



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

Version 4

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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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- Peter Gilchrist CEnv FCIEEM (Jacobs UK) – Chair
- David Collins MCIEEM (Strategic Ecological Solutions)
- Peter Cosgrove FCIEEM (Alba Ecology Ltd)
- Mike Dean CEcol FCIEEM (MD Ecology)
- Bob Edmonds CEnv MCIEEM (SLR Consulting)
- Jon Guarnaccio MCIEEM (Dunelm Ecology Ltd)
- Martina Girvan CEcol MCIEEM (Arcadis)
- Penny Lewns CEcol CEnv MCIEEM (Atkins)
- Mike Oxford CEcol FCIEEM (representing ALGE)
- Jules Price MCIEEM (Atkins)
- Sarah Price MCIEEM (Atkins)
- Paola Reason CEcol CEnv FCIEEM (RSK Biocensus)
- David Wells CEnv MCIEEM (Collins Environmental Consultancy Ltd)
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- Jim Fairclough MCIEEM (BSG Ecology)

- Richard Gowing CEnv MCIEEM (WSP)
- Laura Henderson (Mott MacDonald)
- Lisa Kerslake CEcol FCIEEM (Swift Ecology Ltd)
- Marcus Kohler MCIEEM (MKA Ecology)
- Paul Lee CEcol CEnv MCIEEM (Arachne Ecology Ltd)
- Caroline McParland CEnv MCIEEM (WSP)
- Lisa Norton (CEH)
- Mark Telfer MCIEEM (freelance entomologist)
- Duncan Watson CEnv MCIEEM (SLR Consulting Ltd)
- Paul Watts CEcol MCIEEM (Atkins)

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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 was originally produced in spring 2020 under the highly constraining environment necessitated by movement restrictions at that time; it has been reviewed and amended in January 2021 based on the prevailing circumstances. It 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 continue 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 most 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. These risks should include the logistics of undertaking field surveys such as: travel to and from the surveys, any required accommodation, subsistence, and access to welfare facilities. 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 recognition of biosecurity concerns of transmitting COVID-19 to wildlife and the risk of this transmission developing new strains of the virus, it is strongly recommended that animals are not handled at this time as part of a survey protocol. Handling and close proximity to animals during surveys should only be undertaken in exceptional circumstances and following strict biosecurity measures to protect transmission (further details are provided for specific species in their relevant Appendix).

In some cases, COVID-19 restrictions have constrained the collection of field data and, although restrictions have changed, it is recognised that some landowners are still restricting access in some instances. This document provides guidance on alternative approaches to address the challenge that a

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>

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 governments' positions and the different emphasis in the different UK jurisdictions on travel and working; and
- ensuring that any alternative approach to evidence collection for decision-making meets legislative requirements, and that any limitations and mitigation strategies for these limitations are clearly identified and communicated.

It is reiterated that this guidance does not advocate deviation from other relevant good practice guidance for field data collection and is only to be used where restrictions due to COVID-19 are insurmountable.

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 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."*

NatureScot 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

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>

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 of a scheme to avoid, mitigate or compensate for impacts adequately.

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 and the data need to be such that the third test (i.e. the favourable conservation status of the species will be maintained in its natural range) is adequately evidenced. 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, not least because the licensing process allows the SNCB to give due consideration to the activities that may give rise to an offence if not licensed. This is particularly pertinent in Scotland where the trigger for an offence under the Habitats Regulations (as amended for Scotland) is lower than in the other UK jurisdictions.

A recommended template for Method Statements is provided in Appendix 10. This can also be used for species which are not protected, or where there is no licensing route.

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. Some species technical notes have been removed from this edition to reflect that alternative approaches for these species are no longer relevant and standard good practice approaches should be employed. CIEEM will review this situation and update this Guidance as appropriate. Seasonality and geographical variation will necessitate adapting approaches to local conditions and geographies. Professional judgement⁹ and, where applicable, 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

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.

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 (see Figure 1).

