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Surveying for bats in trees and woodland – Guide

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Contents

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 October 2015. It was prepared by Technical Committee BDY/1, *Biodiversity management*. A list of organizations represented on this committee can be obtained on request to its secretary.

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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0 Introduction

0.1 General

Other publications that include the subject of surveying for bats in trees and woodland have been produced and these are primarily aimed at ecological consultants involved in the planning process for development, or for arboriculturists undertaking tree work. This British Standard brings together, into one place and for the first time, all the information about surveying for bats in trees and woodland. In doing so it updates the information with evolving knowledge about how bats use trees and woodland, and what emerging techniques there are for surveying. It also addresses some identified information gaps.

This British Standard gives guidance on surveying to those directly involved in the management of trees and woodland (urban and rural), enabling those professionals to attain the necessary understanding of the surveys and checks that they can do themselves, while identifying the occasions when the services of a bat specialist might be needed. As such it is of assistance for those carrying out sustainable forest management under the *UK Forestry Standard* [1] (see Annex A for information on the UK Forestry Standard). It also gives guidance to bat specialists where more advanced surveys are required. The aim of this British Standard is to aid clarity by bringing together recommendations on all aspects of surveying, for all audiences, and matrices are included to ensure that the relevant information is accessed with ease (see Figure 1 and Figure 2).

This British Standard acknowledges and maintains the variety of approaches required to fit the differing needs that range from individual garden trees through to loss of woodland as a result of development and ongoing forestry management.

The following are examples of some of the reasons that bat surveys might be required:

- development;
- health and safety considerations;
- forestry operations;
- tree risk management and proposed tree work;
- conservation management; and
- site designation.

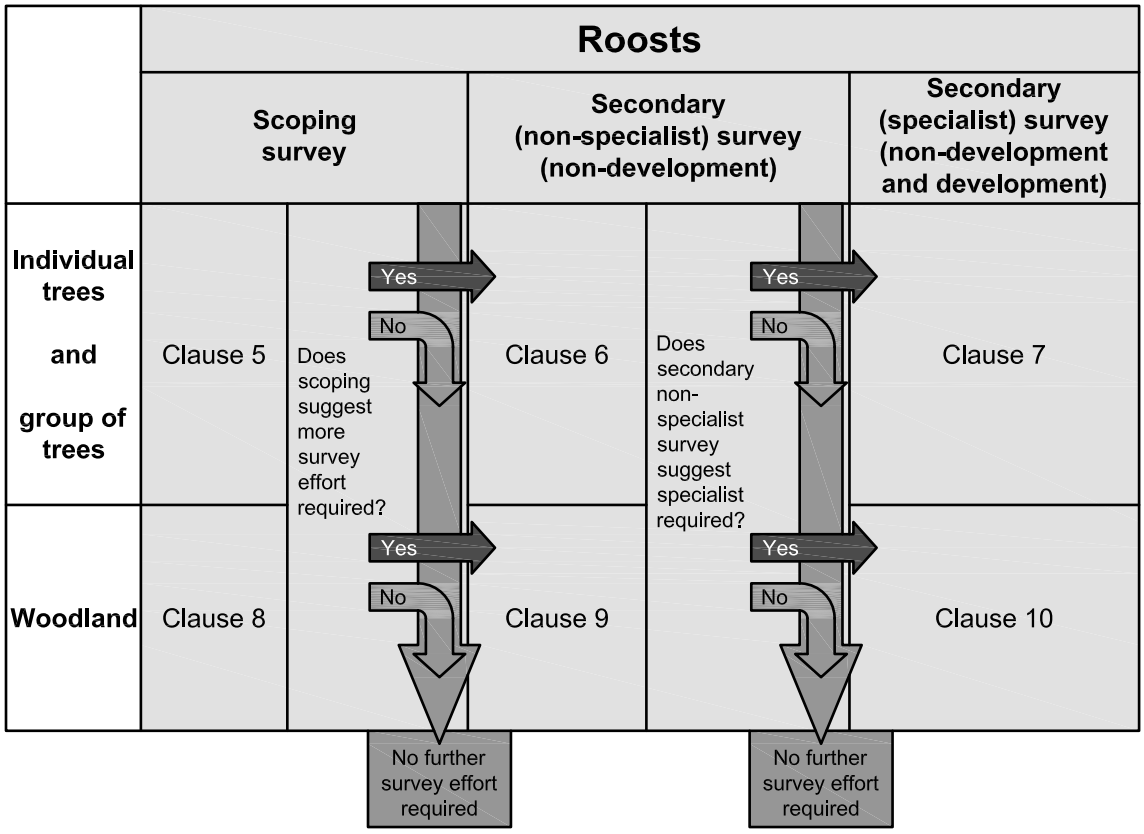
In planning any survey it is important to reflect on the reasons for carrying it out to ensure the survey is fit for purpose.

0.2 The matrices

This British Standard is aimed at those who carry out surveys for bats, whether in individual trees, small copses, woodland or forests. This could relate to trees in gardens or on development sites, within a farmed landscape or in parkland. For woodland, this could relate to management for forestry purposes or conservation.

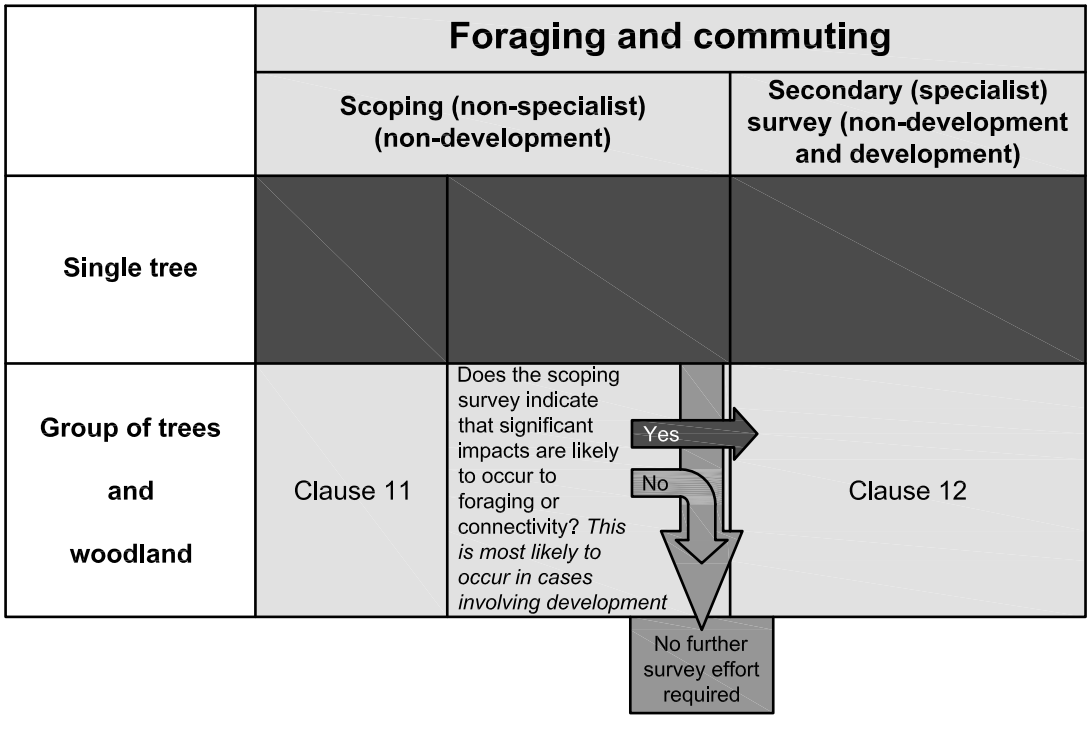
Bat surveys might be required to identify potential roosts in trees or to identify the value of a group of trees or woodland for bat foraging or commuting potential. Figure 1 covers roosts and Figure 2 covers foraging and commuting. Within the sections indicated there are links to other points of common interest or reference.

Figure 1 **Matrix: roosts**



NOTE A more detailed contents list can be found in the front of this Standard.

Figure 2 **Matrix: foraging and commuting**



Section 1: General

1 Scope

This British Standard gives guidance on surveying for bats in individual trees, groups of trees and in woodland. This includes scoping, roost and activity surveys, and record keeping.

This British Standard applies to the following:

- forestry and woodland managers and operatives, including woodland owners, managers, agents, foresters, contractors, conservation bodies and woodland advisers;
- arboriculturists, in particular tree work contractors, but also arboricultural consultants and local authority tree officers;
- planning officers, local government ecologists and other government departments whose functions might bring them into contact with bats in trees or woodland (whether directly or indirectly);
- developers and associated professions, e.g. construction companies, demolition companies and landscape architects;
- ecological consultants, particularly those who have the potential to work on the specialist aspect of surveying for bats in trees;
- utility companies, infrastructure constructors and maintainers, engineers; and
- flood risk managers.

This British Standard does not include guidance relating to bat surveys in buildings, underground sites or any habitat other than woodland or trees. It also does not give any guidance about the outcomes of the surveys undertaken, such as how woodland is managed or mitigation measures.

2 Normative references

The following document, in whole or in part, is normatively referenced in this document and is indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 42020, *Biodiversity – Code of practice for planning and development*

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1 activity survey
assessment undertaken by a bat specialist to establish the extent to which an area is used by bats where additional information is required to supplement the findings of the secondary habitat assessment

NOTE An activity survey might be required when proposed work has the potential for high impact to bats, particularly if mitigation or compensation is required.

3.2 ancient woodland
woodland that has existed continuously since 1600 or before in England, Wales and Northern Ireland (or 1750 in Scotland)

3.3 arboriculturist
person who, through relevant education, training or experience, has gained recognized skills or knowledge in the care and management of trees

NOTE In this British Standard the term "arboriculturist" includes professional tree work contractors and those involved in specifying tree management.

3.4 autumn swarming
bats circling at the entrance to underground sites, tunnels or other structures between August and November where they gather from some distance for the likely purpose of mating or finding a hibernation site

NOTE 1 Autumn swarming mostly occurs with the myotis species.

NOTE 2 Bats might be active at an autumn swarming site for several hours after dusk.

3.5 bat colony
sum of bats that form a social group including males, females and immature bats

*NOTE The colony might utilize a number of roosts for a range of purposes throughout the annual cycle; for example, maternity roost/nursery roost (see **3.21**) and hibernation site (see **3.17**).*

3.6 bat population
total number of bats of a species, in either a local, regional or national context

NOTE Population figures are approximate extrapolations from monitoring data or other methods commonly used to arrive at species population figures and are usually applied at country level.

