from the following sources... This map is not a substitute for an up-to-date field survey.”*

Table 1. Summary of broad applications for UK Habitat Classification data and the accuracy of different methods of data collection.

UKHab Level	Included Habitat Types	Major Applications	Accuracy and Precision
Level 1	Major ecosystem category, currently covering terrestrial, freshwater and coastal ecosystems.	n/a	Straightforward from data collated from desk exercise and earth observed data
Level 2	9 ecosystem types, based upon the Mapping and Assessment of Ecosystems and their Services (MAES) typology and corresponding with the major habitat types within EUNIS.	Many ecosystem service assessments	High quality from data collated from aerial imagery, desk exercise and earth observed or remote-sensed data, e.g. drone.
Level 3	20 broad habitat types, corresponding directly with UK Biodiversity Action Plan Broad Habitats and very closely to EUNIS.	Absolute minimum requirement for Preliminary Ecological Appraisals, project options appraisals and options for BNG	Variable quality from aerial imagery, desk exercise and earth observed or remote-sensed data. Field survey is required for grasslands and

¹² See <https://www.nature.scot/snh-commissioned-report-766-manual-terrestrial-eunis-habitats-scotland>

		assessment	some wetlands.
Level 4	80 habitats, including 47 UK Biodiversity Action Plan Priority Habitats.	Required for BNG metrics, land management decisions and a minimum for EclA	Highly variable quality across the habitats, field survey required for acceptable accuracy and precision for many Priority Habitats.
Level 5	104 habitats, including 69 Habitats Directive Annex 1 habitats and divisions of common habitat types	Required for HRAs, international obligations, protected area assessments.	Field survey required to map the majority of habitats.

Key Survey Limitations

The method for undertaking an enhanced desk-based habitat baseline has a number of limitations compared to field survey. Many limitations are likely to be project-specific, based upon the approach and datasets used to derive the habitat baseline. A systemic limitation of this approach is that sites that are of high biodiversity value but currently unknown (e.g. not on a national or local database) may not receive sufficient baseline survey effort to characterise their value in ecological assessment. It is the ecologist's responsibility to ensure that this risk is minimised by taking a precautionary approach during data interpretation.

General limitations are outlined below:

- The interpretation of grassland habitat types is very difficult in the absence of field surveys, with the possible exception of highly modified agricultural leys and modified *Lolium*-dominated pastures. A coarse level of grassland separation (e.g. calcareous-acid) may be possible using geological and soil maps, but should always be provisional pending field survey.
- The interpretation of some wetland habitat types is likely to be very difficult; for example, fen, marsh and swamp habitats (including Ground-Water Dependent Terrestrial Ecosystems), in particular smaller features such as springs and flushes. Hydrological mapping or modelling may be combined with other environmental data to provisionally identify certain features, but data are unlikely to be able to predict vegetation communities with any accuracy.
- Accurately assigning Habitats of Principal Importance, Annex 1 habitat types or NVC community types is likely to be extremely difficult given the quality and extent of desk-based data likely to be available for most sites. Ecologists can have higher confidence in ancient woodland extent, although they should be aware of the limitations in the original methods for determining ancient woodland sites. Follow-up field surveys with more detailed botanical surveys should therefore be recommended in most cases. Where it is essential to proceed with a project assessment in the absence of any field data, a precautionary approach should be taken, with habitats assigned provisionally as the priority type until this can be proven otherwise.
- This approach is highly unlikely to identify the presence (or likely presence) of any invasive, uncommon or rare plants. It may be appropriate to agree a protocol for identifying potential 'hot spots' for invasive, rare and notable plants on the basis of soils, geology and existing plant records.

- Older data sources are likely to be of limited use for establishing a current habitat baseline, especially in dynamic environments. It is essential that the age of the data used is specified and that limitations are highlighted.
- Where OS Mastermap data is used to derive initial polygon and linear feature boundaries, the assumptions on how each line type has been interpreted should be clearly stated in the method.

The approaches outlined above are unlikely to be useful in determining habitat condition, or to identify locations that are important for improving the condition (structure and function) of existing habitat or that may be key for future development for increasing ecological resilience, species dispersal and ecological networks.

Key Considerations for Results Interpretation

Enhanced desk-based habitat baselines can be used to inform Preliminary Ecological Appraisals, options for project design and initial stages of Biodiversity Net Gain studies. These approaches could also help with identification of biodiversity constraints, e.g. certain irreplaceable habitat types. Clearly stating the limitations of desk-based habitat baselines is essential and, in most cases, it would be appropriate to recommend that field survey is conducted at the next available opportunity.

Field survey is generally required to determine the higher-level habitat classifications, e.g. UKHab Level 4 and 5, such as are required by detailed Biodiversity Net Gain studies and Ecological Impact Assessment. There are currently no accepted methods for determining habitat condition without field-based assessment. In the absence of any field surveys, precautionary assumptions about habitat condition may be acceptable in some circumstances. For example:

- Ancient woodland could be assumed to be of high distinctiveness and good condition.
- Nationally designated sites, including SSSIs/ASSIs, SPAs, SAC etc. could be assumed to support high quality habitats in good condition. In England, reference can be made to the latest Condition Assessments of SSSI Units, which could also assist in identifying some mitigation measures.
- Locally designated sites including local wildlife sites that have been designated due to the presence of priority habitats could be assumed to be of high quality. The presence of priority habitats within locally designated sites should be included in LERC data searches.
- Countryside Survey data can be used to make broad assumptions about the species-richness and condition of commonplace broad habitats, in lieu of field survey.
- In the absence of other habitat condition information, assuming a 'good' condition for all habitats may be an appropriate precautionary approach.

Any assumptions made in relation to habitat condition should be transparent and, in most cases, it would be appropriate to present the worst-case scenario. Impacts on designated sites and irreplaceable habitats are not adequately measured by Biodiversity Net Gain metrics and these must be considered separately in any assessment.

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APPENDIX 2 – GREAT CRESTED NEWTS

In the light of Covid-19 restrictions a number of adaptations to ‘standard’ great crested newt survey methods can be considered by ecologists to enable them to plan and undertake work during spring and summer 2020. This guidance on such adaptations is not intended as a replacement for current good practice guidance. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

Survey method	Survey Timing and Brief Method	Minimum Survey Effort (no. of visits)
Environmental DNA	Collection of water samples between mid-April to late June	1
Egg search	Searching suitable vegetation between April to June	1 - 6 (or until presence identified)
Pitfall traps	Up to 20m of fencing and 15 pitfall traps. (NB: In England this requires Level 2 (WML – CL09) Licence. In Scotland and Wales site/project-specific licences are required).	20 days (max)
Refuge search	Hand searching suitable terrestrial refugia, between March – October	Not specified
Bottle or funnel traps	Traps can be used overnight, or for up to 4hrs for daytime searching. March to June.	4 (p/a) 6 (pop. class)
Netting	15 minutes of netting per 50m of shoreline undertaken between mid-March to mid-June (August-September to find larvae)	4 (p/a) 6 (pop. class)
Torch survey	Mid-March to mid-June (August-September to find larvae)	4 (p/a) 6 (pop. class)
Habitat Suitability Pet suitability index	Daytime field visit at any time of year (but optimal spring/summer)	1

Suggested Adaptations to Methods

Data searches for existing GCN records should always be completed in advance of field surveys and, in some circumstances, recent presence or, in the case of eDNA sampling, or where a recent presence/absence survey has been conducted using standard methods, absence data may be sufficient

for the study's purpose. Natural England has recently added 2017-2019 eDNA data to the MAGIC data portal, providing a highly relevant data source to supplement other sources, such as LERC records searches and EPS licence records.

Recent research (Buxton *et al.* 2017) suggests that eDNA surveys can be effective in detecting great crested newt over summer, beyond the current end June date. However, there are important caveats here, notably that it may be most effective where there are larvae present, and so would run the risk of a false negative in ponds not used for breeding in a given year. Beyond June, eDNA surveys cannot be used to determine absence. Emerging research and statistical tools should be used to help plan and interpret eDNA surveys whilst guarding against false negative and positive results (see especially Griffin *et al.* 2020 and Harper *et al.* 2019).

The conventional survey methods can sometimes positively detect newts beyond the standard recommended survey periods. However, their effectiveness is reduced, sometimes drastically so, meaning that the risk of false negatives increases. There is certainly benefit in ecologists undertaking such methods in order to attempt to detect presence of newts outside the normal periods, so long as: (a) they consider there is a chance that using the method(s) could detect the species if present at the time of survey; (b) any non-detections are not, on their own, interpreted as evidence of absence of the species; and (c) the method would not entail unacceptable risks to wildlife, habitat or the surveyor.

Regular overnight bottle-trapping as a standard method alongside torch surveys may lead to difficulties with accommodation for surveyors. It is suggested that bottle-trapping is replaced with increased effort in other daytime methods, e.g. netting, egg-search or setting bottle- or funnel-traps for a maximum of 4 hours. Bottle- or funnel-trapping can also be used in the early evening, with collection up to 3 hours after sunset, allowing the survey team to combine trapping with torch surveys during the same survey event. The risk of contact transmission through shared field equipment, e.g. traps, nets, etc. should be addressed and minimized through implementation of good hygiene measures.

Importantly, sampling ponds outside the peak night-time activity period is likely to result in fewer detections than usual – i.e. there would be a smaller chance of detecting presence, and lower counts of individuals. This must be explicitly recognised in reporting. In all cases, the welfare of newts and other pond wildlife should be carefully considered; trapping during the day risks harm to trapped animals, especially where conducted in high temperatures or where there is a high density of animals, and so this should only be done after careful assessment of the risks. In addition, ecologists must comply with the conditions of their licence, including abiding by the relevant advice on trapping in the Great Crested Newt Mitigation Guidelines. Some methods could impact negatively on others – e.g. intensive netting often disturbs newts and the substrate (often causing newts to retreat to inaccessible areas, and the pond water to become turbid), meaning that subsequent attempts to detect newts would need to be delayed, as well as disturbing/being harmful to other species and potentially damaging larvae in late summer.

A range of innovative survey methods may also be applicable. For example, the use of trained detection dogs to search for GCN in terrestrial habitats may be able to determine presence and distribution of this species in the absence of pond surveys (although not likely absence). Confidence in distribution will depend on the level of confidence on detection rates in different habitats. Drones have also been used to collect eDNA samples and this technique may be appropriate in some circumstances. Further research and testing efficacy of these or any other innovative sampling techniques would be advisable to support any conclusions drawn and consultation with the relevant licensing body is also advised.

If using desk study information, remote sensing data, aerial photography and predictive modelling, the constraints of these types of data must be acknowledged. Where it is important to determine the presence or likely absence of great crested newts, those methods should not be relied on without recent field evidence. The exception is where the site is being considered in one of the District Level Licensing schemes (in which there are specific protocols for use of such data).

Key Survey Limitations

Most methods listed can only determine presence. Multiple methods and repeat visits are typically required to determine likely absence. Additional effort is recommended where surveys are constrained; e.g. reduced capture effort in trap surveys, surveys conducted outside the optimal season or in other unsuitable conditions (turbid water, densely vegetated ponds). Where additional effort is not possible, the constraints should be noted. When using egg searches, netting, eDNA between July – September or daytime funnel traps, likely absence should be interpreted with caution and where possible these should be used alongside other methods, including HSI and LERC data searches.

Pitfall trapping and terrestrial refugia searches are unlikely to be suitable for determining likely absence without other supporting evidence.

Ecologists must consider how the limitations of their surveys may influence their interpretation of results.

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance (CIEEM, 2019 as amended). In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA.

Mitigation and EPS Licensing

Natural England's Rapid Risk Assessment Tool is useful in establishing whether or not a licence is likely to be required where the scale of impacts and distance to breeding ponds is known. This approach may also be broadly suitable in both Scotland and Wales but local factors must be taken into consideration.