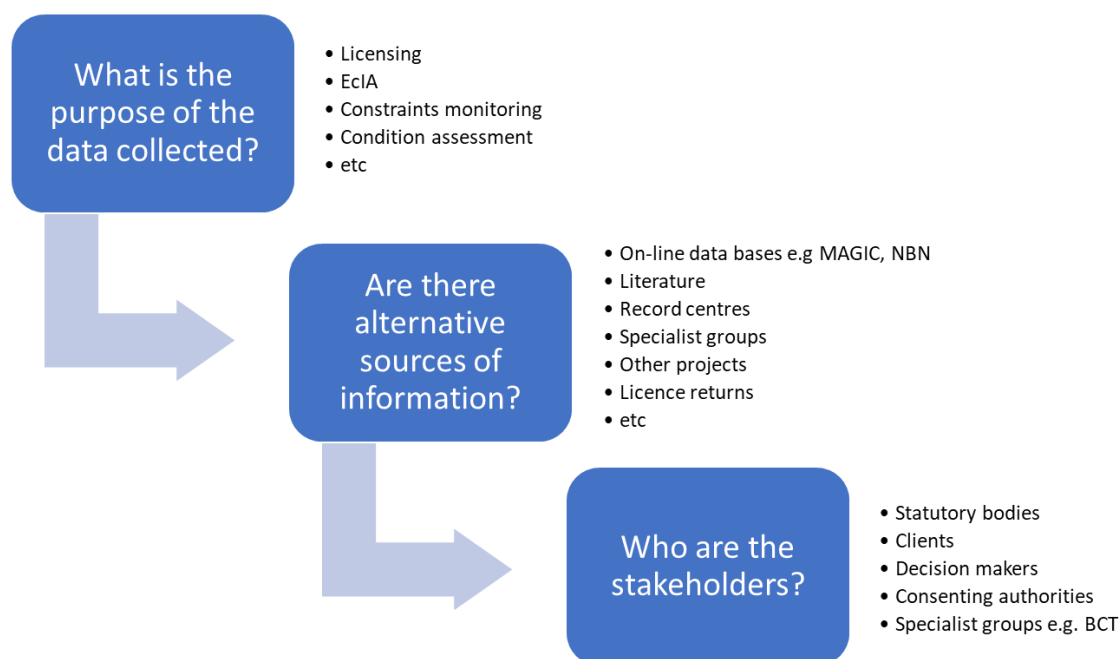


Figure 1. Steps needed to arrive at alternative approaches to evidence collection.

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 (see Figure 2). Early consultation with the planning authority and specifically their ecologist will help to identify what would be acceptable, what mitigation for any limitations is required, and to avoid delays/issues with the application. In some circumstances, it may not be possible to agree an acceptable alternative approach, resulting in delay.