3.7 bat specialist
person who is an experienced and/or licensed bat worker

*NOTE See licensed bat worker (see **3.20**) for cases where licences might be required.*

3.8 commuting
bats travelling through the landscape

NOTE Often the routes used for commuting create feeding opportunities and convey some level of protection from predators.

3.9 connectivity
predominantly natural features that allow bats to travel through the landscape between resource patches

3.10 core sustenance zone
area surrounding a bat roost that is of significance for foraging

NOTE This varies in size depending on the species of bat (see Table 2 [1]).

3.11 dawn swarming
bats circling at around sunrise outside a roost entrance before entering

3.12 desk study
review of available existing information

[1] Table 2 appears at the end of Section 1.

3.13 European protected species (EPS)
specific animals and plants which are protected under the European Habitats Directive 1992 [2]

NOTE 1 All species of bat resident in Britain are listed as European protected species.

NOTE 2 The European Habitats Directive 1992 [2] is as transposed to the UK Habitat Regulations 2010 [3].

3.14 experienced bat worker
individual with practical/professional experience of bat ecology and survey techniques but not necessarily licensed

*NOTE See licensed bat worker (see **3.20**) for cases where licences might be required.*

3.15 foraging
bats feeding on insects and other invertebrates

NOTE This is most often carried out while flying but can involve skimming the water surface, flying to catch insects from a perched position on a tree and picking insects off surfaces such as leaves.

3.16 forester
person who, through relevant education, training or experience, has gained recognized skills or knowledge in the care and management of forests and woodland

3.17 hibernation site
winter roost where bats enter a deep prolonged sleep to save energy (torpor)

3.18 individual tree
tree growing alone which is not obviously part of a wider tree group or woodland

3.19 invasive survey techniques
surveys which involve handling bats, inserting items into a potential roost feature (see **3.23**) or the use of techniques such as trapping bats using harp traps, mist nets or handheld nets, or an acoustic lure, or radio tracking

3.20 licensed bat worker
individual holding a licence issued by the statutory nature conservation organization (SNCO) for survey activities that might otherwise be in violation of wildlife legislation

NOTE Examples of licensed survey activities include disturbance of bats in their roosts, using invasive survey techniques, or capturing and handling bats.

3.21 maternity roost/nursery roost
roosts where mothers give birth to and care for their young

3.22 non-specialist
person who is not an experienced and/or licensed bat worker (see **3.7**)

3.23 potential roost feature (PRF)
feature on or in a tree which has the potential to be a bat roost (see **5.2**)

3.24 roost
resting place of a bat

3.25 scoping survey
preliminary assessment which may be undertaken by a non-specialist with suitable training to establish the suitability of a habitat to support bats or PRFs in trees, or to establish the likely importance of groups of trees or woodland for commuting or foraging by bats

3.26 secondary (non-specialist) survey for roosts
assessment of PRFs identified in the scoping survey to establish as far as possible the suitability of the feature for use by bats as a roost

NOTE This work is likely to require an aerial assessment and may be undertaken by a non-specialist with suitable training.

3.27 secondary (non-specialist) survey for foraging and commuting
assessment undertaken by a non-specialist (see **3.22**) to establish the likely importance of tree group(s) or woodland for bat foraging and commuting, and the potential impact that removal of the trees would have on bat populations present within the area

3.28 semi-natural woodland
area composed of locally native trees and shrubs which have generally derived from natural regeneration within the last few centuries

3.29 soft edge
gradual transition between habitat types

NOTE An example of this is the transition from high woodland to scrub and then to grassland, rather than the abrupt change from high woodland to grazed pasture.

3.30 specialist bat roost assessment
assessment of PRFs undertaken by a bat specialist (see **3.7**)

*NOTE This assessment is required when the secondary (non-specialist) survey for roosts (see **3.26**) is unable to reasonably rule out PRFs as roosts and when work is still intended on the tree(s).*

3.31 secondary (specialist) survey for foraging and commuting
assessment undertaken by a bat specialist to assess the potential value of tree group(s) or woodland for their foraging and commuting potential by bats

NOTE 1 This is required where the non-specialist survey for foraging and commuting has highlighted a potential impact on bat populations using the tree group(s) or woodland or where it has not been possible for the non-specialist to assess the risk.

NOTE 2 The secondary (specialist) survey for foraging and commuting ascertains the degree of impact that planned work would have.

3.32 statutory nature conservation organization (SNCO)
statutory licensing authority for each country in the United Kingdom

NOTE The SNCOs are Natural England, Natural Resources Wales, the Northern Ireland Environment Agency and Scottish Natural Heritage.

3.33 tree group
more than one tree with branch tips touching or close to touching

NOTE The term tree group includes small copses, and linear hedgerow features which might form connections between tree groups or woodland.

3.34 woodland/forest
area of land in excess of 1 000 m^2 under stands of trees with a canopy cover of at least 20% (25% in Northern Ireland) of the overall area

NOTE This covers land dominated by native or non-native trees and includes commercial forestry plantations. The minimum area included in the Forestry Commission woodland inventory is 1 000 m².

4 Background knowledge and considerations for bats in trees and woodland

4.1 General

Before identifying survey requirements for bats in trees and woodland, the surveyor should ensure they have an understanding of the bat species found in the UK, their general habitat requirements and the more specific needs of some species, given in Table 2 [2)].

Surveyors looking at trees and woodland should undertake a brief, preliminary assessment to ascertain whether the site has the potential to support roosting, commuting and foraging bats. This can involve a review of aerial photographs or woodland plans to place the feature (individual trees or woodland) in the context of the surrounding landscape. This review aims to identify the habitat associations listed in Table 2 that would make the area more suitable for bats either for roosts or for foraging. This helps to inform decisions regarding any potential impacts that works could have, thereby influencing survey effort.

The age of the tree(s) should be taken into account at this stage. Although age cannot accurately be used to predict the presence or absence of bats in the majority of situations, very young plantations can often be ruled out at this stage for roosting bats as they do not support the features (see **5.2**) needed for roosting, although they might still be used for foraging or commuting.

4.2 A bat's year

Bats need different roosting conditions at different times of the year and their level of activity varies too. Table 1 gives an outline of these changes over the seasons.

Table 1 **Seasonal bat activity**

Season	Activity
Spring	Becoming more active, feeding and gathering at summer roosts in late spring.
Summer	Maternity groups of females form.
	Mothers give birth with the single young being completely dependent for the first weeks of life.
Autumn	Building up fat reserves for the winter. Social gatherings close to winter sites. Mating.
Winter	Hibernating in cool places where the temperature is stable and humidity is high. Small species occasionally feed if the temperature is high enough to support insect activity.

4.3 Wider habitats and factors affecting suitability for bats

Wider habitat assessment should involve the identification of additional potential foraging areas surrounding the survey site. The radius depends upon the potential impact of the proposed work and the species within the locale likely to be affected. Table 2 gives an indication of the areas to be considered. The assessment should take account of any PRFs. Also, the connectivity between the potential roost site and the foraging ground should be assessed.

[2)] Table 2 appears at the end of Section 1.

NOTE 1 On larger sites, the remainder of the woodland (i.e. the area outside the scope of works) might constitute the foraging grounds of resident bats and, as such, large woodlands isolated from other foraging features are not automatically discounted from a further survey.

When assessing an area for bats, surveyors should take the following wider habitat considerations into account:

a) the surrounding land uses and their potential to support invertebrate prey;

b) features with the potential to concentrate and support an abundance of invertebrate prey (e.g. wetlands, water bodies, rivers, streams and manure piles);

c) proximity to other features that could support roosting bats, especially those that could support bats at other times of year (given that bats roost in different locations during different seasons);

d) barriers to bat movements (e.g. motorways) and the levels of disturbance through human activities (e.g. increased noise and light levels); and

NOTE 2 Several bat species actively forage in suburban areas and roost in buildings.

e) connectivity between potential roosts and surrounding foraging grounds which is particularly important for slow flying species. This could include linear features such as hedgerows, lines of trees or streams. It is a combination of these attributes that make a site more suitable for roosting bats. However, an isolated tree in parkland might still support fast flying species if there are adequate foraging grounds nearby. A wider habitat assessment can only inform assumptions about the likelihood of an area supporting bats. In situations where a tree with the potential to support bats is identified, it is unlikely that a wider habitat assessment alone would be sufficient to conclude bat absence.

4.4 Supporting an abundance of insects

The foraging habits of different bat species vary, but there is a general requirement for a steady supply of insects during their active period (April to October). Surveyors should take note of the features in woodland most likely to support an abundant insect population such as the following:

a) native trees, shrub and ground flora layers;

b) a diverse structure;

c) dead wood (fallen and standing);

d) water (rivers, streams, ponds, ditches and wet/damp woodland); and

e) rides, tracks and clearings with a soft edge (see **3.29**).

4.5 Structural suitability

Different bat species have adapted to feed in different types of woodland surroundings. When surveying woodland, and for the purposes of their preliminary assessment (see **4.1**), surveyors should take note of the following distinctions.

a) Cluttered woodland interior is used by species of bat that are relatively slow flying and have a highly manoeuvrable flight that allows them to hunt by gleaning insects off the surface of vegetation, both in the understory and in the tree canopy.

b) Open areas and woodland edges are used by species of bat that have a

faster flight and catch their insects by hawking them as they fly along tracks, rides or woodland edge or in the more open areas of glades and clearings.

Having a mosaic of habitats that include cluttered interiors, soft edges and open areas is beneficial in providing structural diversity and an abundance of insects.

4.6 Proximity of roosts

If there are known roosts in nearby trees, woodland or other structures, this increases the likelihood that the area is used for foraging by bats. Sources of bat records can be found in Annex B. Table 2 gives more information on the types of woodland and roost that are used by different species.

4.7 A summary of features that are of value to bats

When considering the features of importance to bats, surveyors should take into account the following:

a) features in trees which could support roosting bats (see Table 2);

NOTE Any tree, regardless of its age or size, has the potential to contain a bat roost if it supports features given in Table 2. However, young trees with small stem diameters seldom contain PRFs.

b) features that could support foraging bats (e.g. vegetation and water bodies that concentrate invertebrate activity in a certain area or support an abundant invertebrate population);

c) features that could connect potential roost sites to potential foraging sites (e.g. possible commuting routes provided by hedgerows, watercourses and lines of trees); and

d) other non-tree features that could support roosting bats, which could include buildings close to or within the site and caves/mines/bridges close to the site (see Table 2 for roosting preferences and Annex C for further information on such roosts).

A combination of these factors might influence the suitability of a site for bats and should therefore inform any survey effort and the type of survey that is undertaken at each location.