In England; where a European Protected Species licence is required, ecologists may be able to apply DEFRA's Licensing Policy 4 and propose reasonable worst-case scenario mitigation and compensation based upon the predicted population size in the light of constrained field data. Policy 4 states: "*Natural England may accept a lower than standard survey effort where carrying out standard survey requirements would be disproportionate to the additional certainty that it would bring; the ecological impacts of development can be predicted with sufficient certainty; and mitigation or compensation will ensure that the licensed activity does not detrimentally affect the conservation status of the local population of any EPS.*" Detailed evidence and justification will need to be set out by the Applicant for each of the criteria in order to successfully apply for a licence using this approach.

A Low-Impact Licence for great crested newts in England (WML-CL-33) typically requires only presence or likely absence data to meet the requirements to register a site, although in some circumstances HSI data is also required.

District licensing areas in England do not require the applicant to complete any field work of their own to support the licence application, although there may still be requirements under some District level licences to submit habitat survey data/HSI scores.

Natural England has published specific advice relating to wildlife licencing in response to Covid-19 outbreak¹³.

Where precautionary mitigation is proposed, e.g. using robust, detailed Reasonable Avoidance Measures and in the absence of an EPS licence, the method statement must specify that works that cause an offence must stop immediately.

Where EPS licensed mitigation works are planned, e.g. capture and exclusion of great crested newts from a site, it is likely that minor adaptations to working methods and the implementation of a Risk Assessment and Method Statement, which takes account of Covid-19 public health advice protocols, would allow these works to continue. Any alterations to methods which require the agreement of the licensing authorities should be agreed in advance, as a modification of the licence may be required, and fully justified in any subsequent monitoring reports and licence returns.

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APPENDIX 3 – BIRDS

In the light of Covid-19 restrictions, standard bird survey methods may need to be adapted by ecologists to enable them to plan and undertake work during spring and summer 2020. This guidance on such adaptations is not intended as a replacement for current good practice guidance. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance note provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

This section includes a brief summary of commonly used methods for development projects. A wide range of bird survey methods exist and the summary below is not intended to be comprehensive. For further information please consult the references listed at the end of this note. This is a general guide only and all surveys should be designed to collect the data required for the project.

Survey Method	Survey Timing and Brief Method	Survey Effort (no. of visits)
Breeding bird survey	Establishing breeding territories of all species present through morning surveys between late March and the end of June at least. February start where certain species are likely to be present. Typically using an adapted form of the territory mapping or Common Bird Census (CBC) method (Bibby <i>et al.</i> 2000; Marchant, 1983).	Typically 5
Wintering bird survey (general)	Transect counts carried out between November and March	Monthly during relevant period
Waterfowl counts	Counts undertaken at waterbodies or in other areas where wildfowl and/or waders are known to congregate. Through winter but typically including spring and autumn migration periods (so including April and May and August-October). Typically based on Wetland Bird Survey (WeBS) methodology.	At least monthly during relevant period
Vantage Point Survey	Timing varies to suit the location and potentially vulnerable species – can be breeding birds or passage/wintering birds	Large number of visits needed in relevant periods to establish flight lines adequately

Species-specific survey methods exist for a range of protected and priority bird species (see for example Gilbert *et al.* 1998; Hardey *et al.* 2013) and there are also specific methods targeted at certain species groups, e.g. breeding waders and breeding wildfowl.

Specific survey guidelines also exist for certain development projects, for example wind farms (SNH, 2017). These may recommend a combination of generic methods alongside more bespoke, development-specific survey methods, such as Vantage Point flight activity surveys for wind farms.

There is high potential for breeding bird surveys in particular to be affected by restrictions relating to Covid-19.

Suggested Adaptations to Methods

For all the survey methods, the quality of baseline bird data is highly dependent on the number (and duration) of survey visits. Where it is impossible to undertake some of the visits that would normally be undertaken due to access constraints, the value of the data sets will be affected. However, if access restrictions are lifted before the end of the survey season relevant to the survey type, some useable data can be obtained. There will often be some benefit in increasing the frequency of survey visits during the remaining time period, and this would be worth considering. However, increasing the frequency of visits in this way will not fully compensate for visits that were missed earlier in the season, even if only a small part of the required season is missed.

In all cases, where survey effort has been curtailed, a precautionary approach to assessing the data must be taken.

Where surveys are restricted, a range of alternative approaches may be considered. These could include:

- Detailed desk study
- Delaying surveys
- Habitat-based assessment

Birds are probably the most-studied taxa in Britain and in many cases a wealth of existing information will be available to help identify important bird species that may be present at a site, although not necessarily their breeding status. Potential sources of relevant information include:

- Local Environmental Records Centre searches
- County Bird Recorders, County Bird Clubs and other specialist recording groups, e.g. Local Raptor Study Groups
- Local and National Bird Atlases (e.g. Balmer *et al.* 2013)
- National surveys such as the Wetland Bird Surveys
- Local Bird Reports, such as, annual county bird reports
- Survey Reports for other nearby development projects (accessed via local planning portals)
- NIEA Natural Environment Map Viewer

Depending on the duration of Covid-19 related restrictions, it may be possible to delay the start of surveys and still obtain useful data. In such cases surveys should commence at the first available opportunity once restrictions are lifted. It is noted that some species are much more detectable during

the early part of the season or may finish breeding relatively early and, as such, a lack of survey data during April and May would be a significant limitation.

Where survey is not possible, or where only partial survey can be carried out, desk study data could usefully be supplemented by a detailed habitat-based assessment, undertaken by an experienced ornithologist with habitat survey skills. This would involve a review of maps and aerial images and, ideally, a site-based assessment following the lifting of restrictions. The aim of the assessment, in combination with a detailed desk study, would be to identify the likelihood that important species are present at a site and if so, which parts of the site are likely to be important for them. The approach would be most effective if recent bird data exist for adjacent similar habitats and may be insufficient for the scarce and rare breeding species that are often of greatest importance in assessments. The limitations of this approach should be carefully stated in any report.

Key Survey Limitations

Due to timing, the most disruption due to Covid-19 is likely to be to breeding bird surveys and vantage point surveys that are required to consider the flight lines of vulnerable breeding birds. Surveys may not be possible during April-May at least. The most notable limitation is that without detailed survey data, collected at the appropriate time, it may not be possible to confirm the absence of important bird species.

For general breeding bird surveys, some species are only likely to be recorded early on in the year, e.g. willow tit (Carr and Lunn 2017) and lesser spotted woodpecker (both are rarely encountered; more common early species include grey partridge, mistle thrush and nuthatch). Where the habitat is suitable and these early visits are not possible, later surveys will not be able to rule their presence out. However, they may have been recorded during February and March before restrictions came into place. A lack of records during April and May is likely to make it difficult to confirm presence of some species (for example, nightingale). It will also severely reduce the ability to determine territories for many other species, as this is a key time for territorial behaviour in most. It is still worth undertaking surveys if late access is possible in case family groups etc. are encountered, but this would not record abundance and distribution of territories, and the limitations of the surveys must be made clear.

Where specially protected species are present that are likely to require additional, more targeted surveys, generally also during March-June (Gilbert, Gibbons and Evans 1998); it is unlikely that these can be adequately completed where Covid-19 related restrictions have limited access.

However, some targeted Schedule 1 and key species surveys can be of significant value outside the key territorial breeding season. Species such as hobby are far more evident when newly fledged young are present in August and tend to show site fidelity so breeding location can still be reasonably assumed. The presence of juvenile birds of other species can inform the species assemblage, though the ability of some juvenile species such as lapwing and wildfowl to disperse merit consideration in the appraisal.

Flightlines are likely to change through the breeding season as birds move around their environment or use different food resources. For example, mute swans may nest in one location but use other wetland areas once chicks have hatched, resulting in different flightlines. Hence loss of survey data in part of the breeding season will result in an incomplete understanding of potential vulnerability.

Wintering bird surveys and most waterfowl surveys are less likely to be affected as restrictions might have been lifted by the time they are required. The exception to this is spring migration counts, which are unlikely to be feasible.

The significance of any limitations will depend on the extent and quality of data able to be collected and on the potential ornithological sensitivity of the site. It is recommended, wherever possible, that the proposed approach is discussed and agreed with relevant stakeholders. This will be particularly important for sites likely to be of high ornithological importance.

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance (CIEEM, 2019 as amended). In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA.

Fortunately, there are good datasets for birds that can be used to support the development of the baseline. Although it is now somewhat out of date, the Bird Atlas 2007-11 (Balmer *et al.* 2013) provides a starting point for the establishment of likely presence of all species in both the breeding season and the winter. Where surveys have been affected and a precautionary assessment is required, the species identified for the relevant 10km square should be considered likely to be present if there is suitable habitat within the area being investigated. In some areas, there are more detailed county bird atlases that can be used to supplement the baseline if the data are of a similar age, or in place of it where the data are more recent. British Trust for Ornithology's (BTO) BirdTrack, Breeding Bird Survey or other surveys and schemes may provide more detailed information.

Wetland Bird Surveys (WeBS) data are available for long periods for most larger wetlands and some quite small wetlands. Where these are available, they provide a valuable dataset for assessing the likely effects of a development. However, they are unlikely to provide sufficient information on distribution within a larger wetland area to enable the full impact to be determined. Again, a precautionary approach would be required where this is the only information available.

For both breeding and wintering birds, other valuable information is likely to be available through local environmental records centres and bird groups.

Although there may be some anecdotal information on bird flightlines available from local birdwatchers, this is unlikely to be of sufficient quality to reliably determine the potential effects. Hence a very precautionary approach will need to be taken.

Ultimately, if the assessment is considered to be substantially compromised by the lack of access for surveys, consideration should be given to extending the project timeline to enable surveys to be fully undertaken after restrictions have been raised.

Mitigation

Where project timings allow, for projects likely to affect important bird species, consideration should be given to carrying out pre-construction bird surveys (i.e. post planning-consent). In such cases a

mechanism should be included for adapting mitigation and compensation proposals, if appropriate to do so in light of survey results.

Where adaptive mitigation is not practicable, a precautionary assessment is likely to lead to a precautionary approach to mitigation. This will likely entail additional expenditure. In particular, a precautionary approach is required where it has not been possible to rule out the likely presence of specially protected species, i.e. those listed on Annex 1 of the Birds Directive or Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). This will involve consideration as to whether the presence of more widespread specially protected species such as barn owl, red kite, hobby and kingfisher, can safely be eliminated. For example, a precautionary approach to site development would require construction to be programmed as if specially protected species are present and all special measures must be taken to ensure compliance with the legislation.

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Wetland Bird Survey (WeBS). <https://www.bto.org/our-science/projects/wetland-bird-survey/data>

APPENDIX 4 – BATS

The following provides a way forward where a full suite of surveys has not been possible in 2020. It is not a replacement for current good practice guidance on methods where surveys are possible and relies on ‘reasonable worst-case scenarios’ (for example, in terms of species, numbers, or roost types) that may result in more mitigation than would strictly be necessary. Should this become apparent through later surveys, such additional mitigation would effectively be enhancement and contribute to biodiversity net gain.

Restrictions on surveys could affect:

- Planning decisions
- EPS licence applications
- Site works where these are dependent on pre-construction surveys in the preceding season

Summary of Commonly Used Survey Methods

Planning and Licensing

The Bat Survey Guidelines (Collins, 2016) set out the surveys required to submit an adequate assessment of impacts on bats, in order that information that is material to a planning decision is taken into account. Methods include:

- Desk study
- Preliminary ecological appraisal
- Preliminary roost assessment, structures
- Emergence/re-entry surveys
- Preliminary ground-level tree-roost assessment
- Potential tree roost inspections
- Transects and static activity surveys
- Hibernation surveys – structures (inspections or static detector)
- Swarming surveys
- Back-tracking surveys
- Trapping, radio tagging and tracking surveys

A number of these surveys could be undertaken under guidelines for social distancing and depending on country-specific restrictions, but may be ruled out because of the need for overnight accommodation or landowner concern. Where surveying requirements cannot be met, then it is important to document the reasons and explain this to the planning/licensing authority (as is the case for any deviations from published guidance).