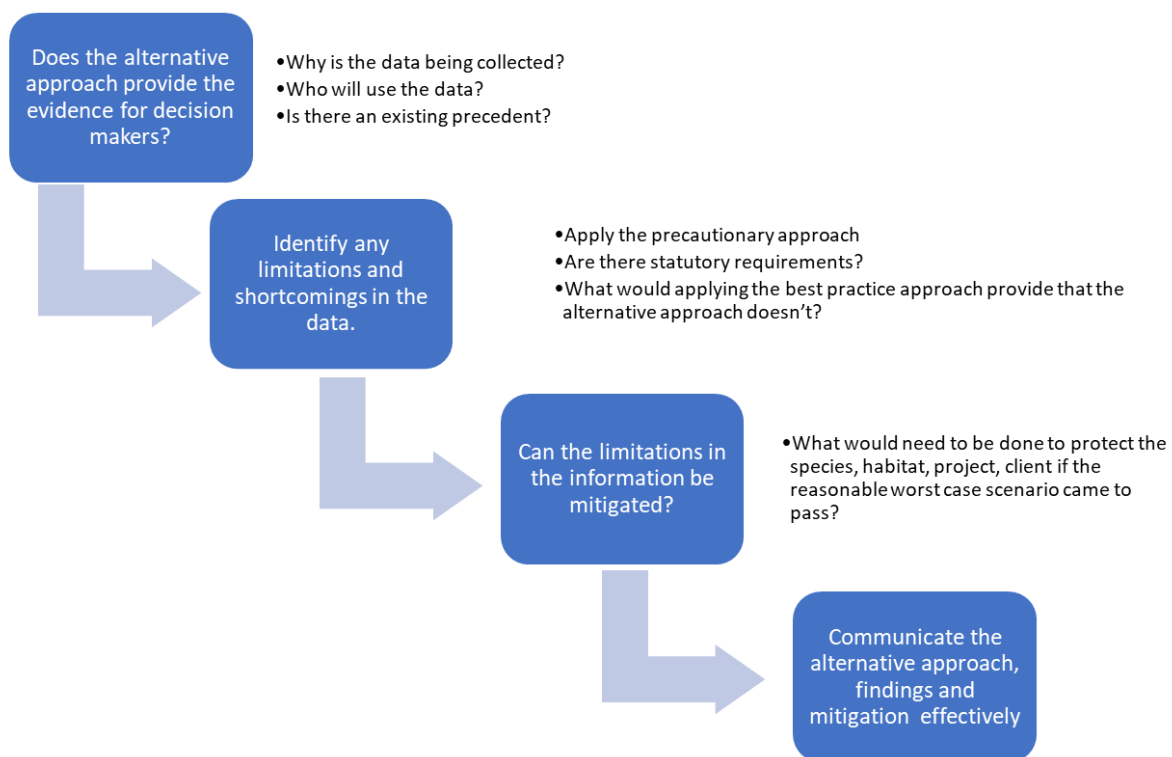


Figure 2. Key considerations for the data collected using an alternative approach.

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 as a result of COVID-19 restrictions. It is not intended as a replacement for current guidance on survey methods, but to provide examples of approaches for 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, prior to field surveys being undertaken.

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) – IHS 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 Method for Desk-based Habitat Baseline

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/SLNCI 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	111 habitats, including 70 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.

References and Data Sources

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Ancient Tree Inventory. <https://www.woodlandtrust.org.uk/visiting-woods/things-to-do/ancient-tree-inventory/>

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Natural Resources Wales environmental data portal. <https://naturalresources.wales/evidence-and-data/access-our-data/?lang=en>

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Old Maps. <https://www.old-maps.co.uk/#/> and <https://www.oldmapsonline.org/>

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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, whilst restrictions to some activities remain in place. In most cases, it is expected that surveys are unlikely to be significantly constrained in spring 2021 and will take place as normal. However, in the event that surveys, or access to land is restricted, this guidance describes some possible alternatives. 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.

Where any survey method is not available or possible to carry out safely due to restrictions in place resulting from COVID-19, it is suggested that this method is replaced with increased effort in other daytime methods, e.g. netting, egg-search or setting bottle- or funnel-traps for a maximum of four hours. Wherever possible, three different survey methods should be used for each survey. 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 minimised 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

When the first version of this guidance was published in May 2020, COVID-19 restrictions were causing significant limitations to site access, meaning that in many cases standard bird survey methods needed to be adapted by ecologists to enable them to plan and undertake work during spring and summer 2020. Guidance was therefore provided on adaptations to survey methods, with a particular focus on surveys for breeding birds, which were of most direct relevance at that time.

At the time of writing this update (November 2020), although COVID-19 restrictions remain in place, limitations to site access for survey by professional ecologists are much reduced. In most cases bird surveys are therefore unlikely to be significantly constrained and can take place as normal. However, in cases where access to third party land is required, access may still be difficult due to landowner concerns regarding COVID-19. This updated guidance therefore primarily covers adaptations to survey methods that may be considered to specifically address situations in which access to third party land is required but is not possible. It also provides a greater focus on wintering bird surveys than previous versions of the guidance.

This guidance on 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.

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 or other mapped 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 may also include spring and autumn migration periods (so including April and May and August-October). Typically based on Wetland Bird Survey (WeBS) methodology. Surveys of coastal sites may need to take place 'through-the-tide'.	At least monthly during relevant period

Vantage Point Survey	Observations of flight activity of particular ‘target’ species from specific vantage points. 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
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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 (NatureScot, 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 potential for bird surveys to be affected by access restrictions relating to COVID-19. At the time of writing, this is most likely to occur where access is required to third party land. Access to third party land is frequently needed for bird surveys, especially for winter surveys but also some breeding surveys, to enable an assessment of potential effects on birds using areas outside development site boundaries.