4.8 Woodland use by bats

4.8.1 General

All species of bat which breed in Britain are protected under the UK Habitat Regulations 2010 [3] (see Annex D for information about these regulations). All bat species use woodland and woodland edge habitats at least during part of the year, whether to forage, roost, breed or hibernate. Anyone surveying woodland for bats should take into account the ways in which bat species are likely to make use of woodland. Additional sources of information on bats and woodland are listed in Annex E.

It is possible to break down the use by bat species into two general groupings: bats that require woodland interior (typically with a cluttered understory and often in areas of minimum intervention); and bats that utilize woodland edges, tracks, rides and clearings.

Examples of the bat species using cluttered understory and woodland interior are:

a) Bechstein's bat (see **4.8.2**);

b) barbastelle (see **4.8.3**);

c) brown long-eared bat;

d) lesser horseshoe bat; and

e) Alcathoe bat.

The recent discovery of the presence of Alcathoe bats in the UK might highlight the importance of woodland to this species and additional survey methods might be required in future.

Examples of the bat species using woodland edges, tracks, rides and clearings are:

1) noctule;

2) common pipistrelle;

3) soprano pipistrelle;

4) serotine; and

5) greater horseshoe bat.

There are four species of bat present in England and Wales that are listed in Annex II of the European Habitats Directive 1992 [2] to highlight their conservation significance and this enables the designation of Special Areas of Conservation. These are the greater horseshoe bat, lesser horseshoe bat, Bechstein's bat and barbastelle. Three of these four species are particularly associated with woodland.

The lesser horseshoe bat does not roost in trees (although it can roost in built structures or mines and caves within woodland) but relies on woodland as an important place to forage all year round. Barbastelles and Bechstein's bats roost almost exclusively in trees, and Bechstein's bats in particular are woodland obligates as their whole life cycle, including roosting and foraging, are directly linked to suitable woodland.

4.8.2 Bechstein's bat

While many bat species forage in the wider landscape as well as within woodland, Bechstein's bats forage only in woodland and are a species that specializes in feeding in cluttered areas. They prefer large woodlands of 40 Ha to 50 Ha but are found using woodlands of over 25 Ha. This might be continuous woodland in a single block, or in two, three or more well connected woodlands. However, smaller unconnected ancient (see **3.2**) semi-natural woodlands (see **3.28**) are known to be utilized.

A colony of Bechstein's bats might only utilize roosts within a small area of woodland at any one time, however, the colony is more likely to thrive in a large woodland where there is likely to be a better long-term availability of roosts in a slowly changing woodland, and where the woodland is better able to support foraging.

Bechstein's bats require woodland that has a diverse structure with a range of tree age classes. Bechstein's bat colonies in the UK tend to be associated with a predominantly oak and ash canopy with a dense understory (at least 50% cover) of native species such as holly, hazel and hawthorn. Bechstein's bats can also roost in suitable trees in well connected tree lines and hedges.

4.8.3 Barbastelle

Proximity to rivers and woodland streams appears to be a factor in the choice of woodland by barbastelles, with unmanaged and quieter areas of the woodland preferred.

A high degree of canopy closure can be important in allowing the bats to emerge earlier after dusk and feed within the woodland with reduced threat from predation. Barbastelles continue to forage within woodland during the winter months when temperatures inside the wood exceed around 8 °C to 10 °C, which is often higher than the temperature in the surrounding countryside.

4.8.4 Commuting and connectivity

Surveyors should take into account the importance that connectivity (see **3.9**) has for bat species when assessing the area in question.

Most bat species, even those that feed in more open areas, prefer to move through the landscape using features such as hedgerows, rivers and woodland. This protects the bats from predators, as well as providing a sheltered environment.

A lack of ideal connectivity does not immediately indicate a lack of bats utilizing the woodland; it only reduces the likelihood of bats being present and the number of species likely to use such woodland. For instance, common pipistrelles roosting in woodland in the North York Moors utilize moorland drainage ditches as cover to commute from the woodland to adjacent foraging features, and noctules commonly cross open ground to get to foraging sites.

Table 2 **Summary of distribution and habitat associations of British bats**

Species	Distribution	Habitat associations and requirements	Core sustenance zone sizes [A)] km
Common pipistrelle (*Pipistrellus pipistrellus*)	Common throughout the UK (the most common UK species).	Roosts in buildings, trees and bat boxes. Often found in cracks and crevices. Exploits a wide range of foraging habitats including those associated with woodland, watercourses, grassland and built-up areas.	2 Poor data to support
Soprano pipistrelle (*Pipistrellus pygmaeus*)	Common throughout the UK (second most common UK species).	Roosts in buildings, trees and bat boxes. Often found in crevices. Exploits a wide range of foraging habitats but is more often associated with water and riparian woodland.	3 Good data to support
Nathusius' pipistrelle (*Pipistrellus nathusii*)	Distribution is unclear. Present throughout England but with a patchy distribution and a proportion of the population that appears to be migratory. There appears to be a strong presence in east England. It has been recorded in Wales.	Roosts in buildings, trees and bat boxes. Found in tree hollows and crevices. Often found foraging over water and along woodland edges and rides.	3 Poor data to support
Barbastelle (*Barbastella barbastellus*)	Recorded south of a line from North Wales to the Wash. Not recorded in Scotland or Ireland.	Roosts in trees and can also roost in buildings. Summer roosts almost exclusively in trees, often within ancient woodland; either behind loose bark or in vertical/horizontal cracks and broken branches (maternity roosts/nursery roosts). Roosts move frequently, but are loyal to a general area. Hollow and cracked trunks used as winter roosts. Forages along woodland edge and rides and within woodland when there are cold or poor weather conditions. Uses hedges, streams and rivers for commuting. This species often uses very low intensity echolocation calls and has a relatively fast flight. This can make it difficult to detect during surveys.	6 Moderate data to support

Table 2 **Summary of distribution and habitat associations of British bats**

Species	Distribution	Habitat associations and requirements	Core sustenance zone sizes [A)] km
Bechstein's bat (*Myotis bechsteinii*)	Found in southern England from Kent to Devon with records extending up to Herefordshire and Buckinghamshire. A small number have been recorded in Wales.	Roosts in holes and cracks in mature trees. Uses bat boxes and occasionally found in buildings. Usually associated with broadleaved woodland containing mature, over-mature and veteran trees, particularly oak. Nursery colonies favour old woodpecker holes. Tree holes are also used as hibernation sites. Forages in areas of closed-canopy woodland close to water, along overgrown hedgerows and near tree lines. Within woodland, this species spends a lot of its time high up in the tree canopy. This can make it difficult to detect during activity surveys.	3 Moderate data to support
Leisler's bat (*Nyctalus leisleri*)	Widespread and common in Ireland. Rare and widespread in England (significant populations in central and southern counties) and southern Scotland. Few records from Wales.	Roosts in trees, bat boxes and buildings. Forms dense clusters in tree holes and crevices. Can be found foraging in open habitats (often over water or pasture). Flies high and far and does not rely on linear features.	3 Moderate data to support
Noctule (*Nyctalus noctula*)	Found throughout England and Wales and in southern Scotland. Not recorded in Ireland.	Roosts in trees, bat boxes and rarely in buildings. Often found in tree holes, bats can form clusters in hollow trees. Forages over pasture, parkland and deciduous woodland. Flies high and far and does not rely on linear features.	4 Poor data to support
Serotine (*Eptesicus serotinus*)	Widespread but scarce in southern Britain, restricted to the south and south east of England. Occasional records in Wales.	Roosts in buildings and rarely roosts in trees but has been found in tree hollows. Forages mainly over pasture, parkland, woodland and suburban gardens.	4 Poor data to support
Brown long-eared bat (*Plecotus auritus*)	Common throughout UK wherever there is suitable woodland (distribution appears to reflect tree cover in general pattern).	Roosts in buildings, trees and bat boxes year round. Strongly associated with tree cover, prefers woodland with cluttered understory, particularly deciduous. Also forages in mixed woodland edge and among conifers. [B)]	3 Poor data to support
Grey long-eared bat (*Plecotus austriacus*)	A rare species found in a few areas of southern England and on the Isle of Wight.	Roosts in buildings and caves. Not known to roost in trees. Forages in more open areas than the brown long-eared bat, over grassland and woodland edges.	3 Moderate data to support

Table 2 **Summary of distribution and habitat associations of British bats**

Species	Distribution	Habitat associations and requirements	Core sustenance zone sizes [A)] km
Natterer's bat (*Myotis nattereri*)	Found throughout the UK (except the far north of Scotland) where there is suitable woodland.	Generally, summer roosts within crevices and cavities in trees. Also roosts in buildings. Not commonly recorded as hibernating in trees. Forages in tree canopies or close to foliage and by the edge of water.	4 Good data to support
Daubenton's bat (*Myotis daubentonii*)	Found throughout the UK.	Roosts in trees, buildings, bridges and caves. Known to roost in tree holes with noctules. Forages mainly close to the surface of slow-moving or calm water. Also forages in trees or along woodland rides, especially if these are associated with water.	2 Poor data to support
Whiskered bat (*Myotis mystacinus*)	Found throughout England, Wales, southern Scotland and parts of Northern Ireland.	Roosts mainly in buildings, but some summer roosts have been found in trees (no known preference for features). Not known to hibernate in trees. Forages in a wide range of habitats including woodland, parklands, flowing water and suburban gardens.	1 Poor data to support
Brandt's bat (*Myotis brandtii*)	Found throughout England, Wales, southern Scotland and parts of Northern Ireland.	Mainly roosts in buildings. However, roosts have been recorded in trees, bridges and bat boxes. Forage in woodland and close to water bodies.	1 Poor data to support
Alcathoe bat (*Myotis alcathoe*)	Confirmed as a UK resident in 2010. Distribution unknown but includes Yorkshire, Surrey and Sussex.	From the limited knowledge available it is a tree roosting species that also relies on woodland for foraging.	1 Poor data to support
Greater horseshoe bat (*Rhinolophus ferrumequinum*)	Found in western England and Wales.	Maternity roosts/nursery roots normally found in sun-warmed attics of large buildings or underground sites. Hibernates in underground sites. Not known to roost in trees. Will use branches as perches from which to hunt. In spring, predominantly forages over cattle-grazed pasture and in ancient woodland or semi-natural woodland. During summer, forages mainly over hay meadows and silage fields. Hunts mainly along linear features, such as substantial hedgerows and woodland edge.	3 Moderate data to support
Lesser horseshoe bat (*Rhinolophus hipposideros*)	South west England, West Midlands, Wales and western Ireland.	Roosts in disused or undisturbed sections of buildings, caves and mines. Usually in areas of extensive deciduous woodland, well connected with tree lines and hedgerows. Forages in deciduous woodland, riparian trees, and over pasture, along hedgerows and lines of trees.	2 Good data to support

Table 2 **Summary of distribution and habitat associations of British bats**

Species	Distribution	Habitat associations and requirements	Core sustenance zone sizes [A)] km

[A)] From latest available data. For further information, see the Bat Conservation Trust (BCT) website [3)].
[B)] Brown long-eared bats often hunt without using echolocation (instead using passive hearing and their eyes to detect prey). As such, they can be difficult to identify during surveys using bat detectors. Their call might be of a higher intensity when bats are commuting between roosts and foraging areas.