Pre-Construction Surveys

These tend to comprise direct inspections or emergence/re-entry surveys of structures, buildings or trees. Occasionally static detector surveys are employed within structures, especially those that are difficult to access, or likely to be used only intermittently.

Suggested Adaptations to Methods

Desk Study

A wide range of sources should be used to provide geographic context. These could include:

- State of UK's bats (JNCC and BCT, 2017)
- National Bat Monitoring Programme annual reports (BCT website)
- Bats of Britain, Europe and Northwest Africa (Dietz *et al.* 2009)
- Atlas of the Mammals of Great Britain and Northern Ireland (Crawley *et al.* 2020)
- Habitats Directive Article 17¹⁴ reporting
- Site designations
- National Biodiversity Network Atlas¹⁵; county bat atlases
- Local Environmental Records Centres (LERCs)
- EPS licensing data (available in England on DEFRA's MAGIC website)
- Review of planning portal for adjacent developments
- Local stakeholders and bat group(s)

From the site itself:

- Aerial photographs and Google Earth (from different years/seasons where available)
- OS mapping for land parcels, boundaries and topography
- Photographs from other members of the client's team (or the estate/land agent)

Preliminary Ecological Appraisal; Preliminary Roost Assessment; Emergence/Re-Entry Surveys

Initial assessment based on a comprehensive desk study is unlikely to identify all suitable roost sites but could highlight those structures of higher value (those representing the greatest constraints), the potential extent of any tree roost resource, and landscape-scale connectivity.

For restricted sites, surveys are unlikely to be ruled out for the entirety of 2020; it may therefore be possible to undertake some level of assessment at some point in the year (or early 2021), following the lifting of restrictions. This may not be in time to undertake emergence/re-entry surveys for maternity roosts (before the end of August, ideally earlier), but inspections of roof voids to look for signs of previous occupation (applicable only to some species) should be possible with appropriate measures taken to reduce risks of transmission.

Tree Surveys (All Types)

There are three reasons for assessing trees:

- to inform the impact assessment
- to inform the licence - has to be based on confirmed roosts

¹⁴ <http://jncc.defra.gov.uk/page-6387>

¹⁵ Note: most of the data on the Atlas are published under a CC-BY-NC licence which is for **non-commercial use only**. Licence conditions apply to commercial and non-commercial use: <https://docs.nbnatlas.org/guidance-on-the-definition-of-non-commercial-use/>.

- to ensure bats are not injured or killed during felling

Collins (2016) notes:

“Due to the limitations [of bat surveys of tree roosts] and from what is known about the ecology of tree-roosting bats, it is arguable that all trees with bat roosting potential should be considered part of a resource that will be used at one time or another by tree-roosting bats in order to determine the extent of impacts. Survey work on individual trees may confirm presence but is unlikely to conclusively confirm absence. Precautionary measures are likely to still be essential during works even where surveys have not identified occupancy.”

...and also:

“Where there are large numbers of trees, the efficiency and efficacy of PRF inspection and other techniques should be evaluated and alternative methods considered. In situations where there are a lot of trees to survey, such as in woodland, it may be more effective to consider advanced licence bat survey techniques such as trapping and radio tracking to locate tree roosts.”

In the absence of land access, the desk-study should identify the extent of the tree resource and connectivity within the landscape. The species likely to be using that resource will need to be predicted, based on national/regional distributions, informed by local knowledge for presence, and assumed presence of other species on a precautionary basis. Ground-level roost assessments (GLTAs), to identify the scale of impact in terms of tree quality not just area, should be undertaken once restrictions lift.

GLTAs alone would not be sufficient for an EPS licence application so additional surveys would be required. If aerial inspections are not possible or not appropriate, a combination of static surveys and possibly trapping (as noted above) may be required to confirm species presence, dependent on the quality of the resource, extent of impact and geography. This may not identify individual roosts, but will identify the species, potentially give an indication of roost type and inform the extent of the roost resource those species are able to use.

Pre-Construction Surveys

If the works requiring pre-construction surveys are proceeding (i.e. can be undertaken safely), then it should also be possible to undertake some level of pre-construction survey/inspection. For example, climbing inspections of trees would take place once felling activities are able to resume.

Activity Surveys (Transects, Automated Static Detector Surveys, Back-Tracking)

Surveys are unlikely to be ruled out, on any sites, for the whole of 2020 ; it should therefore be possible to undertake some level of assessment in at least some months of the year. Statics may become permissible before transect surveys are feasible, so the intensity and duration of static monitoring (units and duration) could be increased in such circumstances. Larger data sets are likely to require the use of auto-identification software. Guidelines¹⁶ for selection and use are available. The best use possible should be made of static data (which may mean more statistical analysis than normally employed).

¹⁶

https://cdn.bats.org.uk/pdf/AutomaticID_Recommendations_Version_date_210416.pdf?mtime=20181109121746&focal=none

Trapping, Radio Tagging and Tracking Surveys

Trapping and tagging bats would be difficult (but not impossible) to achieve whilst maintaining social distancing. However, such activities are not in keeping with recently issued IUCN advice to suspend fieldwork that includes capture and handling bats (see below). Any decision to continue with activities that require capture and handling would therefore require robust justification of the need to proceed.

Hibernation Surveys (All Types); Swarming Surveys

The next hibernation season does not start until November/December 2020 (swarming from Aug onwards), and it is difficult to imagine that survey restrictions would not be lifted by that point. Most objectives could be met using static detectors, even if some social distancing needs to be observed.

Key Survey Limitations

Given the desire of construction activities to continue, and that most field work provides a lower risk of Covid-19 transmission, it is unlikely that surveys will be restricted for the whole of the survey season. However, the months of May, June and July are key to determining the presence of maternity colonies and the resources on which they depend.

The effectiveness of mitigation, particularly for buildings (including domestic applications) may be reduced if roosting location(s) and access points are assumed and not confirmed. The relevance of this risk will need to be assessed on a case-by-case basis.

Key Considerations for Results Interpretation

Planning Decisions

Crevice-dwelling species in structures, potentially maternity roosts but particularly smaller roosts, are likely to be missed through daytime inspections alone (Froidevaux 2020), or where emergence surveys are undertaken outside of the breeding season.

Ground-level roost assessments give an idea of the scale of the impact in terms of potential tree roost quality, but are unlikely to provide sufficient information on species presence or the specific roost types that will be affected. If sufficient additional surveys have not been undertaken to ascertain this, then a precautionary assemblage of species and roost types will need to be assumed for impact assessment and mitigation design.

In more complex scenarios, for example, in areas where Annex II species or grey long-eared bats may be present and could be significantly affected, or where the impacts can't be adequately predicted or compensated using a reasonable worst-case scenario approach, planning decisions may need to be delayed.

Licensing Decisions

It is currently not possible to apply for a precautionary licence on the basis that a species *may* be present. Should planning consent be given on assumed presence and a detailed Method Statement employed¹⁷, and then it becomes apparent that a licence is required, works would need to stop until a licence is granted. If there are significant gaps in survey effort prior to this point (because of Covid-19 restrictions and the seasonal constraints), there is a risk of expensive delays to programmes.

If there is reason to strongly suspect the presence of a species, but this cannot be confirmed because surveys are restricted, then the licensing authority may consider there to be sufficient confidence to issue a licence (especially if older or nearby records support this conclusion). This will need to be judged on a case-by-case basis, and applicants should contact the relevant licensing authority for advice.

Where a licence is required from the outset, SNCBs may be able to consider relaxing constraints on the age of data, and/or accept less data than would normally be supplied, again on a case-by-case risk-based approach, potentially in conjunction with an assessment of consultant competence. The presumption against precautionary mitigation may need to be reviewed on a case-by-case basis. In England, reference could be made to Licensing Policy 4 which allows, in certain circumstances, for worst case scenario compensation to be proposed. Advice should be sought from the relevant licensing authority, where appropriate.

IUCN SSC Bat Specialist Group

The IUCN SSC Bat Specialist Group¹⁸ has posted a notice (12 April 2020) recommending suspension of field activities for the protection of bats:

“Transmission of SARS-CoV-2 from humans to animals has been documented. If human-bat transmission is possible, the impact on bat populations and conservation will depend on the consequences of SARS-CoV-2 for bat health and the potential for bat-to-bat transmission. The worst-case scenario considers SARS-CoV-2 circulating in bat populations with the potential to spillover to other wildlife and people. Studies to determine whether humans can spread SARS-CoV-2 to bats, bat morbidity, and transmission are ongoing. Until we have a clearer picture of the magnitude of these risks, the IUCN Bat Specialist Group recommends suspending all field work that involves direct interactions with bats. This includes capture and handling bats, as well as being in sustained proximity (< 3 m) at roost sites.”

This should be considered where relevant but is unlikely to apply to the majority of development-led situations as the need for direct handling of, or being in sustained proximity to, bats is relatively infrequent. Eurobats has recently (11.05.2020) issued a useful response to the IUCN advice (<https://www.eurobats.org/node/2602>). This situation must be kept under review, particularly for hibernation counts where sustained proximity is perhaps more likely, as it may be some time before transmission risks are understood. These precautions may therefore be in place for longer than general movement restrictions.

¹⁷ Refer to Method Statement Guidance in the final section of this document for circumstances where a Method Statement is appropriate.

¹⁸ <https://www.iucnbsg.org/>

BCT advice can be found online¹⁹.

References and Data Sources

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

Crawley, D., Coomber, F., Kubasiewicz, L., Harrower, C., Evans, P., Waggitt, J., Smith, B. and Matthews, F. (2020). *Atlas of the Mammals of Great Britain and Northern Ireland*. Mammal Society.

Dietz, C. von Helversen, O. and Nill, D. (2009). *Bats of Britain, Europe and North-west Africa*. A&C Black, London.

Froidevaux J.S.P., Boughey K.L., Hawkins C.L., Jones G. and Collins J. (2020). Evaluating survey methods for bat roost detection in ecological impact assessment. *Animal Conservation*. <https://doi.org/10.1111/acv.12574>

JNCC and BCT (2017). *The state of the UK's bats 2017: National Bat Monitoring Programme Population Trends*. Available at: <https://www.bats.org.uk/our-work/national-bat-monitoring-programme/reports/the-state-of-the-uks-bats>

¹⁹ <https://www.bats.org.uk/news/2020/04/bct-response-to-iucn-covid-19-recommendations-for-bat-field-workers>

APPENDIX 5 – DORMOUSE

In the light of Covid-19 restrictions, alternative dormouse survey methods may need to be considered by ecologists to enable them to plan and undertake work during spring and summer 2020. This guidance on such alternative approaches is not intended as a replacement for current good practice guidance. Consultants working on dormice in both England and Wales should note that different approaches may need to be adopted on otherwise similar sites if there are differences in government restrictions on movement as a result of Covid-19. In all cases, where departures from standard practice are necessary, these should be fully explained in reports, including an explanation of any limitations arising from use of alternative approaches, and an assessment of the consequences that may have on the interpretation of survey results.

Summary of Commonly Used Survey Methods

Current standard survey approaches are set out in standing advice from the English and Welsh governments. Bright *et al.* (2006) is also relevant, though modified in some respects by the more recent standing advice. Updated guidance (comprising a third edition of the Dormouse Conservation Handbook and a Dormouse Mitigation Handbook) is in preparation and may be published during 2020; if so the advice in this document will be reviewed to take account of any changes in standard practice.

Standard survey approaches comprise:

- Searches for characteristically-chewed hazelnuts (September to December)
- Nest tube surveys (April to November)
- Nest box surveys (used in parallel with nest tube surveys, April to November)

Although likely to be included in forthcoming guidance, use of footprint tunnels for dormice (Bullion *et al.* (2018) is not yet accepted as standard practice. However positive records of dormouse footprints in tunnels are acceptable as evidence of presence (in case of doubt, footprints could be verified by an experienced worker). It should be noted that none of these survey methods allow population estimates to be made; all simply allow presence or (for nest tubes only) likely absence to be determined.