Suggested Adaptations to Methods

Difficulties accessing third party land are not specific to COVID-19 and regularly occur at other times. However, such difficulties are probably greater now and ecologists have recently reported access being refused, with COVID-19 given as a reason.

In such situations, where surveys ideally require access to third party land, in the first instance it will be important to demonstrate that reasonable efforts to obtain access to the relevant land have been made. Where access is not granted the next step is to identify what can be covered using roads, Public Rights of Way and other publicly accessible land. For many winter surveys it can be possible to obtain adequate coverage, using a telescope, from a series of vantage points located on publicly accessible land (although this is likely to be of less value for most breeding surveys). For vantage point surveys, where access to adjacent land is not possible it may be feasible to locate vantage points within the site boundary, but use a vehicle or a hide to reduce potential disturbance.

In all cases, where limitations to access are identified, a precautionary approach to assessing the data must be taken.

Where access is restricted and areas cannot be viewed from publicly accessible land, alternative approaches may be considered. These could include:

- Detailed desk study
- 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 Survey
- 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

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 with the aim of the assessment, in combination with a detailed desk study, being to identify the likelihood that important species are present and if so, which areas 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 scarce and rare breeding species or where detailed data on bird numbers and activity are required. The limitations of this approach should be carefully stated in any report.

Key Survey Limitations

Bird surveys covering third party land may be required in a number of situations. Some examples include: where disturbance to important non-breeding waterbird populations using adjacent land (or waterbodies) is possible; for linear developments in which land is not necessarily controlled by the developer; for certain breeding species sensitive to disturbance; and to avoid disturbance during the surveys themselves (e.g. by locating vantage points outside site boundaries). Where access is not possible (and areas are unable to be viewed from publicly accessible land) survey data may not be sufficient to inform a robust impact assessment.

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, where potentially significant limitations to access are encountered, that the proposed approach is discussed and agreed with relevant stakeholders wherever possible. 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 by access restrictions 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 Survey (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 record centres and bird groups.

Mitigation

Where project timings allow, for projects likely to affect important bird species for which significant access restrictions precluded robust assessment at the planning stage, 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), or important wintering bird populations. For example, a precautionary approach to site development would require construction to be programmed as if specially protected species or important wintering bird populations are present and take appropriate measures to avoid significant negative effects or contravention of the legislation.

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APPENDIX 4 – BATS

When this guidance was first produced (May 2020), the main constraints affecting standard survey approaches for bats were perceived to be: measures to minimise the risk of COVID-19 transmission between co-workers (and others); restriction of access to survey sites; and minimising the risk of transmission between surveyors and bats.

At the time of this update (January 2021), there is abundant guidance available elsewhere on preventing transmission between co-workers.

Most types of surveys continued in most months during 2020. However, some types of survey were constrained, notably where other individuals could be unnecessarily exposed or social distancing was difficult. This will have prevented many internal inspections of occupied dwellings and other structures. In addition, the limited availability of overnight accommodation (varying in different months/geographies) may have prevented some nocturnal (i.e. activity) surveys from taking place in some months of the year.

The likelihood and implications of COVID-19 transmission to bats remains unknown, so precautionary measures to minimise this risk remain appropriate for everyone undertaking surveys where handling bats is required.

The IUCN SSC Bat Specialist Group¹⁴ posted a notice (12 April 2020) recommending suspension of field activities for the protection of bats. 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 (11 May 2020) issued a response to the IUCN advice¹⁵, similarly recommending precautionary measures to minimise any potential risk to bats. Above all, they note that relevant authorities should consider if activities involving close contact with bats (capture, handling of bats or roost inspection) should be postponed or continued. If a given activity is continued, it should only be undertaken if appropriate personal protective equipment (PPE) is used.