[3)] <http://www.bats.org.uk/> [viewed 14 September 2015]

Section 2: Roosts

5 Scoping (non-specialist) surveys for roosts: individual trees and groups of trees

5.1 General

Clause **5** applies to all trees which stand alone as individuals (see **3.18**) or are components of tree groups (see **3.33**). It does not apply when the management of wider woodland areas are proposed.

Prior to any tree felling or pruning commencing, a scoping survey should be undertaken to assess the tree(s) for the presence of PRFs.

It is the responsibility of the person undertaking the tree work to verify that a suitable scoping survey has been undertaken. In most situations the contractor is required to perform this work, though there might be occasions when the scoping survey has previously been undertaken by an ecological consultant (e.g. where a bat survey is required in support of a development application).

5.2 Methodology

Surveys can be undertaken at any time of year, but should preferably be carried out when the trees are not in full leaf, to aid the viewing of PRFs.

Any constraints to surveys should always be noted.

The scoping survey to identify the existence of PRFs should include checks for the presence of the following features that bats might be able to use:

a) natural holes (e.g. knot holes) arising from naturally shed branches, or branches previously pruned back to the branch collar;

b) man-made holes (e.g. cavities that have developed from flush cuts) or cavities created by branches tearing out from parent stems;

c) woodpecker holes;

d) cracks/splits in stems or branches (both vertical and horizontal);

e) partially detached or loose, platy bark;

f) cankers (caused by localized bark death) in which cavities have developed;

g) other hollows or cavities, including butt rots;

h) compression forks with included bark, forming potential cavities;

i) crossing stems or branches with suitable space between for roosting;

j) ivy stems with diameters in excess of 50 mm with suitable roosting space behind (or where a roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk);

k) bird and bat boxes on trees; or

l) other features that offer a place of shelter.

NOTE Roosts of some species can occur very low on trees so PRFs can be found at all heights.

The scoping survey should be undertaken by contractors or land managers, or anyone carrying out their own routine inspections when viewing the tree(s) for the first time. In many cases the survey can be undertaken when a tree is assessed to provide a price quotation for work required.

The tree(s) in question should be viewed from ground level systematically around all parts of the tree (viewed from close to the trunk and further away). High level PRFs can be identified by shining a torch on cavities and shaded areas. Whenever possible, this assessment should be carried out in the winter when leaves do not obstruct the view.

5.3 Skills level

Scoping surveys for roosts should only be undertaken by people who have received basic bat awareness training.

Arboricultural, forestry and landscape contractors performing tree work should ensure that a sufficient number of staff have been trained to enable scoping surveys to be performed for all trees intended for pruning or felling. Basic bat awareness training can be provided either externally or internally if companies or agencies have sufficient expertise to provide this.

A record of training should be kept to include details of who has been trained, the date the training was provided, the name of the training organization or individual trainer(s) and a summary of the training content.

5.4 Equipment

Binoculars should be used when undertaking a scoping survey.

A powerful torch and a camera might also be beneficial.

When using a torch the surveyor should ensure that prolonged illumination of a PRF does not occur, to avoid the potential for disturbing bats.

NOTE The use of cameras is solely for recording PRFs and not to photograph roosting bats.

5.5 Recording of findings

Information about PRFs seen during the scoping survey should be recorded. The information should include the site address, date of survey, name of surveyor, trees surveyed, tree location, species and details of PRFs observed. An example roost scoping survey form is given in Annex F. A separate plan and numbered tags attached to tree stems might be required to assist with tree identification.

If no PRFs are seen during the scoping survey, a record should still be made noting the tree(s) surveyed, date of survey and name of surveyor.

Trees should be graded for PRFs using Table 3. If no PRFs are seen during the scoping survey, tree(s) should be graded as low risk or negligible/no risk and work to the tree(s) can continue, though contractors should have procedures in place and be prepared to take action if bat roosts are subsequently encountered during tree work. Refer to Clause **14** for guidance.

If PRFs are recorded during the scoping survey, the tree(s) should be recorded as high/medium risk and further assessment should be undertaken prior to the commencement of work.

5.6 Next steps

Table 3 specifies the steps that should be taken following the scoping survey classification.

Table 3 **Classification of trees for risk of bat roost presence**

Tree category and description (following scoping survey)	**Secondary (non-specialist) survey recommendations**	**Secondary (specialist) survey recommendations**
Known or confirmed roost	Initially consider if work to tree can be avoided. If not, a specialist bat roost assessment should be undertaken to establish bat species, numbers and the nature of the roost.	
High/medium risk Trees with a suitable PRF, or with several features with some bat roost potential.	Secondary (non-specialist) assessment to examine PRFs previously identified. If roosts cannot reasonably be ruled out a bat specialist should be consulted. Following this assessment the tree could be upgraded or downgraded (see categories column).	Specialist bat roost assessment should be undertaken if work to a tree cannot be avoided. Assessment to include techniques such as endoscope use and dusk/pre-dawn surveys should be undertaken. Following this assessment the tree could be upgraded or downgraded.
Low risk Trees of sufficient size and age to contain bat roosts but with no obvious PRFs seen during the scoping survey, or features seen with limited roosting potential only, e.g. small amounts of ivy.	No further assessment is required unless sufficient new evidence is found to upgrade the category.	None
Negligible/no risk Trees with apparently no potential to support bats.	No further assessment is required unless sufficient new evidence is found to upgrade the category.	None

NOTE Risk equates to the likelihood of bat roost presence.

6 Secondary (non-specialist) survey for roosts: individual trees and groups of trees (non-development)

6.1 General

Where work is proposed to trees in which PRFs have been identified during the scoping survey set out in Clause **5**, a secondary survey of these features should be undertaken. Clause **6** describes the non-specialist secondary assessment which can be performed by anyone involved in tree management who is not a bat specialist but has had basic bat awareness training. If a roost is found and will be affected by work, a bat specialist should be contacted. If during a survey a roost is found, the surveyor (if unlicensed) should retreat immediately and a bat specialist should be contacted.

6.2 Methodology

During the secondary (non-specialist) bat roost survey, each PRF identified during the scoping survey should be examined closely to assess the likelihood of the feature being suitable to support bats. Low PRFs can be assessed from ground level with the use of a high-powered torch which, even in brightly lit conditions, can be useful in removing shadow from shallow cavities and help assess the likelihood of a feature suitable to support a bat roost being present. When using a torch the surveyor should ensure that prolonged illumination of a PRF does not occur, to avoid the potential for disturbing bats.

For PRFs which cannot easily be assessed from ground level it might be necessary to examine them by getting as close as reasonably possible using aerial techniques from a ladder, by rope-accessed climbing techniques, or by mobile elevating work platforms (MEWP).

NOTE 1 If it is not possible to assess the PRF at height, then other methods might need to be considered.

NOTE 2 Attention is drawn to The Work at Height Regulations 2005 [4] and the Lifting Operations and Lifting Equipment Regulations 1998 [5].

NOTE 3 How long a survey is to remain valid is to be decided on a case by case basis.

6.3 Primary signs of bat use

The signs most often encountered and most reliable when assessing the suitability of a PRF are:

a) the presence of bats (live or dead);

b) open cavities which extend above the opening, and that have sections which are smooth and free of debris; or

NOTE Cavities extending downwards only below entry holes are less likely to be used by bats.

c) bat droppings in, around or below the entrance (especially caught on horizontal branches below the entrance or surrounding leaves).

6.4 Occasional signs of bat presence

These signs of bat roosts are less frequently encountered, more difficult to determine and are less conclusive than those in **6.3**:

a) staining immediately around the opening;

b) smoothing of surfaces around the opening;

c) the distinctive smell of bats or ammonia;

d) audible chattering at dusk or in warm weather for some species; and

e) accumulation of prey debris such as insect wings.

If a PRF has signs of bat use but no bats are present, it should still be regarded as a bat roost.

6.5 Skills level

Secondary (non-specialist) surveys for roosts should only be undertaken by people who have received basic bat awareness training.

Additional formal training for the limited use of endoscopes is available to non-specialists to assess the suitability of PRFs and is essential for those wishing to use endoscopes to rule out potential roosting features.

Tree climbing surveys should be done by those appropriately trained, qualified and experienced in using tree climbing and aerial rescue techniques.

The use of artificial light (e.g. torch light) and endoscopes can disturb bats and are therefore licensable activities in known bat roosts. If an endoscope is being used by an unlicensed but appropriately trained individual it should only be used where other survey methods (use of binoculars, torches and mirrors) have been exhausted and no evidence (such as droppings and staining) has been observed. In this situation the limited use of an endoscope may be used to rule out PRFs that it was not possible to assess from ground level.

NOTE *See* Method Statement for the Appropriate Use of Endoscopes by Arborists [6] *for further guidance on endoscopes.*

If any further investigation is required beyond confirming a potential bat roost, then a suitably licensed bat specialist should be used. The use of a mirror can be employed to help with viewing hard to see PRFs and is not subject to the same licensing considerations, although the avoidance of bat disturbance remains paramount.

6.6 Equipment

For the secondary (non-specialist) bat roost survey the required equipment might include climbing equipment (ladder, MEWP, ropes and harness, etc.), binoculars, a powerful torch, mirror on a telescopic handle and an endoscope. Endoscopes should only be used to rule out the suitability of features to support a bat roost where this has not been possible from ground level and when less invasive methods have not been practicable. Before considering endoscopes, the following should be considered in preference:

a) an assessment of the PRF entrance using binoculars, torches or a mirror; and

b) use of mirrors with telescopic shafts and differing head sizes.

NOTE *LED torches are preferable as they tend to produce less heat than conventional filament bulb torches.*

When using an endoscope or any other invasive method, as soon as evidence that confirms the presence of a bat roost is identified, all equipment should be removed immediately. Any further invasive survey should be undertaken by a person licensed to use invasive survey techniques.