Standard measures to avoid harm to dormice during vegetation clearance comprise:

- Visual searches for hibernation (November to April) or summer (May to October) nests;

In many cases it will be possible to undertake these surveys within the constraints imposed by government restrictions, but lack of land access (for part or all of the survey season), distance to the site, equipment shortages or the need for two ecologists to work together in close proximity may constrain the use of standard methods. Specific reasons for the constraints should be properly documented and evidenced where possible.

Suggested Adaptations to Methods

The suggested adaptations below have been informed by the disease risk assessment²⁰ undertaken for dormice by ZSL, which can be viewed on the PTES website. Although primarily intended to inform

²⁰ <https://ptes.org/wp-content/uploads/2020/05/SARS-CoV-2-DRA-for-dormice.docx>

voluntary dormouse surveys (i.e. National Dormouse Monitoring Programme checks), it includes useful guidance on minimising risk of disease transmission from humans to dormice. Although there is currently no evidence that dormice have been infected with Covid-19 by humans, it is known that other rodent species can be infected and so it is assumed on a precautionary basis that this could occur. Measures recommended for all dormouse field surveys, including where these are possible under existing standard guidance include:

- Hands should be washed or sterilised immediately prior to the survey.
- Facemasks should be worn during the survey.
- No more than two surveyors, who should maintain social distancing (unless surveyors are in the same household; see also ‘lone working adaptations’, below).
- Minimise or, if possible, avoid handling of dormice.
- If dormice are to be handled, disposable gloves should be worn and these should be cleaned with hand steriliser after each box of animals is checked.
- At the end of each survey, gloves, mask etc. should be disposed of. Hands should be cleaned and clothing changed as soon as possible.
- Avoid moving equipment between sites if possible. or ensure that equipment is thoroughly cleaned before use on a different site.

Use of Desk Study Data

Desk study data should be thoroughly reviewed to identify any data which could pertain to the status of dormice on a site. Data from local environmental records centres, EPS licensing data (available via DEFRA’s MAGIC website for sites in England) and survey reports for nearby developments on LPA planning portals should be reviewed, as should aerial photographs and OS mapping for the site and surroundings.

Dormouse populations tend to be associated with long-established habitat such as woodland and old hedgerow networks. When they are found in scrub or roadside planting areas, these are usually connected to long-established habitats from which dormice have colonised.

- Consequently, records of dormice up to five years old are likely to be a reasonably reliable indicator of continued presence of dormice on a site, unless there have been significant habitat changes in the intervening period.
- Records of dormice from habitat which is off-site but connected to habitat on site, or nearly so (i.e. not separated by gaps in vegetation larger than 20m or single carriageway roads) are also likely to be a reasonably reliable indicator of dormouse presence on the site.

Assessment of Potential Habitat Quality on Inaccessible Sites

If sites are inaccessible for scoping survey purposes, their potential suitability for dormice can be assessed remotely in the following ways:

- Use of aerial photos (including historic photos tool in Google Earth) can be useful in assessing habitat quality. Dormice are more likely to be present in species-rich habitats (or large scrub areas), so aerial photos can be used to gain an impression of whether woodlands have a diverse canopy layer and whether canopy trees are of uniform or varying ages. Bear in mind though that

dormice can occur in plantations on ancient woodland sites, particularly if broad-leaved shelterbelts are present.

- In hedgerow networks, dormice are more likely to be present if these are unmanaged or rarely managed, rather than regularly trimmed or flailed.
- Connectivity between habitat blocks can be assessed using website measuring tools.
- Where possible, these aerial photo observations should be ground-truthed from public roads or paths, using binoculars or (subject to appropriate regulations) drones.

Strategic Off-Site Surveys

- If access to a survey site is not possible, but access can be obtained to nearby (i.e. connected or nearly so, as above) suitable habitats, it may be possible to survey these off-site habitats using standard methods (modified by the disease risk assessment precautions summarised above) and infer the status of dormice on the development site from these off-site results. It is essential in this situation that the extent and nature of habitat connectivity between development site and survey site is communicated in the report.

Lone Working Adaptations

Most dormouse surveys can be undertaken by lone workers, provided appropriate PPE is worn (e.g. eye protection) and a suitable lone working protocol (e.g. buddy system) is in place. Installing nest boxes is difficult as a lone worker activity, due to the weight of the boxes and the need to hold them in place whilst fixing wire around the box and tree. However, a Velcro or similar strap can be useful to hold the box in place temporarily whilst fixing the wire.

On sites where no lone working is allowed, ecologists should travel to site in separate vehicles and if possible work in different areas (e.g. separate hedges) keeping in contact using phones or walkie-talkies. If they need to work in the same area, 'partitioning' the task should be considered to maintain social distancing; for example, one surveyor installs nest tubes while their colleague follows at a suitable distance recording tube number, tree species, aspect data etc.

For development (presence/likely absence) surveys, it is not essential to handle dormice. Checking of nest tubes and nest boxes can therefore usually be undertaken as a lone worker activity without affecting the survey results.

Alternative Methods

- If there are problems with obtaining survey equipment (nest tubes, nest boxes) it may be necessary to undertake more nut searches or use footprint tunnels in order to confirm presence (but this will not confirm absence).
- Alternatively, it may be possible to 'self-build' nest tubes using square section downpipe and plywood (potentially available as a delivery from builders' merchants). Any deviations from the standard nest tube size or design should be detailed in reports, and if there is any possibility that the effectiveness of nest tubes could be compromised it may be appropriate to increase confidence in survey results by using some nest boxes (as per standing advice) and/or footprint tunnels in addition to nest tubes in these cases.

Alternative Timings

- Although standing advice recommends a fairly short survey window for nut searches, it is often possible to find characteristically-chewed hazelnuts at other times of year, particularly on dry sites. It is more likely that equivocal hazelnuts will be found at other times of year, in which case it is recommended that these (or images of them) be shown to several experienced surveyors to obtain a consensus opinion on whether they were eaten by dormice.
- It is possible that restrictions on social distancing and/or access to some sites may be eased in time for some surveys to take place during the later summer and autumn 2020. If so, it may still be possible to deploy 100 nest tubes in August and September (but not more than 100 per site) following standard practice.

Key Survey Limitations

The effect of survey limitations, even with use of alternative methods described above, may be to:

- Reduce confidence in a presence/absence survey result (e.g. because it is inferred from off-site or older data).
- Reduce confidence in population estimates where presence has been confirmed, because these depend on a robust assessment of the habitat quality on site.

Survey limitations, and assumptions made to mitigate these, must be clearly detailed and explained in survey reports. Both of the above limitations have potential implications for licensing and mitigation of development impacts on dormice.

Key Considerations for Results Interpretation

Impact Assessment

Where there is reduced confidence in survey results or population estimates, the precautionary principle should be followed. Consequently, on some sites it may be appropriate to assume presence on a precautionary basis, or to assume a larger population is present than may have been estimated if habitat quality could be assessed more accurately. Where there is uncertainty over survey results, this must be detailed in survey reports.

Mitigation and Licensing

In situations where the risk of offences occurring is low, planning consent may be granted based on assumed (rather than confirmed or inferred from reliable data) presence and submission of a detailed Method Statement. This should aim to achieve the outcomes for dormice (in terms of minimising disturbance, avoiding harm, and ensuring no net loss of habitat) that would normally be achieved under a licence. If presence of dormice is confirmed whilst operating under a Method Statement, it will be necessary to stop works and obtain a licence, and the client should be made aware in advance of the potential for this to delay works. For dormice, the confirmation of presence and an estimate of population affected based on habitat quality should be sufficient information on which to submit a licence application, without the need for further surveys and associated delays

As mitigation licences are not normally granted on a precautionary basis, licences cannot be granted for development sites where the presence of dormice has been assumed, rather than confirmed or inferred from reliable data.

Where presence of dormice has been confirmed, but on limited evidence (e.g. older data or results inferred from off-site surveys), licensing bodies may be prepared to relax their criteria for survey data on a case-by-case basis in order to provide developers and their consultants with a way forward which reflects the presence of dormice on a site but also the limitations affecting surveys.

Most ecologist activities associated with site clearance (e.g. fingertip searches ahead of vegetation clearance) can be carried out whilst observing government guidance on social distancing. If it is necessary to move occupied dormouse nests under licence as a lone worker activity, additional care should be taken to prevent escapes (i.e. place the dormouse nest or nest box inside a plastic crate or similar while moving it, and take extra care that the bung blocking the box entrance does not fall out, potentially by securing it with a Velcro strap or re-useable cable tie around the body of the box).

References and Data Sources

Bright, P., Morris, P. and Mitchell-Jones, T. (2006). *The Dormouse Conservation Handbook (Second Edition)*. English Nature.

Bullion, S., Looser, A. and Langton, S. (2018). An evaluation of the effectiveness of footprint tracking tunnels for detecting hazel dormice. *In Practice – Bulletin of the Chartered Institute of Ecology and Environmental Management*, 101: 36-41.

Standing Advice for England: <https://www.gov.uk/guidance/hazel-or-common-dormice-surveys-and-mitigation-for-development-projects>

Standing Advice for Wales: <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/european-protected-species/dormouse/?lang=en>

APPENDIX 6 – WATER VOLE

In the light of Covid-19 restrictions a number of adaptations to ‘standard’ ecological survey methods can be considered by ecologists to enable them to plan and undertake work in line with government restrictions, industry and country Public Health Organisations’ recommendations during the Covid-19 outbreak. This guidance on such adaptations is not intended as a replacement for current good practice guidance. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

Water vole field surveys comprise a habitat assessment in parallel with a search for field signs. In most cases a count is made of the number of latrines as part of the search for field signs, to give an indication of relative population density. A desk study is also undertaken to provide contextual information, including known distribution of water voles in the wider landscape and the potential connectivity of suitable habitat to the survey site.

The survey season is variable across the UK, but in most cases is considered to be from mid-April to the end of September (with a shorter season in Scotland and in upland areas of England and Wales, and a longer season in south-east England).

Two survey visits are recommended as standard for the field survey element, one in the first half of the season (mid-April to end of June in most cases) and one in the second half of the survey season (July to September in most cases). Surveys in the first half of the season are particularly important for sites supporting watercourses or other wetland habitats that dry out over the course of the summer.

Surveys in the second half of the season are important in the majority of cases, as they will confirm the likely maximum distribution of water voles across a site (as population density will be at its highest) and may detect water vole presence even in cases where no signs were recorded in the early part of the season, where colonies are located outside of the site boundaries (and expand into parts of the site in the latter half of the season).

In some cases, it is possible to gain sufficient information from a single survey visit. However, this will need to be justified on the basis of site-specific circumstances, with consideration of the benefits of surveying in different parts of the season, as summarised above. See also Box 2 in the Water Vole Mitigation Handbook.

Note that there is no particular benefit of increasing the level of survey effort in one half of the survey season.

Suggested Adaptations to Methods

In the first instance consideration should be given to the options for delaying, or avoiding the need for, a water vole survey visit.

Where a field survey visit is proposed in spring/early-summer 2020 as a second survey visit, with the first survey visit having been undertaken in the second half of the 2019 season, the need for the survey visit should be reviewed based on the factors described above. Can an assessment based on a single survey visit be justified?

Where a survey is proposed in spring/early-summer 2020 as a first survey visit, this could be delayed until late May or June, by which time the restrictions relating to Covid-19 may have been relaxed.

Should the restrictions relating to Covid-19 still be in place in late-May/June 2020, and a visit in the first half of the season is considered appropriate, it may be feasible to undertake field surveys despite the restrictions. Many companies or organisations will require surveys to be undertaken by a team of two staff members for health and safety reasons. Where this is the case, each company or organisation will need to consider whether they can undertake water vole surveys safely whilst still staying within the prevailing government guidance relating to Covid-19. This is likely to need to be considered on a case-by-case basis.