Eurobats' recommendations on how to protect bats from the risk of transmission of SARS-CoV-2 from people include the following:

- General rule: If a bat worker is showing symptoms of COVID-19 or has been in contact with a person with such symptoms, they should not undertake any form of bat survey or handling of animals (including bats in care).
- When entering a roost or handling bats, effective measures of hygiene must be applied. People coming into close proximity of bats or handling bats should wear single-use gloves (over handling gloves if needed) and cover their mouth and nose with an appropriate face mask. Strict hygiene procedures should be followed, for example, washing hands and washing and disinfecting equipment used in bat rehabilitation or to process bats in the field (calipers, balances etc.) before and after use (see recommendations on disinfectants provided by national health authorities). Single-use overalls or a change of clothing should be used if visiting multiple

¹⁴ <https://www.iucnbsg.org/>

¹⁵ <https://www.eurobats.org/node/2602>

roosts in buildings or in under-ground sites (e.g. caves, mines), and boots/shoes should be disinfected between such roost visits.

BCT advice can be found online¹⁶.

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 are likely to be maintained into the next bat active season, affecting proposals for trapping, ringing and radio-tagging. Any decision to continue with activities that require capture and handling would require robust justification of the need to proceed.

Key Considerations

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.

In 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 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 similarly 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.

¹⁶ <https://www.bats.org.uk/news/2020/04/bct-response-to-iucn-covid-19-recommendations-for-bat-field-workers>

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

APPENDIX 5 – DORMOUSE

When the first version of this guidance was produced in May 2020 the main constraints affecting standard survey approaches for dormice were perceived to be restriction of access to survey sites, minimising risk of COVID-19 transmission between co-workers, and minimising the risk of transmission between surveyors and dormice. At the time of this update (November 2020), there are few problems with site access due to COVID-19, and there is abundant guidance available elsewhere on preventing transmission between co-workers (on www.gov.uk and www.gov.wales). However, the likelihood and implications of COVID-19 transmission to dormice remain unknown, so precautionary measures to minimise this risk remain appropriate for everyone undertaking dormouse surveys. These measures are additional to the standard survey methodologies set out in Bright *et al.* (2006) and standing advice online. 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 will be published in 2021, after which 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 without constraints other than the need to minimise risk of COVID-19 transmission to dormice.

Suggested Adaptations to Methods

The suggested adaptations below have been informed by the disease risk assessment¹⁸ undertaken for dormice by ZSL, which can be viewed on the PTES website, and by coronavirus guidance on surveying and mitigation works affecting wildlife produced by Natural England and Defra¹⁹. These provide guidance on minimising risk of disease transmission from humans to dormice and other wild mammals. 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 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/bubble; see also ‘lone working adaptations’, below).
- Avoid handling of dormice if possible, and minimise handling in situations where it is unavoidable.
- 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.

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 follow national guidance on minimising risk of COVID-19 transmission (e.g. use of face mask, social distancing etc.) during the survey and whilst travelling to and from the survey site.

Minimising Contact with Dormice

For development (presence/likely absence) surveys, it is not normally essential to handle dormice. No-one who has recently tested positive for COVID-19, is exhibiting symptoms or who should be self-isolating having been in contact with someone with COVID-19 should check dormouse nest tubes or nest boxes.

Surveyors (wearing mask, gloves etc. as described above) should open nest boxes or nest tubes and wait a few seconds for any active animals to leave, while watching closely so that any animals can be

¹⁸ <https://ptes.org/wp-content/uploads/2020/05/SARS-CoV-2-DRA-for-dormice.docx>

¹⁹ <https://www.gov.uk/guidance/coronavirus-covid-19-surveying-and-mitigation-works-affecting-wildlife>

identified visually. If a dormouse has left a box or tube it will usually stay nearby and return to the box when the surveyor has left, so move further away as soon as possible to allow it to return.

Nest boxes or nest tubes obviously containing a dormouse nest do not need to be checked for torpid or young dormice. If nest material is present, but is not obviously a dormouse nest, it may be necessary to physically examine the nest for torpid or young dormice, and/or to examine the nest structure. Dormice found during this process should be handled as little as possible.

Despite the need to minimise contact with dormice, it is not recommended that nest tubes or nest boxes are left un-monitored until the end of the active season for dormice, as old nests (particularly when re-occupied by wood mice or yellow-necked mice) become increasingly hard to identify with confidence.

Mitigation and Licensing

Most ecologist activities associated with site clearance (e.g. fingertip searches ahead of vegetation clearance) can be carried out whilst observing government guidance. 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). As with surveys, a face mask and gloves must be worn, and handling of dormice should be minimised.