6.7 Recording of findings

Details of the secondary (non-specialist) bat roost survey should be recorded for each relevant tree. The information recorded should include the site address, date of survey, tree number, name of surveyor, tree location and species. See Annex F for an example roost scoping survey form. A photograph of the PRF might additionally assist.

Following the secondary (non-specialist) survey, the category originally allocated to the tree(s) during the scoping survey should be reviewed. If the PRFs are assessed as having low or negligible/no potential of being a bat roost, then the category should be downgraded and the proposed tree work may continue, though contractors should be prepared to take action if bat roosts are subsequently encountered (see Clause **14**). If this assessment confirms a bat roost the tree should be upgraded to "known or confirmed roost" status. If the PRFs being surveyed appear likely to be a roost, or could not be examined to the satisfaction of the surveyor, or could not be reasonably ruled out as being a roost, then the trees should be graded as high/medium risk (see Table 3). Consideration should be given as to whether high/medium risk trees can be managed differently at this stage to preserve the PRF.

6.8 Next steps

Next steps are determined by the categorization of the feature as described in **6.7**.

Where a secondary (specialist) survey is required this should be undertaken with the timing decided on a case by case basis, ideally with a pre-work inspection being undertaken on the same day as the scheduled work.

7 Secondary (specialist) survey for roosts: individual trees and groups of trees (non-development and development)

7.1 General

If tree pruning or removal is intended following a secondary (non-specialist) bat roost survey which confirmed a roost or assessed a high/medium risk for the tree having a PRF, then a specialist bat roost assessment should be undertaken.

NOTE 1 The assessment may be carried out immediately following a scoping survey which identifies a high likelihood of a bat roost.

NOTE 2 How long a survey remains valid needs to be decided on a case by case basis using the specialist's judgement. Where operations are proposed that would impact a potential roost, surveys are likely to be required prior to operations commencing.

During the bat roost survey, each PRF which has not been ruled out as a potential bat roost should be inspected in detail by the specialist.

NOTE 3 If it is not possible to assess the PRF at height, then other methods might need to be considered.

The methodologies and survey effort for the different types of survey vary depending on the survey requirements identified by the bat specialist but should be based upon the recommendations given in **7.2** and **7.3**.

7.2 Emergence and dawn surveys methodology

Emergence and dawn surveys of known roosts and PRFs should be utilized to determine species present and estimate numbers and usage. These are considered a non-intrusive measure of surveying and, since this method of surveying is not considered as disturbance, it can be carried out by non-licensed but experienced bat workers.

NOTE Emergence and dawn surveys are not suitable for hibernation use.

These surveys should be undertaken utilizing broadband handheld bat detectors to enable the detection and identification of bats species. A recording device is generally attached or built in to the detector which records the bat calls.

Recordings should be analysed using sound analysis software to either confirm species identification or to separate species with similar call patterns.

Camcorders with or without additional infrared illumination are increasingly being used to view and record emergence/entry as it can be difficult to pinpoint the exact point of emergence or numbers of bats in dark conditions. Infrared light does not cause disturbance to bats, and IR cameras can be used without a licence and can be beneficial in allowing activity to be seen in low light conditions.

Emergence and dawn surveys should be employed in situations where there are numerous features on individual trees which cannot be fully inspected via a daytime assessment. This could be due to features being deemed inaccessible for health and safety reasons or because the features being surveyed might extend beyond the scope of other survey techniques. Where there is a small group of trees covered in thick mat ivy or vegetation and features within the trees are not visible, carrying out emergence or dawn surveys can prove a more efficient and accurate method of surveying than direct searching of each individual tree.

The number of surveys to be undertaken depends on the objectives of the survey programme. Sufficient information might be gleaned from a single survey, or it is possible that multiple surveys might be needed.

The emergence surveys can be carried out during the active season (April to October) and should start fifteen minutes prior to sunset and continue for up to two hours after sunset. Ideally, surveys should cover spring, summer and autumn. The duration of the survey should include sufficient time to count all the bats out of the roost, and to count any bats returning to suckle their young.

Enough surveyors should simultaneously be deployed to observe all PRFs on any one tree. Surveyors should consider, particularly for dusk surveys, whether night vision scopes or infrared cameras would be beneficial.

Dawn surveys are likely to be far more effective as bats returning to the roost often take part in dawn swarming where the bats repeatedly approach the roost entrance before entering. This not only makes counting the numbers of bats returning to a roost easier (especially where leaf cover hampers the view), it also helps in identifying the exact roosting feature that the bats are using. Dawn surveys can also be used to back track (see **10.2.3**) the bats to a specific tree (i.e. when the survey covers a small copse).

Bats usually take part in dawn swarming at their roost one hour to one-and-a-half hours prior to sunrise, so dawn swarm surveys should commence at least two hours prior to sunrise. This reduces the potential for bats to return to their roosts prior to the survey commencing. The survey should finish at sunrise unless bats are still active. In areas that have a dense canopy, creating a dark area beneath, the survey might have to be extended.

As bats are known to move between roosts (in particular where they occur in trees, roosts can be used transiently for a few days at a time), multiple surveys should be undertaken. The number of surveys should be determined by the bat specialist and should involve some of the surveys taking place within the peak bat maternity season (May to August).

7.3 Direct searches of known roosts methodology

Direct searches of known roosts are a licensable activity.

A direct search involves the use of an endoscope or torch to identify the species and the number of bats present. This should only be undertaken where there is a potential impact on the roost or on the colony.

Where it is necessary to identify to species level, bats could be identified in the hand (where the roost opening and structure permits) or could be caught by an appropriate method such as use of a static hand net when the bats emerge. Handling bats should be avoided when they are heavily pregnant and lactating, and gloves should be worn at all times. Hibernating bats should not be handled. Handheld identification is especially useful where some bat species have similar echolocation calls and a definitive identification is required. It is possible to confirm the sex of the bat, and determine whether the roost is being used by breeding females and as such is a maternity roost/nursery roost, or whether the roost is being used by non-breeding females. As some species of bat are known to occasionally share roosts, care should be taken to ensure that other species are not overlooked within the same roost.

If during the search no bats are present but evidence of usage is found (e.g. droppings) biological evidence may be collected in a clean container and sent for DNA analysis to identify the species.

NOTE Droppings from tree holes can be contaminated with other matter or degraded by moisture, making DNA analysis difficult.

7.4 Skills level

The secondary (specialist) survey for roosts should be undertaken by a bat specialist who has had training and/or experience in the techniques used and is licensed where necessary.

7.5 Equipment

The equipment that should be used in the close examination of PRFs is given in Table 4. When climbing trees, contact with features such as loose bark that might be a bat roost should be avoided, where possible.

Table 4 **Equipment for direct searches**

Equipment	Use
Climbing and at height equipment (e.g. ladder, MEWP, ropes and harness)	For climbing tree to view PRF
Powerful torch	To view cavity and estimate likely depth
Mirror on telescopic handle	To aid with viewing interior of PRF
Endoscope	To aid with viewing interior of PRF

The equipment that should be used for dawn re-entry and dusk emergence surveys is given in Table 5.

7.6 Recording of findings

Assessed PRFs should be annotated on a plan or otherwise recorded in a way that allows their location to be apparent to all involved. Other information that could be recorded includes tree species, height, girth and life stage. Photographs may be used to record trees and their features where possible. Handheld GPS technology might assist in locating trees. Also, aspect, height, orientation and position of the PRF on the tree should be recorded.

7.7 Next steps

If a bat roost has been confirmed and work affecting the roost are planned to proceed, an EPS licence is required. If the PRF is reassessed as having low or no potential for a bat roost, work may proceed with precautionary measures in place (see Clause **14**).

Table 5 **Equipment for manual bat activity surveys**

Equipment	Use
Bat detector	Assists in finding bats
Recording equipment (various types, analogue and digital)	Sound recording of survey and allows for subsequent computer analysis
Headphones	Greatly increases the sound quality of the detector and allows two methods of listening to bats (heterodyne and frequency division)
Computer with spectrographic sound software	Spectrographic sound analysis
Hand held temperature and humidity meter	Instruments to record temperature and humidity (wind speed and direction and cloud cover can be estimated by eye)
Plans	To record findings
Torch/head torch	To light the way, for safety and to aid in recording notes
Compass	For orientation
Infrared or night vision equipment	To assist in the visual observation of bats

8 Scoping (non-specialist) surveys for roosts: woodland (non-development)

8.1 General

*COMMENTARY ON **8.1***

*If the reason for surveying woodland is for development relating to woodland loss or partial woodland loss, an ecologist needs to assess the potential impact (see Clause **10** and Clause **12**).*

To avoid or minimize any adverse effects from woodland operations on bats, an assessment should be undertaken to determine the likelihood of bat roosts being present.

If trees have features with the potential to be bat roosts then any impact on the roost (direct or indirect) should be avoided, where possible. If a bat roost is known then any operations that have the potential to impact the roost or the bats should be avoided. If it is not possible to avoid impacting the roost or the bats then further information and guidance is required and the appropriate agency advice sought with regard to the need for an EPS licence (see **3.32**) The country forestry authority can sometimes be an initial point of contact in this process.

Priority for bat assessments should be given to woodland stands where work is potentially required within the next five years. The reason for this is to minimize the potential for delays caused by late discoveries of bats, and to allow for rapid mobilization into woodland stands to meet timber demand at short notice. A walkover survey can be incorporated into any routine site inspections carried out for any reason by relevant staff. This reduces the additional time taken when considering bats.

This assessment can be undertaken in two stages. The first stage is a desk study (see **8.2.1**) and the second stage is a daytime field walkover survey (see **8.2.3**). The desk study is useful in the context it gives but is not essential in the majority of cases.

8.2 Methods

8.2.1 Desk study

Desk studies can be carried out to establish the available current data for the area of interest and are particularly important for any surveys that are:

a) over a large area (woodland scale);

b) of a complex nature, e.g. where there are permanent losses of woodland or major operations; and

c) in locations where the rarer woodland bat species are potentially present.

Desk studies should be conducted at an early stage when planning bat surveys, and are useful in deciding the type and intensity of survey required. Desk studies can provide historical knowledge of the woodland under survey and its past importance to bats, and how this might have altered over the years since the collection of records for that woodland began. For some woodland this knowledge might already be available so that a desk study is not necessary.

The first stage in any desk study should be to obtain maps of the area and study the recorded woodland habitats and features likely to be important for bats. This enables a judgement to be made about the species likely to be present and to determine where best to look for them. Maps can be supplemented with aerial images, which can be obtained from various online sources.

Species likely to be present should be ascertained utilizing both national and, where available, local distribution data (see Annex B for information about sources of distribution data and local records). The desk study should take account of as many sources of information as possible.