It may be possible, for example in the case of very shallow watercourses with shallow sloping sides, for a surveyor to undertake a survey following the approach set out in the Water Vole Mitigation Handbook, with virtually no likelihood of needing to be 'rescued' by the second member of staff, who is therefore able to remain more than 2m away at all times.

In other cases, the likelihood of a surveyor needing assistance will be much higher, for example in the case of deep watercourses, or where watercourses have steep, high banks. In such cases it may not be considered feasible to undertake a water vole survey and stay within government guidelines on social distancing.

There are likely to be some cases which fall between the two extreme examples above. In these cases it may be possible for a surveyor to adapt their approach to reduce the likelihood that they will require assistance, by only surveying parts of a watercourse or wetland habitat where there is virtually no likelihood of needing to be 'rescued'. The extent to which this limits their ability to survey the habitat, and the likely influence on their survey results, would need to be fully described.

In scenarios where a field survey visit in the first half of the season is not considered possible, or where one is undertaken but there are significant limitations on the information collected, a visit in the second half of the season will be particularly important. It may be feasible to gather sufficient information during the survey visit in the second half of the season, based on the factors described above. Survey visits in the second half of the season at sites where a survey visit with limitations was undertaken in the first half of the season should be undertaken by the same surveyor, to ensure that the limitations of the information collected during the first half of the season are fully understood.

Key Survey Limitations

Water vole surveys based on a single visit may not identify the full extent of the distribution of the species within a site (although there are circumstances where a single visit will be sufficient, as described above).

Water vole surveys where a metre-by-metre search of suitable habitat could not be undertaken for health and safety reasons may not have identified all field signs of water voles present. The extent to

which this is a limitation in the context of a particular survey will vary between sites and will need to be determined by the surveyor.

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance (CIEEM, 2019 as amended). In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA.

Nevertheless, it is considered likely that, in most cases, a sufficient level of field survey effort will be possible for water voles, unless the restrictions relating to Covid-19 persist until after September 2020.

Mitigation and Licensing

Precautionary mitigation, due to restrictions on water vole surveys as a result of Covid-19, is only likely to be necessary in a very small number of cases. Where this is proposed, a survey should be undertaken as soon as possible to confirm any assumptions made.

In England, for small-scale works (less than 50m of watercourse) it may be appropriate to propose a precautionary approach and then, if evidence of water vole is found, use the Natural England Class Licence (CL31 or CL24) to displace water voles, provided that the relevant conditions can be met.

In other parts of the UK, or for larger scale operations, it would be necessary to discuss and agree with the relevant SNCB as to whether sufficient information has been gathered to inform a licence application.

References and Data Sources

Dean, M., Strachan, R. Gow, D and Andrews, R. (2016). *The Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series)*. Eds. Fiona Mathews and Paul Chanin. Mammal Society, London.

England Government Standing Advice. <https://www.gov.uk/guidance/water-voles-protection-surveys-and-licences>

APPENDIX 7 – BADGER

In the light of Covid-19 restrictions a number of adaptations to ‘standard’ ecological survey methods can be considered by ecologists to enable them to plan and undertake work in line with government restrictions, industry and country Public Health Organisation recommendations. This guidance on such adaptations is not intended as a replacement for current good practice guidance. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

Survey method	Survey timing and brief method	Survey effort (no. of visits)
Walkover survey to identify habitat suitability	Daytime field visit at any time of year; spring or autumn best for observing signs of activity	1
Recording activity signs	Daytime field visit at any time of year; spring or autumn best for observing signs of activity	Several visits
Recording sett data and classifying setts	Monitoring of sett entrances over 4 – 6 weeks; spring or autumn best	Several visits over 4-6 week period
Bait marking	Optimum time is early spring	Numerous visits over 2-3 week period

Suggested Adaptations to Methods

Site surveys should be possible with careful planning. In order to minimise time on site, use desk study data thoroughly so that site survey time can be focused on most likely areas of sett location and badger activity:

- Use google maps and other aerial images to look for setts and paths, view the site at previous points in time and look at historical photos that might reveal setts due to seasonality or different land use or land cover.
- Undertake more intensive interrogation of LERC data, badger road-kill data, badger group records on nearby/similar areas and wildlife hospital records to provide background on badger presence and abundance.

Alternative Methods to Assist with Classifying Setts

- To confirm sett status – if regular visits to site cannot be undertaken safely, increase use of cameras and use desk study and initial site survey data to classify setts on a precautionary basis.
- Use next optimum survey window (i.e. next autumn or next spring) to fill survey gaps

Alternatives to Territory Mapping by Bait-Marking

- Use Nearest Neighbour distance to estimate likely spacing between main setts (see explanation in Harris. Assume boundary will be approximately mid-way between main setts. NB under normal circumstances this is a useful technique to see if any main setts have been ‘missed’
- Use mean main sett density for the Land Class or main habitat type to estimate number of social groups present within an area of interest.
 - For England and Wales - determine what Land Class your site belongs to using the Institute of Terrestrial Ecology website and use density estimates from Judge to estimate the number of social groups likely to be present in your area of interest.
 - For Scotland determine which habitat type your site belongs to and use the information on main sett density containing Rainey to estimate the number of social groups likely to be present in your area of interest.
 - For Northern Ireland the Land Class system is described in Murray but is not available on Open Access data. The most recent estimates of badger densities associated with these Land Classes are given in Reid.
 - For Republic of Ireland the most recent estimates are by Byrne *et al.*, but the information is not available on open access.
- To confirm sett status - monthly monitoring of sett to record activity levels over a four to six month (or longer period). If levels of activity are sustained and pathways remain clear assume main sett – if activity levels turn out to vary with season, assume subsidiary.
- Use next optimum survey window (i.e. autumn (late August to early October) or spring (February to April)) to carry out standard bait-marking survey.

Key Survey Limitations

If alternative survey approaches need to be employed, there are a number of possible limitations:

- Sett status and activity determined on incomplete survey data
- Territory size and boundaries determined on desk study only or on incomplete survey data
- Survey not undertaken at optimum time of year
- Unable to determine whether the badger social groups within the study area are likely to form a critical part of the county or even of the district population
- Unable to identify optimum location for artificial badger sett
- Unable to accurately assess extent of fencing required

The significance of these limitations will depend on the extent of the alternative approach, the type of development and the characteristics of badger populations in the area in question. The interpretation of results will take these limitations into account, as described below.

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance (CIEEM, 2019 as amended). In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be fully explained and acknowledged in the EclA.

Mitigation and Licensing

- Assume main sett unless there are obvious periods of disuse to suggest it is seasonal.
- Assume any sett, if directly affected, needs a receptor sett, and if there are no natural setts within 100m, provision of an alternative (artificial) sett is required.
- Provision of an artificial sett may still be required for loss of a main sett even if natural setts are present within 100m.
- Site artificial setts within 50m if possible and certainly within 100m, ensuring that there are no barriers between them and there are clear habitat links between the affected setts and the artificial sett (hedges etc.).

Clearly explain limitations and assumptions to the client and in any associated reporting.

If a Precautionary Method of Working is being used based on incomplete data and where precautionary mitigation is proposed, the method statement within the PMW must specify that works that cause an offence should stop immediately. The client must be made aware of the increased risk of this happening due to incomplete survey data. Any structure/place that is displaying signs indicating current use by badgers is protected under the legislation. This will need to be ascertained (and a licence issued where signs are present) before works to damage, destroy, obstruct access to or disturb (badgers occupying) that sett commence.

References and Data Sources

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Scotland Government Standing Advice. <https://www.nature.scot/sites/default/files/2019-10/Species%20Planning%20Advice%20-%20badger.pdf>;

Wales Government Standing Advice. <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/uk-protected-species/badgers/?lang=en>

APPENDIX 8 – FRESHWATER PEARL MUSSEL

In the light of Covid-19 restrictions, standard freshwater pearl mussel survey methods may need to be adapted by ecologists to enable them to plan and undertake work safely during spring, summer and autumn 2020. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance note provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

This section includes a brief summary of commonly used methods for development projects. As all pearl mussel surveys require working in and around water at least two surveyors are required for health and safety purposes at all times. This aspect of pearl mussel surveying brings with it specific requirements and careful planning for 2m social distancing between surveyors.

All freshwater pearl mussel surveys require licensing, due to the legal protection afforded to pearl mussels through the UK, which should be applied for well in advance of any planned survey works from the appropriate national licencing authority.

Guidance on freshwater pearl mussel surveys can be found in Young *et al.* 2003 and the British Standard BS EN 16859:2017. It is important to note that standard methods for the country in the UK in which the survey is carried out should be used and will need to be modified depending on the questions being addressed.

Survey method	Survey timing and brief description of method	Survey effort (no. of visits)
Desk study	<p>All UK rivers with known pearl mussel populations have been systematically surveyed for pearl mussels under licence in recent years, so much information (which is confidential due to the wildlife crime threat posed by illegal pearl fishing) is available for legitimate purposes from statutory nature conservation agencies.</p> <p>For example, all known Scottish rivers containing pearl mussel populations were systematically surveyed in 1997-1998 (Cosgrove <i>et al.</i> 2000) and in 2013-2015 (Watt <i>et al.</i> 2015). Nevertheless, many watercourses have not been surveyed for pearl mussels and it is not safe to assume no historical records = no pearl mussels. By</p>	N/A

	<p>way of example, starting in 2013, Forest Enterprise Scotland, now Forestry and Land Scotland, conducted a series of targeted pearl mussel surveys of unsurveyed watercourses on its landholdings in North Highland Forest District. During these surveys approximately one ‘new to science’ pearl mussel population was discovered in every 10 watercourses surveyed (Cosgrove <i>et al.</i> 2017).</p> <p>Pearl mussel rivers vary considerable in size e.g. ca. 2m-70m wide in Scotland, where >90% of the extant UK populations occur (Cosgrove <i>et al.</i> 2016) and so small size alone cannot be used to scope out a previously unsurveyed watercourse for survey.</p> <p>Furthermore, riverbed habitat in several former pearl mussel rivers has become predominantly unstable and unsuitable due to a number of impacts, some which are associated with climate change. All known extant pearl mussel populations in Scotland now occur in watercourses that flow from headwater lochs/lochans, which ameliorate extremes of flow. Consequently, a reasonable case could be made to scope out surveys of small watercourses that do not flow from headwater lochs/lochans.</p>	
<p>Shallow-water point source development survey</p>	<p>Typically April-October. For a localised, point source development proposal, e.g. a new bridge or pipe crossing at a specific location, the watercourse development area directly affected + 500m downstream and 100m upstream is typically surveyed. However, if the proposed development could impact on water quantity over the wider catchment (e.g. hydro-scheme, water catchment transfer) or water quality (e.g. a new effluent discharge) then much larger areas/reaches may need to be surveyed. The relevant UK regulator may advise on this.</p>	<p>One survey visit for pre-construction surveys. Follow-up visits may be required for ECoW work, or post construction monitoring.</p>
<p>Shallow-water catchment wide presence or absence survey</p>	<p>Typically April-October. For surveys to determine pearl mussel presence or absence in a catchment or upper and lower distributional limits, then a sample-based survey is usually</p>	<p>One survey visit typically,</p>

	undertaken in the lower, middle and upper reaches of a catchment.	but can be more.
Deep-water development survey	Any time turbidity allows. Boat-based surveys using underwater Spyball cameras, and snorkelling/SCUBA diving.	One survey visit typically, but can be more.

Given the one-off nature of most pearl mussel development surveys, many surveys can typically be delayed until later in the survey season (when some Covid-19 restrictions may be eased). The recommended April-October pearl mussel survey season is defined over these months for two main reasons: (i) water levels and turbidity is usually more conducive to surveying (especially on larger rivers) during these months than late autumn/winter, and (ii) water temperatures are warmer during these months than late autumn/winter and so this makes survey work safer (in case a surveyor falls in/gets wet) and also more pleasant (pearl mussel population profiles are usually provided and that requires pearl mussels to be handled and measured). However, small, shallow streams can often be surveyed outwith this period if water levels and turbidity allow.