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 7 – BADGER

When the first version of this guidance was produced in May 2020, the main constraints affecting standard survey approaches for badger were perceived to be restriction of access to survey sites and minimising risk of COVID-19 transmission between co-workers. At the time of this update (November 2020), there are fewer problems with site access due to COVID-19, and there is abundant guidance available elsewhere on preventing transmission between co-workers.

The risk of COVID-19 transmission to badgers is unknown, but as most badger survey work is based on indirect surveys (field signs), it would appear to be relatively low risk. However, some activities, such as bait-marking and deploying camera traps, could pose a higher risk of transmission (think about the number of camera shots with badgers nosing and licking cameras), so precautionary measures to minimise this risk should be adopted (wearing gloves and masks when mixing and deploying bait and disinfecting cameras).

Access for walk-over or sett inspection surveys is likely to be possible for most sites. During periods of local restrictions, there could be delays to completing the surveys. However, lack of access during the spring or autumn periods could result in a lack of survey information on use/location of boundary latrines and prevent completion of bait-marking surveys.

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.

Alternatives to Territory Mapping by Bait-Marking

- Use Nearest Neighbour distance to estimate likely spacing between main setts (see explanation in Harris *et al.*. 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’
- Look for published data on local territory sizes in similar geographical locations (such as the surveys during the Randomised Badger Cull Trial, Bourne *et al.*)
- 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.
- 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 prolonged 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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<https://www.nature.scot/sites/default/files/2019-10/Scottish%20Badger%20Distribution%20Survey%2006-09%20-%20Results%20-16%20November%202009.pdf>

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Scottish 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, standard freshwater pearl mussel survey methods may need to be adapted by ecologists to enable them to plan and undertake work safely. 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, but these should not replace standard good practice survey methods where these are possible.

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</p>	N/A

	<p>it is not safe to assume no historical records = no pearl mussels. By 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. 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</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>

presence or absence survey	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

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APPENDIX 9 – TERRESTRIAL INVERTEBRATES

In the event that COVID-19 restrictions remain in place in April 2021 **and** prevent, or substantially reduce, access to study sites, the requirement to adapt standard terrestrial invertebrate survey methods as described below may remain to enable ecologists to plan and undertake field work during the 2021 survey season. 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.

If COVID-19 restrictions are relaxed before April 2021, allowing unfettered access to study sites, and thus enabling field surveys to commence normally, no further consideration is required at this point. In this instance, ecologists should ideally plan to commence field survey work during April 2021 following standard methods and techniques appropriate to the site. If restrictions are subsequently imposed, guidance relating to terrestrial invertebrates will be revised to reflect the survey season period that this relates to.

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 into 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>
- Drake, C.M., Lott, D.A., Alexander, K.N.A. and Webb, J. (2007). *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report (NERR005). Natural England, Sheffield. 132pp.
- 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>
- Telfer, M.G. (2006). *Invertebrate survey of the soft-rock cliffs of Norfolk*. Report for Buglife – The Invertebrate Conservation Trust.

APPENDIX 10 – 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 habitats²⁰ that need to be safeguarded, or species that:

- do not receive specific legal protection but may be of notable conservation status²¹;
- receive specific legal protection, but for which there is no licensing route, such as widespread reptile species or nesting birds; and
- receive specific legal protection, and for which a licensing route exists, 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	<ul style="list-style-type: none"> • Site name • Site address

²⁰ Protected habitats are those which receive specific legal protection. Notable habitats are likely to include, as a minimum, habitats listed as being of Principal Importance for the Conservation of Biodiversity in England, Scotland or Wales, or listed as a local priority for conservation in a Local Biodiversity Action Plan.

²¹ For example, species listed as being of Principal Importance for the Conservation of Biodiversity in England, Scotland or Wales, or listed as a local priority for conservation in a Local Biodiversity Action Plan. In some cases such species may be subject to legislation which offers limited legal protection which is unlikely to be breached in the context of most developments, such as hedgehogs which are listed under the Wild Mammals (Protection) Act (1996).

Headings	Content
<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"> • 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 • 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, such as may have been the case during the COVID-19 outbreak for example, 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 toolbox 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