NOTE The absence of a species record in an area does not necessarily mean that the species is not present.

It is unlikely that a desk study alone would provide enough information to fully assess the value of an area for bats and an initial visit to the site for a walkover or scoping survey should be carried out.

8.2.2 Geographical extent of desk study

Information relating to the presence of bats surrounding the survey site should be requested. The radius depends upon the potential impact of the proposed work and the species within the locale likely to be affected. For foraging distances that might be travelled from the roost, see Table 2.

Where the proposed work could affect a special area of conservation (SAC), a Habitat Regulations assessment (HRA) might be required. Such an assessment should be undertaken by a bat specialist.

8.2.3 Daytime walkover

The daytime walkover survey should identify whether any PRFs (see Table 3) are present within or adjacent to the area of woodland being affected. It is not the aim of the scoping survey to map each individual feature, but to ascertain whether suitable roost features are present which would require further assessment.

It is preferable (but not essential) to undertake a desk study (see **8.2.1**) prior to the daytime walkover survey. For examples of how the desk study might inform the walkover, see Annex G.

8.3 Skills level

Scoping surveys for roosts should be undertaken only by people who have received basic bat awareness training.

For forestry operations or woodland management, those managing the site should ensure that a sufficient number of staff have been trained to a basic level to enable scoping surveys to be performed for all trees intended for pruning or felling. A record of training should be kept to include details of who has been trained, the date the training was provided, the name of the training organization or individual trainer(s) and a summary of the training content.

Basic bat awareness training can be provided internally if there is sufficient expertise to provide this.

8.4 Equipment

Binoculars and a powerful torch are the only essential equipment that should be used to undertake a scoping survey.

8.5 Recording of findings

The location of trees containing PRFs and that of those trees with potential but that could not be viewed should be recorded clearly enough to enable them to be relocated for a secondary survey.

8.6 Next steps

If no PRFs are present that would be affected by planned work then no further action is required with regard to roost assessments.

If PRFs are identified that would be affected by planned work then a secondary survey should be carried out (see Clause **9**). If a roost which might be impacted by planned works is confirmed by the walkover a specialist survey should be undertaken (see Clause **10**).

NOTE Works that would impact a confirmed bat roost require an EPS licence.

9 Secondary (non-specialist) survey for roosts: woodland (non-development)

*COMMENTARY ON **CLAUSE 9***

*Clause **9** applies to forestry or conservation management operations and not to instances where woodland is impacted as a result of development, which most often involves the permanent loss of woodland as a habitat in the affected areas. For development, see Clause **10** and Clause **13**.*

Non-development in this context means operations that are linked to managing woodland for conservation, public enjoyment or commercial reasons, but does not involve the permanent loss of woodland that occurs as a result of activities such as development or infrastructure projects.

9.1 General

The recommendations given in **9.2** to **9.6** should be implemented if the scoping survey (see Clause **8**) has identified the potential presence of bat roosts. If operations can be planned around these so that there is no impact on the potential roosts, then no further action is necessary.

If there is a confirmed roost present and it is not possible to avoid impacting the roost then an EPS licence is required from the country SNCO (see **3.32**). The country forestry authority can sometimes be an initial point of contact in this process and specialist surveys are required to inform this (see Clause **10**).

In those areas where potential (but unconfirmed) roosts have been identified then a second, more detailed, survey should be undertaken.

*NOTE For consideration of foraging and commuting value, see Clause **11**.*

9.2 Methodology

9.2.1 Visual assessment of PRFs

The secondary (non-specialist) survey should ideally be undertaken in winter when leaves are off trees and it is easier to observe PRFs. Where PRFs are present, a high-powered torch and binoculars should be used to discount features which look like a cavity but which do not penetrate into the tree, being too shallow to offer any suitable protection for roosting bats. When using a torch the surveyor should ensure that prolonged illumination of a PRF does not occur, to avoid the potential for disturbing bats. This survey can be carried out in summer but takes longer and could result in features being missed as they might be obscured by the foliage. Where operatives are trained to do so, PRFs can be directly assessed utilizing ladders, tree climbing equipment or MEWPs and then directly searched using torches and endoscopes (see **6.5** for guidance on endoscope use by non-specialists). This process will identify features which might be too shallow to provide suitable roosting features for bats.

During the survey it should be determined whether it is more efficient to survey the trees via direct access methods (i.e. tree climbing) or whether it is more efficient to undertake emergence/return surveys. For example, a small group of trees covered in dense ivy which appear to have some roost potential could be recorded as a single point. If affected by planned work, it might be more efficient to undertake emergence/return surveys of the group rather than climbing each tree individually.

If a bat roost is identified during the mapping exercises then, subject to land owner consent, the tree should be marked in such a way that the marking cannot be confused with other forestry operations markings. Hazard tape can be used to mark the trees temporarily. However, care needs to be taken when using this method as wild animals (or livestock) can remove the tape if it is placed too low.

Surveyors should be aware that bats regularly move between roosts and so where a bat roost has been identified in a tree, other roosts in the same tree or adjacent trees might also exist.

9.2.2 Basic audible bat roost surveys

Daytime mapping of PRFs can be supplemented by the use of additional survey techniques to determine whether bats are using roosts in the woodland. This should be undertaken by surveyors with some knowledge of bats. The local bat group could be invited onto the site to provide additional bat information.

The appropriate use of these techniques should be applied where winter surveys have identified areas with a moderate to high potential for bat roosts. Daytime summer surveys carried out during midsummer (July to August), ideally on hot days, involve walking through the woodland approximately thirty minutes prior to sunset, observing and listening for bat activity. Prior to emergence, bats are active within the roost, and some species can make social/chattering noises that might be detected both with a bat detector and the human ear.

NOTE This method does not work for all roost types or species and cannot be relied upon solely.

Basic bat surveys using bat detectors are most likely to be useful if employed when looking for bats emerging at dusk from PRFs or for when they enter at dawn. As bats move from roost to roost through the summer, unoccupied roosts can be missed from one visit alone and, as such, absence should not be determined based upon a single visit.

Where bat roosts are identified and those roost features are going to be directly or indirectly impacted by adjacent operations, then further specialist surveys should be carried out.

9.3 Skills level

A secondary (non-specialist) survey should only be undertaken by someone who is trained to do so. For forestry operations or woodland management, the manager of the site should ensure that a sufficient number of staff have been trained to a basic level to enable such surveys to be performed.

A record of training should be kept to include details of who has been trained, the date the training was provided, the name of training organization or individual trainer(s) and a summary of the course content. Basic bat awareness training can be provided internally if there is sufficient expertise to provide this.

9.4 Equipment

Recommendations for suitable equipment are given in **6.6**.

9.5 Recording findings

Any trees containing PRFs which have not been ruled out as roosts following the secondary (non-specialist) survey should be annotated on a large scale plan or recorded in a way that allows their location to be apparent to all involved. Aspect, height, orientation and position of the PRF on the tree should be recorded. Other information that could be recorded includes tree species, height, girth and life stage (see Annex F).

9.6 Next steps

Where trees are confirmed as containing a bat roost, or where they have been categorized as high/medium (see Table 3) and are likely to be impacted directly or indirectly by planned works, then further surveys by a bat specialist should be undertaken.

Where a bat roost is present and the tree is to be felled or have work undertaken which could damage the roost or disturb the bats, then an EPS licence is required from the SNCO (see **3.32**). To obtain a licence, further survey work is likely to be required to establish the bat species present, the population, status and the extent to which the bats use the site. These are required to inform the impact assessment and any required mitigation or compensation. The level of further survey effort depends upon the rarity of the species present and the status of the bat roost.

10 Secondary (specialist) survey for roosts: woodland (non-development and development)

10.1 General

Secondary (specialist) surveys should only be undertaken when PRFs with high/medium potential for roosts have been identified and it is not possible to avoid a direct or indirect adverse impact on the PRFs. Secondary (specialist) surveys of the PRFs should be carried out to assess the potential bat value of the roost combined with the potential impact of the works. The specialist should assess the potential and propose a survey methodology. This could include:

a) emergence and dawn surveys;

b) transect and static detector surveys;

c) back tracking surveys;

d) direct searches of known roosts (including at height);

e) use of infrared equipment to aid surveys;

f) direct capture using either mist nets and/or harp traps; and

g) radio tracking surveys.

10.2 Methodology

10.2.1 General

The methodologies and survey effort for the different types of survey vary depending upon the requirements identified by the bat specialist but should be based upon the good practice guidelines summarized below.

10.2.2 Emergence and dawn surveys

Recommendations for emergence and dawn surveys are given in **7.2**.

10.2.3 Back tracking surveys

Back tracking surveys are undertaken using handheld bat detectors and associated recording equipment using the general methodologies outlined for emergence and dawn surveys (see **7.2**).

NOTE These are not successful for all species or in all woodland types.

These surveys should be carried out by identifying the commuting routes of bats during the emergence period, going to the locations where any bat was observed to begin its commuting from, waiting for the next bat to come from that direction and gradually moving closer to the roost area. This can be an efficient way of finding new roosting locations or narrowing down the roosting locations within blocks of woodland, although it requires several evenings/mornings surveying.

As the surveys require back tracking the bats from their foraging grounds to their roosts, the evening surveys should be undertaken for a longer period to allow the bats sufficient time to commute from their roosts to the foraging grounds. The opposite is true for the dawn back tracking surveys, which should start earlier so that the bats can be followed back from the foraging grounds to their roosts prior to commencing their dawn swarming.

These surveys are generally combined with emergence and dawn surveys.

The survey effort for back tracking surveys is not fixed. These surveys have the specific aim of locating roosts using commuting bats for guidance and should be continued until this aim is reached unless alternative methods are considered more appropriate.

10.2.4 Direct searches of known roosts

Recommendations for direct searches of known roosts are given in **7.3**.

10.2.5 Direct capture using either mist nets and/or harp traps

Mist nets and harp traps can be used where the exact roost is unknown, such as within a small copse with poor visibility of several PRFs. Mist nets and harp traps can be also used to confirm the identity of the species which might be roosting on or adjacent to the site.

Mist nets and harp traps can also be used to determine whether species such as Bechstein's bat, grey long-eared bat, whiskered bat, Brandt's bat and Alcathoe bat are present, to ensure that they have not been misidentified as other similar bat species. As with the taking of bats (see **7.3**), the use of mist nets and harp traps can determine whether the nearby roost is used by males, breeding females or non-breeding females with the results used to inform the potential impact of the works.

The use of a lure can increase capture rates but should only be used in very limited circumstances (see **12.2.7**).