Recently, e-DNA from water samples has been trialled in remote areas of Scandinavia as a rapid assessment methodology for determining presence or absence of pearl mussels in watercourses. It is not 100% reliable and is not currently a recognised standard survey method in the UK.

Suggested Adaptations to Methods

Shallow-Water Surveys

Typically, surveyors work closely together and often alongside each other in the water, especially when searching for pearl mussels within a defined development area. It is possible to adapt this methodology in the following ways:

- Surveyors do not work side by side and instead take it in turns to survey an area, i.e. one sits on the bank recording details, whilst the other surveys in the water. This is most suitable for working in narrow water courses where instream 2m social distancing is not feasible.
- Surveyors do not work side by side, but instead work separately with one surveyor in front and the other several meters behind and to one side, maintaining 2m social distancing and ensuring that the distance between surveyors is such that no turbidity from the upstream surveyor impacts upon the downstream surveyor. As Covid-19 is known to be transported in water,

working in the flow downstream of another surveyor increases the risk of possible transmission and so should be avoided. This method is most suitable for wider watercourses where social distancing is possible.

- Mark out the defined instream point source development area with bright white painted stones on the riverbed to create a grid or lane system and surveyors only work within their designated grid or lane, allowing for 2m social distancing whilst in the water. Carefully remove the painted stones afterwards.

Deep-Water Surveys

- It is very difficult for 2 surveyors and a coxswain to remain 2m apart in 6-8m boat, even when anchored. Furthermore, the Spyball camera is usually passed along the length of the boat from person to person, which makes 2m social distancing next to impossible to implement for boat-based deep-water surveys.
- Experienced freshwater pearl mussel trained SCUBA divers usually operate in sizeable teams from a nearby safety vehicle. This poses substantial challenges for 2m social distancing and Covid-19 compliant working procedures. Given the current difficulty with social distancing during SCUBA surveys, deep-water surveys should be postponed until Covid-19 rules are eased. Otherwise there is the risk of not only increasing potential transmission, but also causing public concern/negative publicity.

Given the threat posed by illegal pearl fishing (e.g. Cosgrove *et al.* 2012), many people living in and around pearl mussel watercourses provide 'eyes on the water' and readily report suspicious activity immediately to the police. There is little way for a member of the public to differentiate between an illegal pearl fisher in a river and a licensed pearl mussel surveyor legitimately in a river, so surveyors are recommended to undertake the following actions:

1. Phone 101, the non-emergency police number, on the day before surveying. Provide them with your name, mobile phone number, address, purpose of work (explaining you have a licence), location, duration of survey work and vehicle registration number(s). The police will then have details on file and should not need to be called out unnecessarily to check on legitimate survey work.
2. If issues arise with contacting the 101 non-emergency number (given the current pressure it has been under recently), it may be possible to contact the local police station directly in order to inform the local police of the intended work.

3. Leave a copy of your freshwater pearl mussel survey licence on your vehicle dashboard, along with a mobile phone number and your name so that a member of the public can understand what your survey team is doing in a river. This is likely to reduce unnecessary phone calls to the police reporting suspected wildlife crime.

Key Survey Limitations

Most carefully planned pearl mussel survey work provides a very low risk of Covid-19 transmission (deep-water surveys notwithstanding) and it is unlikely that surveys will be restricted for the whole of the survey season. With only one survey visit usually required, pearl mussel surveys may be able to be delayed until later in the survey season (when some Covid-19 restrictions may be eased). Thus, managing client expectations regarding survey timing may be necessary.

Many pearl mussel watercourses are in relatively remote areas and usually require overnight stays in remote locations. Careful planning, including considering guidance on overnight stays away from home, needs to be made. Additionally, 'normal' Mountain Rescue service has not resumed and surveyors should think and plan carefully how they would react to an emergency situation in a remote location and not rely on Mountain Rescue to respond.

Key Considerations for Results Interpretation

Given that most pearl mussel survey work should be able to be conducted with a low risk of Covid-19 transmission, results are unlikely to be adversely affected (deep-water surveys notwithstanding).

Impact Assessment and Mitigation

If pearl mussel surveys are unable to be undertaken (for whatever reason) and the watercourse is known to (historically) hold pearl mussels, then their presence in the proposed instream development area should be assumed. It is possible for certain types of development e.g. an unavoidable stream crossing for a wind farm track, to use bridge designs that span from bank to bank and require no instream works. Other best practice actions, such as blocking artificial drainage ditches from proposed development areas adjacent to pearl mussel watercourses, can be important inbuilt project mitigation to reduce/avoid runoff (e.g. Cosgrove *et al.* 2017), but will need to be looked at on a site by site basis.

The Precautionary Principle is well-established in EclA guidance. In cases of reasonable doubt, where it is not possible to survey and robustly justify a conclusion of no likely significant effect, a likely significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA.

Given the on-going threats from illegal pearl fishing, especially during Covid-19, the location of any freshwater pearl mussels within the proposed work area should remain confidential in project materials. If pearl mussel presence needs to appear in project public materials (having first questioned this assumption), consider using ambiguous terms such as ‘Sensitive or Legally Protected Ecological Receptor’ instead. In planning submissions, pearl mussel information should be provided in a confidential appendix or annex.

References and Data Sources

BSI Standards (2017). Water quality – Guidance standard on monitoring freshwater pearl mussel (*Margaritifera margaritifera*) populations and their environment. BS EN 16859:2017.

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APPENDIX 9 – TERRESTRIAL INVERTEBRATES

In the light of Covid-19 restrictions, standard terrestrial invertebrate survey methods may need to be adapted by ecologists to enable them to plan and undertake work June 2020 onwards. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated. This guidance note provides examples of adaptations that may need to be considered.

Summary of Commonly Used Survey Methods

There is currently no standard guidance available that informs whether terrestrial invertebrate surveys are required, or the extent to what should be undertaken. However, there are some general principles that most experienced ecologists/ entomologists follow that are broadly consistent.

As a rule of thumb, the presence of priority habitats (Habitats of Principal Importance), mosaics of higher value habitat within or adjacent to the study site, presence of veteran trees (including within-field standards, boundary features or within woodlands), a site's nature conservation designation (non-statutory and/ or statutory), connectivity to the ecological landscape and baseline data collected either as part of a desk study or Preliminary Ecological Appraisal should all form an evidence base to determine whether terrestrial invertebrate surveys should be commissioned. A not unreasonable rule of thumb is that if a site is designated as a non-statutory site (or potentially meets the threshold for designation), then terrestrial invertebrate survey could reasonably be considered appropriate to inform an Ecological Impact Assessment (EclA).

Relevant documents that can aid decisions include Buglife (2019), Drake *et al.*, (2007), Kirby (2001) and Scottish Natural Heritage (2019). If terrestrial invertebrate surveys have been commissioned, a typical approach, excluding scoping and bespoke species surveys, may include three or four visits between late April and September, separated by approximately four weeks/a month. Examples of milestones periods within a season where surveys might be timed to coincide with peaks in invertebrate species-richness could include early to mid-spring flowering willows and sallows (*Salix* spp.) and blackthorn (*Prunus spinosa*); late spring and early summer flowering flora such as hawthorn (*Crataegus monogyna*); mid-summer meadows in flower (e.g. abundance of umbellifers); and a late summer visit to coincide with bramble (*Rubus fruticosus* agg.) and ivy (*Hedera helix*) in flower. For some sites, an autumn visit (September and/or October) may be appropriate where, for example, veteran trees or mature woodlands with a diversity of wood decay are present and due to proliferation of fungal fruiting bodies, to record Diptera such as fungus-gnats. This is a general guide only and all surveys should be designed to collect the data required for the project.

Species-specific survey methods exist for a range of taxa or guilds. For example, some butterflies such as hairstreaks can be easier to survey in winter through targeted egg-searches; and wood decay invertebrates through aerial flight interception traps. Advice should be obtained from specialists as to how to adapt these approaches, if necessary.

As most terrestrial invertebrates are only reliably identifiable during their adult phase, many taxa can have restricted phenology that may last only a few weeks to a couple of months. Butterflies, moths, dragonflies and damselflies are well known, but this also applies to other taxa, including flies, beetles (Coleoptera), spiders (Arachnida) and bugs (Hemiptera). Spring and early summer faunas (i.e. those adult between April and June inclusive) have (or have had) high potential to be (or have been) affected by restrictions relating to Covid-19.

Suggested Adaptations to Methods

For all the survey methods, the quality of baseline terrestrial invertebrate data is highly dependent on the skills and experience of the surveyor, number of survey visits and spread through the season. Where it is impossible to carry out some of the visits that would normally be undertaken due to access constraints, the value of the datasets will be affected. However, if access restrictions are lifted before the end of the survey season, some useable data may be obtained. There may be some benefit in increasing the frequency of survey visits during the remaining time period, for example, to increase the sampling of invertebrate assemblages which could yield more Key Species (species with a nature conservation status). However, increasing the frequency of visits in this way will not fully compensate for visits that were missed earlier in the season, even if only a small part of the required season is missed, as spring and early summer faunas that are univoltine (single adult phase) will not be recordable. In all cases, where survey effort has been curtailed, a precautionary approach to assessing the data must be taken. Where surveys are restricted, a range of alternative approaches may be considered, *but* given invertebrate species-richness is substantially greater than all other fauna, it remains the case that surveys covering the missed period may well have to be undertaken in 2021 (but see narrative below and under ‘Habitat-based Assessments’ and ‘Split Survey Season’ headings).

Alternative approaches that might be able to reduce the likelihood of follow-up surveys in 2021 could include:

- Reference to Natural England’s Invertebrate Site Register and Welsh Invertebrate Database. Consultation with Scottish Natural Heritage; Department of Agriculture, Environment and Rural Affairs (Northern Ireland); and National Biodiversity Data Centre (Republic of Ireland), and National Parks and Wildlife Service (Republic of Ireland) is recommended to establish what bespoke invertebrate datasets (if any) are held by them. This could provide an indication of important nearby sites though the data may date back to the 1980s and 1990s. Consideration would have to be given to any subsequent changes in habitat and whether this data remains relevant.
- Liaison with county natural history societies’ invertebrate recorders.
- Habitat-based assessment (see ‘Habitat-Based Assessment’ heading).

Desk Studies

Existing information may be available to help identify important terrestrial invertebrate species that could be present at a site. The NBN Atlas is a potential source of data providing the relevant datasets’

licence permits commercial use (see NBN Terms and Conditions). However, invertebrate datasets can be inconsistent in terms of their accuracy and users should cross-reference these records with peer-reviewed information such as published atlases or have the data reviewed by an experienced entomologist.

Other potential sources of relevant information are listed below, though note that those marked with * are generally run in an honorary capacity and may not be able to release data for commercial purposes.

- Local Environmental Records Centre (LERC) searches with specific requests for any known terrestrial invertebrate survey reports undertaken by local amateur naturalists, natural history societies or previous surveys supporting planning applications. Environmental Information Regulation/Freedom of Information Requests may also be an avenue worth exploring for relevant bodies/organisations;
- County or national terrestrial invertebrate atlases.
- *National recording schemes (see <https://www.brc.ac.uk/recording-schemes>).
- *County terrestrial invertebrate recorders.
- *Larger NGOs such as Buglife, Butterfly Conservation, and the British Dragonfly Society (who employ staff). Smaller NGOs are run by volunteers in an honorary capacity. It may only be appropriate to contact these organisations if the study site is considered to be of particularly high value.

A degree of caution needs to be applied when reviewing LERCs' invertebrate datasets as they are generally dominated by readily identifiable groups such as butterflies, dragonflies and damselflies. Other taxa such as flies, beetles, spiders etc., which require more specialist literature to identify, are typically less well represented, and further, the validity of the records are less likely to have been checked by a competent ecologist with specialist knowledge. National recording schemes for such groups are likely to provide a more reliable, and up to date dataset as they are administered by specialists in their field, but it is reiterated that they are generally run by volunteers and they may not be able to release data.