These methods are invasive and require an appropriate licence from the SNCO (see **3.32**). The licensee will need to justify why the information is needed and why less invasive methods have not been used.

10.2.6 Radio tracking surveys

Radio tracking is the most intrusive method of surveying as it involves catching and tagging individual animals, but it can be the most informative. Radio tracking surveys should be undertaken to inform whether rarer bat species are affected, or where smaller isolated populations might be segregated from the surrounding environment as a result of the proposed works. These surveys provide detailed and accurate data on roosting sites used by those individuals tagged (with males and females utilizing different sites) and on mating sites (depending on the time of year the survey is carried out).

*NOTE 1 Radio tracking studies can often provide important data on flight routes and foraging areas (see **12.2.8**).*

Radio tracking surveys are expensive and time consuming, and only a few bats can be followed at any one time.

To radio track, a bat should be taken by hand or handheld static net, mist net or harp trap. If the individual bat is suitable (i.e. appropriate weight in relation to the tag, of appropriate breeding status, healthy and of the targeted species) then a radio tag can be attached. Over the course of the following days/weeks, the radio tagged bats should be followed to determine roosts that might not have been identified in the initial surveys. This method should also be used when no roosts are present on site, but the locations of roosts off site still need to be identified to accurately assess the impact of works upon these roosts.

Radio tracking can also determine whether any additional roosts are present within the surrounding area provided tagged bats visit them. As the rarer woodland bats change roosts frequently, the identification of additional roosts either on or off site can be valuable in assessing the overall impact upon this species of proposed works.

The proportion of roosts affected should be accurately determined. The radio tracking studies might determine that only a small proportion of roosts are affected (e.g. only one roost is present on site for the specific bat colony, whereas twelve are present off site including the majority of the area in which they forage). However, the radio tracking studies might identify that the majority of roosts for the bat colony would be impacted by the works, and as such could detrimentally affect the colony and population.

Radio tracking is invasive and requires an appropriate licence from the SNCO (see **3.32**). The licensee will need to justify why the information is needed and why less invasive methods have not been used.

NOTE 2 Further information on all aspects of catching and marking bats can be found in Bat Surveys for Professional Ecologists – Good Practice Guidelines *[7] and the Natural England publication* Guidance on the capture and marking of bats under the authority of Natural England licence *[8].*

10.3 Skills level

Secondary (specialist) surveys for roosts should be undertaken by a bat specialist (see **3.7**) who has had training and/or experience in the techniques used. Where invasive survey techniques are to be used on bats or known bat roosts the work should only be undertaken by a licensed bat worker (see **3.20**).

10.4 Equipment

The equipment that should be used in specialist secondary surveys for roosts is listed in Table 6.

10.5 Next steps

If a bat roost has been confirmed and works affecting the roost are planned to proceed, an EPS licence is required. If the PRF is assessed as having low or no potential for a bat roost, work may proceed with precautionary measures in place (see Clause **14**).

Table 6 **Equipment required for secondary (specialist) surveys**

Equipment	Use
Emergence and dawn surveys	
Bat detector	Assists in finding bats
Recording equipment (various types, analogue and digital)	Sound recording of survey and allows for subsequent computer analysis
Headphones	Greatly increases the sound quality of the detector and allows two methods of listening to bats (heterodyne and frequency division)
Plans	To record findings
Computer with spectrographic sound software	Spectrographic sound analysis
GPS	Accurately records the location of roosting sites, allowing these to be efficiently found on re-visits by other personnel
Compass	For orientation
Torch/head torch	To light the way, for safety and to aid in recording notes
Binoculars	To aid close up observation of specific entrance/exit points
Infrared or night vision equipment	To assist in visual observation of bats
Radios	To enable constant communication between surveyors who are working together
Back tracking	
As for "Emergence and dawn surveys"	As for "Emergence and dawn surveys"
Ordnance Survey map of the area	To enable fast navigation through the landscape in relation to the survey site (and to note any areas to which access is not granted)
Direct capture (using mist nets and harp traps)	
Mist nets and harp traps	To capture bats
Capture bags	To transport bats directly after they've been captured [A)]
Identification sheets	Reference guides to assist species identification
Micro lens	To examine small details
Cuticle scissors	To enable quick release of individuals if displaying signs of stress in mist nets
Gloves (different thicknesses)	To enable safe handling of bats
Signage/tape	To denote nets and traps on public rights of way
Direct search	
Climbing equipment (e.g. ladders, MEWP, ropes and harness) (where applicable)	To assist access for the inspection of the roosting feature
Powerful torch	To view a cavity, estimate the likely depth and inspect areas which might not be accessible
Mirror on telescopic handle or endoscope	To aid with viewing the interior of PRFs
Gloves and bags	To enable safe handling of bats
Handheld net	To aid capture for species identification (if required)
Radio tracking	
As for "Direct capture"	As for "Direct capture"
Very high frequency (VHF) transmission tags	To attach to a studied bat
Tagging equipment including weighing scales, scissors, glue and bags	To enable the quick and efficient tagging of animals
Receiver and aerial	To receive transmission from tagged bats to determine their location

[A)] Bats of different species, sexes and breeding status cannot be kept in the same bags. Therefore, numerous capture bags should be used to hold animals if a large number are captured at the same time (e.g. at emergence), especially when using mist nets.

Section 3: Foraging and commuting

11 Scoping (non-specialist) survey for foraging and commuting: groups of trees and woodland (non-development)

11.1 General

Clause **11** gives recommendations for surveying groups of trees and woodland to determine their value for foraging by bats or use for commuting through the landscape where intended management works might impact this.

NOTE In some circumstances, individual trees can have importance for foraging and commuting.

This survey should be undertaken in all woodland and groups of trees, including those where there is little or no roost potential, and should include a consideration of planned work over a long period of time. Where possible, the survey should be carried out in adjacent woodland to take into account cumulative effects (i.e. the combined impacts of multiple activities). The survey allows the wider implications for provision of roosts, foraging habitat and connectivity to be assessed.

11.2 Methodology

11.2.1 Desk study

Using the recommendations given in **8.2.1**, as much information and data as possible should be obtained on the use of the site by bats. In all cases, the species of bat that have distribution ranges that include the woodland in question should be ascertained. For those bat species indicated as having the potential to be present, Table 2 gives their foraging requirements and Clause **4** provides more information on this.

Using this information, a woodland manager or their agent should assess the woodland in question for its likely importance for bat foraging and commuting.

The rarity of barbastelle and/or Bechstein's bat species and their recognized dependence on woodland should be taken into account as well as their particular requirements. If the risks warrant it, a more thorough survey should be undertaken by a bat specialist.

11.2.2 Site walkover

A systematic walk through the group of trees or woodland should be undertaken to assess the areas that hold the highest levels of importance for foraging and commuting. This includes a consideration of structure and vegetation type, and recognized areas that support invertebrates (see **4.4**). Information gained from any desk study might help inform this (see **11.2.1**).

The level of intensity of site walkover depends on the overall size and how homogeneous the woodland is. If there are large tracts of plantation that have the same features throughout then the amount of effort needed is reduced compared to woodland that has a mosaic of woodland types and features.

If the group of trees or woodland in question is likely to be used by barbastelles or Bechstein's bats, or if the operations being carried out are likely to result in long lasting or severe impacts (such as in the permanent loss of woodland habitat), then a secondary (specialist) survey by bat specialists should be undertaken.

11.3 Skills level

Scoping surveys should only be undertaken by people who have received basic bat awareness training and, preferably, who are familiar with the group of trees/woodland.

11.4 Equipment

No specialist equipment is required at this stage.

11.5 Recording of findings

The habitats and features most likely to be of value for foraging and commuting bats should be marked on a map or plan. The findings should be recorded as part of the process along with an annotated map.

11.6 Next steps

If it is assessed that the planned work could have a significant impact on bat foraging or commuting, or if the level of impact is uncertain (especially in the case of barbastelles and Bechstein's bats), then a specialist survey should be carried out (see Clause **12**).

If the information obtained from the non-specialist assessment allows sufficient confidence that either the groups of trees or woodland have poor potential for bat foraging or for commuting, or the important foraging areas (see Clause **4**) and their connectivity within the rest of the woodland and wider landscape is maintained for the bat species likely to be present, then no further survey effort is required.

12 Secondary (specialist) survey for foraging and commuting: groups of trees and woodland (non-development and development)

12.1 General

Secondary (specialist) surveys should be undertaken where woodland is to be lost for development or infrastructure projects. They should also be undertaken where forestry operations or other works within a woodland or group of trees are likely to cause a loss or deterioration of valuable foraging areas or connectivity, especially where barbastelles or Bechstein's bats are known to be present.

A full desk study and site walkover survey should be undertaken, to determine the appropriate survey methods used.

The appropriate combination of survey techniques should be determined by a bat specialist on a case by case basis. This guidance does not cover any specific considerations relating to other activities or changes in land use that the proposed work might be associated with for planning developments (e.g. roads, wind turbines); these would be assessed through the environmental impact assessment (EIA) process in consultation with relevant specific guidance.

12.2 Methodology

12.2.1 Timing

Manual bat activity surveys should be programmed to take place when bats are most likely to be active. Start times should vary throughout the year, according to dusk and dawn times. In practice, surveys may be undertaken as:

a) dusk surveys only;

b) dusk and dawn surveys with a rest break between the two;

c) dusk to dawn surveys (as undertaken for radio tracking studies, which can provide valuable information when conducted as manual activity surveys); or

d) dawn surveys only.

Peak bat activity is seen at dusk and dawn, and there can be a lull in activity in the early hours of the morning, although at autumn swarming sites bats remain active for several hours after dusk. For this reason surveys are usually concentrated in the hours after dusk.

As a minimum, one dawn survey should be undertaken. This increases the understanding of how bats use the site and can be particularly useful in locating roosts by detecting bats engaging in dawn swarming activity outside the entrances to their roosting sites.

NOTE Dawn surveys are only appropriate in weather conditions conducive to bats either staying out all night or dawn foraging. This is most likely to be during the summer period.

12.2.2 Survey effort and frequency

The optimum number of surveyors should be determined by the area of woodland and bat potential of the site in terms of the species expected to be present, the number of potential roost sites and the availability of suitable habitat. Ease of access and navigation around the site might also be a factor in determining the number of surveyors. The number of surveyors is also influenced by the type and number of bat detectors available and the objective of the survey. The bat potential and number of surveyors is decided after the desk study and preliminary walkover survey.

When undertaking any survey for development, or where other operations in the woodland are likely to have a significant impact, the level of survey effort should be proportionate to the likely use of the site by bats and the potential effects of the proposed activity on the species present. The effort should be closely related to the habitats present. For example, more effort is required when the site is predominately deciduous woodland and a river corridor.