Habitat-Based Assessments

Enhanced reviews of reliable desk study data, supplemented by a detailed on-site habitat-based assessment when access is possible *may* be able to increase an evaluation's robustness but this would have to be decided on a site-by-site basis. Any detailed on-site habitat based assessment could be undertaken, subject to region and habitats, as late as autumn 2020 but after August, its value is likely to diminish as for example, appreciating a grassland's botanical composition in the context of pollinator resource is likely to be hard to interpret as most flowering species will have gone over. If this approach is undertaken, it must be completed by an experienced entomologist. Useful additional ecological datasets that could be used to help inform conclusion might include:

- A review of Ordnance Survey (OS) maps (1:25,000 and 1:10,000 scale), including older OS maps (see <https://www.old-maps.co.uk/#/>).
- Reference to Habitats of Principal Importance (= Priority Habitats) as indicated in the Multi-Agency Geographic Information for the Countryside website.
- Ancient tree inventory.

- Reference to Natural England’s Character Areas, Wales’ National Landscape Character Areas and other devolved administrations equivalents if they exist.
- Review of up to date aerial images.

The objective of this adapted assessment would be to identify the likelihood/potential for noteworthy species to be present at a site and if so, which parts of the site are likely to be important for them. If species are likely to be present and their phenology is such that any field survey in 2020 will have missed their season, this can inform decisions whether follow up survey work in 2021 would be proportionate and appropriate (see later narrative). The approach would be most effective if recent terrestrial invertebrate data exist for adjacent similar habitats and may be insufficient for the scarce and rare breeding species that are often of greatest importance in assessments. For invertebrates, this is less likely than, for example, bird survey data, and as such, the limitations of this approach should be carefully stated in any report.

Habitat-based assessment by an experienced entomologist can therefore potentially form an important part of the consideration. For example, if Open Mosaic Habitat on Previously Developed Land (OMH), old orchards, wood pasture/parkland, or long-standing (‘ancient’) grasslands are present, then this can suggest a potentially rich invertebrate fauna. In the absence of species-specific data, it should be assumed that the habitat is of high value (e.g. at least county importance). Additional evidence such as quantity and quality of habitat, connectivity and proximity with non-statutory and statutorily designated sites for nature conservation can also inform potential value.

This said, nothing can replace a ‘pooter and net’ survey so whilst habitat-based assessment can potentially help inform design layouts in the first instance through avoidance, and thus inform survey priorities within the 2020 survey season, it can also focus the surveyor’s attention on those compartments/habitat parcels or features where there is predicted to be a likely significant effect on high(er) value habitats such as through habitat loss (see also the narrative under the ‘Split Survey Season’ heading).

Split Survey Season

Depending on the duration of Covid-19-related restrictions, it may be that only partial survey data for 2020 is achievable, e.g. summer through to autumn. Surveys would still obtain useful data, and these should commence at the first available opportunity once restrictions are lifted. However, after approximately early June (southern England) through to approximately late June (northern England), the lack of survey data in the first half of the survey season will likely present such a constraint that follow-up survey work in 2021 would be a serious consideration. In considering whether follow up survey work in 2021 is proportionate and appropriate, it will be reasonable to consider whether there is sufficient confidence in the data set that has been obtained that the decision maker can rely on the report’s conclusions. Such considerations could include whether follow up survey visits the following spring and early summer (if this is the period missed) will likely alter the site’s evaluation. A greater reliance will have to be made on professional judgement, taking in to account of all the data utilised, but bearing in mind that invertebrate species-richness are orders of magnitude more diverse than other fauna, rendering generalisations based on partial data extremely challenging.

Thus, whilst it may be the case that through a combination of partial survey data, a detailed habitat assessment and avoidance measures, such as by altering site layouts, the need for follow up surveys to inform a planning decision could be removed, if there is a likelihood for legally protected species being present such as marsh fritillary (*Euphydryas aurinia*), which flies in May and June, or there are other factors which reduces confidence in this approach, this may not be an option.

In these circumstances, there ought to be no impediment to conditioning follow up survey work in 2021 (excluding legal constraints) where there is a likelihood that this could better inform mitigation, enhancement and genuine biodiversity net gain (see ‘Mitigation’ heading).

Use of eDNA

There may be a temptation to include the use of DNA-based methods as a means in itself, or in combination with traditional approaches. At the time of writing, DNA-based survey and identification for terrestrial invertebrates in Britain is still being developed and two main areas require further work. The first of these areas is the development of standard, recommended methods for sample collection and processing. The second is improving the reference databases of DNA sequences (barcodes) so that these are complete and reliable. Recent work by Buglife (in preparation), on behalf of Natural England, suggests that only a very small proportion of sequences from the Barcode of Life Database (BOLD) could be classed as ‘high confidence’, i.e. with a specimen collected in the UK, with a voucher specimen stored in a UK institution and where identification had been made by an experienced worker. It is therefore inappropriate to rely on surveys of terrestrial invertebrates using DNA methods as a substitute to conventional methods until further work has been done on methods and improving barcode libraries.

Nocturnal Surveys

The only regularly applied nocturnal survey method is light-trapping for moths. This uses a standard design of trap which attracts moths (and other insects) using actinic bulbs, retaining them in a compartment (alive) for later identification. They can either be used via the mains or a portable generator.

Depending on the site it may be possible to securely leave the equipment overnight unattended, in which case, the same surveyor(s) can set the equipment up and return the following morning to check the catch, if the site is close enough to do so. Alternatively, it may be possible to stay in a self-catering accommodation or use a campervan/motorhome parked up on site if this is safe to do so, maintaining social distancing and ‘secure bubble’ between the surveyor and third parties. A more cautious approach would be to get a non-entomologist to set the trap up, having been advised on suitable locations (e.g. sheltered spot from prevailing breezes, such as in an area partially enclosed by scrub/woodland edge) to do so. The entomologist can then visit the following morning to identify the catch.

Other nocturnal survey work may include species-specific surveys such as for the soft cliff specialist ground beetle, *Nebria livida* (Telfer, 2006), and the seed-eating ground beetles *Amara fusca* (referred to as the wormwood moonshiner) which is associated with mugwort (*Artemisia vulgaris*) in Britain. Such

specialist surveys will be determined by the study site's location and likelihood of presence. If such surveys are required, a minimum of two individuals will be necessary for safety reasons. In order to maintain social distancing, two surveyors will have to travel down in separate vehicles and it would also have to be determined if overnight accommodation is safe to use if the site is too distant to prevent safe return to homes. Reference to the narrative under amphibian (great crested newt *Triturus cristatus*) surveys will be helpful in determining the best approach.

Key Survey Limitations

Due to timing, the most disruption due to Covid-19 is likely to be to those terrestrial invertebrate species active in spring and early summer. Surveys may not have been possible during April and early May; and in some instances, into early June (at the time of writing). The most notable limitation is that without detailed survey data, collected at the appropriate time, it may not be possible to confirm the likely absence of important terrestrial invertebrate species, if other data such as habitats and historical data suggests this is a possibility. The limitations of the surveys must be made clear.

For some invertebrate species, notably, hairstreaks (butterflies), winter egg-searches can provide a more informed survey than adults, which are canopy dwellers and harder to observe. Such surveys could be informed by presence of foodplant such as elms for white-letter hairstreak, or blackthorn for brown hairstreak, and thus reliance on butterfly and foodplant distribution at the county level may prove informative. The availability of up to date county atlases can be located from local Butterfly Conservation branches and the Botanical Society of Britain and Ireland (BSBI).

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance. In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA. Datasets for terrestrial invertebrates that can be used to support the development of the baseline are variable, both regionally and for relevant taxa.

Reviewing reliable desk-based data will require collation of disparate datasets from various organisations, which will in itself be a time-consuming task. If this is undertaken, and a precautionary assessment is required, the species identified for the relevant hectad (10km OS grid square) should be considered likely to be present if there is suitable habitat within the area being investigated. However, invertebrates can and are changing distributions, with, for example, southern species moving north in response to various factors including climate change. Therefore, published distributions, even at the county scale, are potentially no longer accurate. In some areas, there are more detailed county terrestrial invertebrate atlases for certain taxonomic groups and these, if available, could be used to supplement the baseline. National recording schemes may also be able to provide more detailed information. Nevertheless, a very precautionary approach will potentially need to be taken. Ultimately, if the assessment is considered to be substantially compromised by the lack of access for surveys,

consideration should be given to extending the project timeline to enable surveys to be fully undertaken after restrictions have been raised, which would likely mean survey work extending in to summer 2021.

Mitigation

Where project timings allow, for proposals likely to affect important terrestrial invertebrate species, consideration should be given to carrying out pre-construction terrestrial invertebrate surveys (i.e. post planning-consent). In such cases a mechanism should be included for adapting mitigation and compensation proposals, if appropriate to do so in light of survey results. Where adaptive mitigation is not practicable, a precautionary assessment is likely to lead to a precautionary approach to mitigation, with avoidance being the default starting point. This will likely entail additional expenditure. In particular, a precautionary approach is required where it has not been possible to rule out the likely presence of Key Species, including Species of Principal Importance (SoPI).

References and Data Sources

Buglife (2019). *Good planning practice for invertebrates: surveys*. Buglife – The Invertebrate Conservation Trust, Peterborough. Available online: <https://cdn.buglife.org.uk/2019/07/Good-practice-planning-surveys.pdf>

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Kirby, P. (2001). *Habitat Management for Invertebrates. A practical handbook*. Pelagic Publishing, Exeter.

Scottish Natural Heritage (2019). *Assessing habitats for deadwood invertebrates*. Scottish Natural Heritage, Edinburgh. Available to download: <https://www.nature.scot/sites/default/files/2019-05/Guidance%20-%20Assessing%20habitats%20for%20deadwood%20invertebrates.pdf>

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APPENDIX 10 – OTTER

In the light of Covid-19 restrictions a number of adaptations to ‘standard’ ecological survey methods can be considered by ecologists to enable them to plan and undertake work in line with government restrictions, industry and country Public Health Organisations’ recommendations during the Covid-19 outbreak. Any adaptations to methods should be fully explained in reports and any limitations or other factors that may influence interpretation should be clearly stated.

This guidance provides examples of adaptations that may be considered.

Summary of Commonly Used Survey Methods

Otters are well distributed throughout most river catchments within the UK but pre-existing survey information (e.g. National Otter Surveys and Local Record Centre data) should be reviewed to better understand otter distribution within the site and wider area. There is currently no industry standard methodology for undertaking otter surveys²¹ although a range of publications relating to otter ecology and conservation do exist (e.g. Chanin 2003, Environment Agency 1999, DMRB 1999) and surveys are usually informed by these. Survey requirements are different for each project but otter surveys typically include a search for field signs such as resting sites (holts and couches), droppings (spraint)²², footprints, sign heaps, slides and feeding remains. The main aim of such surveys is to confirm otter presence, how otters use habitats and to identify resting sites. Otter surveys are usually confined to aquatic habitats and adjacent riparian zones but can sometimes extend away from waterbodies e.g. where otters tracks are found leading into adjacent terrestrial habitat. Surveys may be limited to the site itself or for larger infrastructure schemes, up to 200 m from the site boundary (SNH undated). Additionally, a habitat assessment is usually carried out in conjunction with searching for field signs to assess the suitability of the water feature to support otters e.g. in terms of prey resources and terrestrial habitat quality for lying-up.

Otter surveys can be undertaken throughout the year although surveys in late winter and early spring can be advantageous as spraint density is at its highest (Kruuk 1995; <https://www.gov.uk/guidance/otters-protection-surveys-and-licences#survey-methods>) while vegetation levels are limited, thus maximizing the likelihood of recording otter field signs.

In some instances, a single survey may provide sufficient information to inform an ecological assessment although for some sites with more complex impact pathways (particularly larger developments and infrastructure projects), several survey visits throughout the year may be required. Where breeding is suspected and/or resting sites will be impacted, remote camera trap monitoring is likely to be necessary. Again, such monitoring can be undertaken throughout the year with a minimum of two months recording recommended (Findlay *et al.* 2018).

²¹ New otter survey guidance is likely to be published by the Mammal Society in due course

²² Gloves should be used when examining otter spraint and good hygiene measures followed

Suggested Adaptations to Methods

In the first instance, if an otter survey is required, consideration should be given to delaying the survey until later in the year when social distancing restrictions may have eased, particularly as there are no significant seasonal survey restrictions as far as otter surveys are concerned.

As otter surveys involve surveying aquatic habitats, two surveyors will usually be required for health and safety reasons. For instance, one surveyor usually surveys from within the channel while the other follows along the bank top and acts as a rescuer. For small watercourses with shallow banks and limited flows, there is a low risk of needing to be rescued by the other surveyor meaning surveyors are able to stay 2 m apart at all times, therefore complying with current government social distancing guidance. Conversely, where survey sites include larger watercourses, there is a greater risk of a surveyor needing to be rescued which may make the survey impractical in terms of needing to adhere to social distancing.

In addition, there are likely to be some cases which fall between the two extreme examples above. In such instances, it may be possible for a surveyor to adapt their approach to reduce the likelihood that they will require assistance, by only surveying parts of a waterbody where there is virtually no likelihood of needing to be 'rescued'. The extent to which this limits their ability to survey the habitat, and the likely influence on their survey results, would need to be fully described within the survey results and impact assessment. Where significant Covid 19 related limitations have been identified by a surveyor, the same individual should participate in repeat surveys as they are likely to be more familiar with the original constraints, therefore ensuring that the limitations of the initial survey are fully understood.

As well as being a survey approach in its own right, the use of camera traps may represent a valuable supplementary survey technique to traditional field surveys at the current time. For example, a camera trap can be used to obtain data on otter activity on stretches of watercourse which may be difficult to survey physically whilst social distancing restrictions remain in place. However, the quality of data recorded would depend on how the camera trap is set up, the number of traps available to cover significant sections of watercourses, quality/sensitivity of recording equipment, environmental conditions etc; and may only be of limited use.

In summary, using standard otter surveys and only surveying from the banks of a watercourse to minimise the risk of needing to be rescued should be prioritised to obtain more useful survey data while social distancing measures are in place.

Key Survey Limitations

The requirement for most otter surveys to be undertaken by two ecologists means that it may not be practical to survey some sites although it should be possible to collect at least some survey data and there is the possibility to delay the survey until later in the year given there are no key seasonal constraints. However, it is acknowledged that this may not be an option for some larger schemes where several visits are required and delays cannot be incurred.

Key Considerations for Results Interpretation

Impact Assessment

The Precautionary Principle is well-established in EclA guidance (CIEEM, 2019 as amended). In cases of reasonable doubt, where it is not possible to robustly justify a conclusion of no significant effect, a significant effect should be assumed. Where uncertainty exists, it must be acknowledged in the EclA. It is however likely that at least some level of field survey will be possible for otters.

Mitigation and Licensing

Otter mitigation licenses only tend to be required where resting sites will be directly impacted by development proposals. As otter resting sites are generally scattered throughout otter home ranges which can be in excess of 40 km, there is a relatively low likelihood of mitigation licenses being required at most sites. Therefore, the use of precautionary mitigation, due to restrictions on otter surveys as a result of Covid-19, is only likely to be necessary in a very small number of cases. Where this is proposed, a survey should be undertaken as soon as possible to confirm any assumptions made once social distancing restrictions are eased. Where the need for an otter mitigation licence is identified it would be necessary to discuss and agree with the relevant SNCO as to whether sufficient information has been gathered to inform a licence application and this should be done at the earliest opportunity to prevent project delays.

References and Data Sources

Chanin, P.R.F. (2003). *Ecology of the European otter Lutra lutra*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

English Government Standing Advice. *Otters: surveys and mitigation for development projects* <https://www.gov.uk/guidance/otters-protection-surveys-and-licences#survey-methods> Environment Agency (1999). Otters and River Habitat Management. EA, Bristol.

Findlay, M.A., Briers, R.A and White, P.J.C. (2018). Optimising Camera Trap Data Quality at Mammal Resting Places. *In Practice* **102**, 24-28.

Highways Agency (1999). *Design Manual for Roads and Bridges: Nature Conservation Advice in Relation to Otters*. HMSO, London.

Kruuk, H. (1995). *Wild Otters Predation and Populations*. Oxford University Press.

Scottish Natural Heritage (undated). Protected Species Advice for Developers. <https://www.nature.scot/sites/default/files/2018-09/Species%20Planning%20Advice%20-%20otter.pdf>

APPENDIX 11 – METHOD STATEMENT GUIDANCE

The following sets out the minimum requirements for a Precautionary Working Method Statement (PWMS) that describes the minimum mitigation measures required to avoid impacts to biodiversity during any works.

PWMSs must be completed by a suitably qualified ecologist – who has, through relevant education, training and experience, gained recognised qualifications and expertise in the field of ecology and environmental management (see BS42020:2013 Clause 3.24) and has the required relevant experience of the biodiversity features potentially affected by the proposed works.

PWMS may be required to enable development of any size (which may or may not be subject to planning regulations) particularly where there are protected or notable habitats that need to be safeguarded, or species that are:

- not protected but may be of notable conservation status and may be subject to other legislation, such as hedgehog protected under the Wild Mammals (Protection) Act (1996);
- protected, but for which there is no licensing route, such as widespread reptile species or farmland birds; and
- protected, but where it has been determined that there is a sufficiently low likelihood of an offence being committed that a licence is not required (this will need to have been determined by a suitably qualified professional ecologist).

This guidance does not cover licensable mitigation which typically follows templates provided by SNCBs.

Minimum Information Required for a PWMS

Headings	Content
Cover page	<ul style="list-style-type: none"> • Date of issue and a version number • Confirmation that the client, contractor and ecologist have all read and agreed with the PWMS in advance of the works (sign-off could be combined with the names and contact details below). • This may be required for submission to LPA to discharge a condition of planning if secured as part of an ecological report.
Contents page	<ul style="list-style-type: none"> • Table of Contents
Background information <i>Existing documents may be referenced but the PWMS should include sufficient information to ensure</i>	<ul style="list-style-type: none"> • Site name • Site address • Ordnance Survey Grid Reference • Site location map (with a suitably scaled Ordnance Survey base) • Name and contact details of developer • Name and contact details of contractors involved with the works (as far as they are known) • Name, contact details and evidence of the competence of the ecologist that has produced the method statement

Headings	Content
<p><i>that legislative infringements are avoided.</i></p>	<ul style="list-style-type: none"> • Description of the proposed works • Description of the purpose and objectives of the proposed works • Planning status (including reference numbers) if appropriate – does the project have consent? Is it permitted development? Is it essential maintenance? Is this method statement accompanying a planning application or discharging planning conditions? • Legislation relating to the species concerned and justification for a licence not being required • Consideration of other environmental constraints • Reference to guidance documents used to inform the preparation of the method statement
<p><i>Site information and survey</i></p> <p><i>Existing documents may be referenced but the PWMS should include sufficient information to ensure that legislative infringements are avoided.</i></p>	<ul style="list-style-type: none"> • Description of site location and habitats (including surrounding habitats) • Description of desk study undertaken, including sources used and dates of searches • Description of field surveys undertaken, including details of the methods used, competence of personnel involved, level of effort, dates, times, weather conditions, etc. • Survey results summary, to include: status of the population (assessed in a national, regional and local context if appropriate) assessment of habitat quality, estimate of population size to be affected, etc. • Detailed results to be provided in an appendix if appropriate • Clear identification of whether the survey accords or does not accord with current good practice guidance (and justification and explanation of the implications if it does not accord) • Summary of any survey limitations and an explanation of the implications of these • Where a precautionary approach is being taken due to inadequate survey information resulting from survey restrictions during the Covid-19 outbreak, gaps in survey data and additional precautionary measures undertaken should be detailed with any potential implications stated • Appropriately scaled map(s) showing survey area and results • Photographs of site and specific habitat features, as necessary

Headings	Content
<p>Impact assessment as relevant to subject of PWMS</p> <p><i>Existing documents may be referenced but the PWMS should include sufficient information to ensure that legislative infringements are avoided.</i></p>	<ul style="list-style-type: none"> • Quantity (in hectares/m² or linear metres, as appropriate) and type of habitat permanently lost in relation to the species concerned • Quantity (in hectares/m² or linear metres, as appropriate) and type of habitat temporarily lost in relation to the species concerned, and specify the timeframe of the loss • Quantity (in hectares/m² or linear metres, as appropriate) and type of habitat permanently damaged in relation to the species concerned • Quantity (in hectares/m² or linear metres, as appropriate) and type of habitat temporarily damaged in relation to the species concerned, and specify the timeframe of the damage • Identification and assessment of other impact on the species concerned, such as the risk of killing, injury, disturbance, fragmentation, pollution, increased predation • Assessment of the overall impact of the works proposed on the population of the species concerned, with reference to appropriate contextual information • Scaled map to show impacts
<p>Mitigation, compensation and enhancement strategy</p> <p><i>Existing documents may be referenced but the PWMS should include sufficient information to ensure that legislative infringements are avoided.</i></p>	<ul style="list-style-type: none"> • Describe the measures to be employed to avoid / minimise impacts, including, for each measure: <ul style="list-style-type: none"> ○ Justification for the measure to be used – is it a recommended measure in relevant good practice guidance, or not? If not, why is it proposed? ○ Likely effectiveness of measure with justification, based on good practice guidelines and / or relevant research ○ Quantity (in hectares/m² or linear metres, as appropriate) of any new habitat being created, or existing habitat being improved ○ Full details of any capture methods, including timings ○ Full details of any receptor areas being used to release animals into, including location, any designation, details of

Headings	Content
	<p>existing populations, habitat links, evidence that they are within the local range of the species, site ownership</p> <ul style="list-style-type: none"> ○ Design drawings of specific features, such as reptile hibernation sites, bat boxes, and details of materials to be used ○ Details of persons and their roles and responsibilities for implementing the mitigation/compensation works ○ Details of any operations needing to be overseen by an ecologist ○ Details of any tool-box talks or signage required to raise awareness and ensure appropriate behaviours ○ Name, contact details and requirements for the competence level of ecologists overseeing any specific operations ○ Details of specific machinery or equipment to be used ○ Disposal of any wastes arising from mitigation/compensation works ○ Scaled map(s) to show extent & location of mitigation/compensation measures.
Emergency provisions	<ul style="list-style-type: none"> ● What should happen and who needs to be contacted/informed when the provisions of the PWMS are not followed and/or species are found in unexpected circumstances
Monitoring	<ul style="list-style-type: none"> ● Proposals for monitoring, including methods, timing, survey effort, personnel competence level, frequency, start and end dates ● Details of how monitoring will be reported and to whom ● Details of baseline to be used and criteria for determining success/failure ● Mechanisms for remediation
Management	<ul style="list-style-type: none"> ● Details of responsibility for any ongoing management or maintenance of habitat/features from initial aftercare to any long-term management
Timetable	<ul style="list-style-type: none"> ● Start and finish dates for all activities proposed, identifying activities that are seasonally constrained (i.e. must take place at a specific time of year) and any assumptions made with dates that may change, such as start of construction or phases of development.
Declaration	<ul style="list-style-type: none"> ● A form to be provided at the end of the PWMS for site operatives to sign and date to confirm they have read and understood the PWMS and will implement it.
References	<ul style="list-style-type: none"> ● As appropriate

Headings	Content
Supporting figures	<ul style="list-style-type: none">• As needed
Supporting appendices	<ul style="list-style-type: none">• As needed