The geographical location of the site should be taken into account, with increasing species diversity to the south and west of the UK.

Ideally, surveys should aim to achieve 95% certainty of detection of species present. Table 7 shows the most recent research by Scott and Altringham [9], which gives the findings for the number of surveys their study found necessary to reach the recommended level of certainty. However, site conditions and surveyor experience might influence the actual number of visits required. The monitoring was undertaken using software developed by the project to automatically isolate and identify bat species. The software was developed with one brand of detector.

NOTE 1 The compatibility of the software with other brands is uncertain at this stage.

NOTE 2 Survey effort for presence/absence may be reduced through the use of alternative survey methods.

NOTE 3 It is very difficult to separate the Bechstein's bat call from other myotis species by acoustic methods. Catching surveys are likely to be required where there is reasonable potential for this species to be present.

Several methods should be considered during manual bat activity surveys in order to gain an understanding of how bats use an area. A single method should not be used in isolation.

Table 7 **Examples of the number of bat surveys found necessary to identify species composition**

Species	Number of surveys found necessary to achieve 95% certainty of detection for walked transect survey
Pipistrelle	1
Brandt's bat	2
Whiskered bat	2
Barbastelle	2
Alcathoe bat	2 to 3 [A)]
Horseshoe bat	4
Natterer's bat	5
Bechstein's bat	4 to 6 [A)]
Brown long-eared bat	Up to 9 [B)]

[A)] For Alcathoe bats and Bechstein's bats this is an untested estimate.
[B)] It could be reasonable to assume that brown long-eared bats are likely to be present in most broadleaf woodland and the specialist should consider the need for proof of presence and alternatives, for example existing records, for providing this where required.

12.2.3 Walked transects

12.2.3.1 Choosing the route

The chosen route should first be visited in daylight to plan the route and listening station stops, noting how long one circuit takes. The aim is to ensure that the whole transect takes no more than three hours starting about half an hour before sunset. Surveys should take place when weather conditions are appropriate (dry, mild) and weather conditions should be recorded.

If the site to be surveyed is small, more than one circuit might be achieved in one survey session. At a large site, transects might need to be undertaken over several consecutive nights to cover the whole area, or a larger number of surveyors used.

A route should be chosen using aerial photographs, an Ordnance Survey map and a daytime walkover. The route should incorporate habitat features with potential for use by foraging and commuting bats, and should include, if present, woodland, woodland edge, hedgerows, lines of trees, stream corridors, lake or pond edges, scrub margins and open areas.

In woodland, for health and safety reasons, transects are likely to follow the line of tracks, paths, and include clearings and woodland edges, but typically not woodland interiors. As a number of bat species (including the rarest) specialize in using these more cluttered areas of woodland it is likely that these could be missed using walked transects.

12.2.3.2 Survey design

Survey methods to record bats associated with cluttered interior woodland and those that forage in the canopy should be included (see **12.2.4** for guidance).

The survey design should take into account areas where particular information is needed, e.g. the specific location of proposed works and alternative locations as appropriate. Transects are usually walked with a broadband bat detector connected to a recording device, or the recording device might be an integral part of the detector. Recordings can include the exact time of the bat pass and these can be checked against the surveyor notes during later analysis. Other detectors can be set to record either automatically at an ultrasound trigger, or used on a manual setting. In manual mode, the observer pushes a button to start the sample when ultrasound is heard, and then listens to the time expanded sequence on a loop stored in the detector memory either recording or discarding each sample in turn. Some detectors enable the observer to listen in heterodyne mode as well as record into either time expansion or frequency division. Heterodyne detectors cannot be used for analysis of frequency information.

12.2.3.3 Survey methodology

The transect should be walked along a predefined route and at a steady speed. It can be useful to incorporate between ten and twelve listening station stops interspersed along the chosen route. The length of each stop should be three to five minutes, depending on the overall length of the transect. The overall survey process should take no more than three hours.

When using transects to survey bats for a development or other major impacts on a woodland, the objective is to find not only an estimate of abundance and the species of bat present but also identifying all parts of the site which are used by bats. Therefore, transects should:

a) be undertaken in reverse (or clockwise and anticlockwise);

b) be changed to look at different areas; and/or

c) include spot counts (remaining stationary for three to five minutes), depending on the level or type of activity.

Scott and Altringham [9] found that the ability to use a raised external microphone is an advantage in obtaining the highest quality and potentially the most useful recordings, but this is not always practical, or a requisite for an effective woodland survey. Collins and Jones [10] found that surveys above the canopy of the woodland are likely to return different results from ground level surveys. Surveyors should be made aware that orientation of the microphone influences the ability to pick up bats.

The use of a lure to increase bat recordings is not recommended except in specific circumstances (see **12.2.7**), until there is a better understanding of how they work. Their use would always need to take account of the aims of the survey and to take account of any bias their use would have on the findings.

12.2.4 Automated bat activity surveys

These surveys should be employed where a greater level of survey intensity is required than can be achieved with manual bat detector surveys. Automated bat activity surveys can allow several sample points to be surveyed at the same time, providing more comparable results, or be used to provide a more flexible timetable for surveying. They also allow the interior areas of woodland to be surveyed, which would not otherwise be possible due to cluttered and difficult walking conditions.

There are two types of system that can be used to record bat activity remotely in the absence of a surveyor. These are remote bat detector recording systems and automated activity logging systems.

a) Remote bat detector recording systems. These consist of broadband detectors (frequency division or time expansion) attached to a recording

device. Depending on the system used this produces either a log of bat passes over time or records calls for later sound analysis, enabling an attempt to be made at species identification. Paired detectors or a detector set up with two microphones can be used to provide information on the direction of flight.

Complete systems that are designed to be left out in the field to detect and record bat calls are commercially available. It is also possible to build a system by combining standard bat detectors and recording devices that use tapes, mini disks, memory cards or hard disk MP3 recorders.

b) Automated activity logging systems. These use a device that is triggered by sound (via a detector) or movement (crossing an infrared beam) and record these as events onto a data logger or to a camera. Systems that only log activity, but do not record bat calls should be supplemented by further observations or recordings for identification purposes.

Automated activity logging systems have the potential to collect long runs of quantitative or semi-quantitative data with minimal effort and might be useful in determining the presence of hard to detect species, such as long-eared bats, that require repeated manual surveys to gain sufficient certainty of detection. The ideal automated activity logging system counts the number of bats going into and out of the site, or derives an index of activity, identifying each bat to species and logging the time of each event.

Night vision camcorders or cameras activated by movement can be used to record bat activity and possibly bat behaviour without the need for an observer to be present throughout the survey period. These systems are deployed in the field at specified sample points, for example, to observe a roost entrance.

Recording systems can save time by determining which areas at a site merit more detailed survey work or which time of the night or season can be prioritized. Some systems are more appropriate for use with certain species or in particular locations, as some species are more easily detected than others and detectors vary in their sensitivity to different frequency ranges. These factors can be used to advantage in surveys concentrating on a particular species but are a restriction for surveys looking at the broad spectrum of bat activity.

Automated techniques of both bat detector recording and activity logging can be undertaken as an alternative to transect surveys in some circumstances but do not provide observer notes, which are often essential to identifying certain species. Therefore, automated techniques should be considered as a way to increase sampling effort. Ideally, both surveying methods should be used in a complementary manner.

12.2.5 Timing, survey effort and period

12.2.5.1 Timing

Activity loggers can be used at any time of year but low or negative results obtained when the weather or time of year is less favourable for bat activity should be interpreted with care.

Deployment of activity loggers should be designed to record bats as they commute, forage, or move to and from daytime and night-time roosts during the summer. Loggers can be used when assessing the level of swarming activity at a site during autumn activity.

Bats rouse periodically from hibernation but as activity levels are lower in winter, bats are most likely to be picked up close to a roost entrance.

Automated systems of both types can be used to supplement transect survey data by leaving the system running throughout the night when observers are carrying out other surveys nearby.

12.2.5.2 Survey effort

For each point at which remote detection and bat sound recording systems are deployed they should be used over multiple consecutive nights for each sampling period (at least five nights) in appropriate weather conditions for bats to give representative figures for that time of year. Survey effort is dependent on the value of the woodland for bats, as assessed by the specialist. As a minimum, three sampling periods (spring [April/May], summer [June/July/August] and autumn [September/October]) should be carried out at each location, to record seasonal variations in activity. The numbers of bat passes recorded can vary from night to night but the overall pattern of activity through the night, and the proportions of different species, are likely to be similar on successive nights.

NOTE Some bat species use the shelter of woodland to extend feeding opportunities when rain would deter this outside of this shelter. However, rain-free nights are more conducive to surveying.

12.2.5.3 Survey period

Programmable automated detectors can be left to record continuously throughout the active period (April to October), switching on and off at preset times. The detectors should activate thirty minutes before sunset and switch off thirty minutes after sunrise, depending on the survey design. The constraints here are security, the weather, and the need to change batteries or link the battery to a self-charging system (such as a solar panel). For example, the equipment could be left to run indefinitely, with only infrequent visits to change batteries and download data if the location being surveyed is hidden from view and protected from rain (although some systems are weatherproof).

12.2.5.4 Other considerations

To correlate results to weather conditions, temperature and humidity data loggers can be used in conjunction with the automated systems.

When using automated activity loggers the flight characteristics of the species under study and the location should inform how these are used. A survey of high flying bats in an open area would require a different placement of detectors than a survey of activity of a bat species associated with cluttered habitats.

Automated activity logging is particularly effective where bats are constrained into a narrow flight path. The use of such systems along flight paths or close to roost entrances can give an indication of the number of bats commuting to or from the roost if the time of the observations is recorded. If several time-linked detectors are used, the direction of flight can potentially be deduced. If the location is hidden from view or secure, the equipment can be left in place over periods of days, weeks or even months.

The likelihood of detecting different groups of bats should be included in the interpretation of the results. Surveys above the canopy of the woodland are likely to return different results from ground level surveys, as discussed by Collins and Jones [10].

12.2.6 Direct capture using either mist nets and/or harp traps

Mist nets and harp traps should be utilized to determine whether species such as Bechstein's bat, grey long-eared bat, whiskered bat, Brandt's bat and Alcathoe bat are present and to ensure that they have not been misidentified as other similar bat species. The use of mist nets and harp traps can also be used to confirm the sex and breeding status of bats, the age class and the identity of the species which might be roosting on or adjacent to the site. These methods are invasive and require an appropriate licence from the SNCO (see **3.32**). They should only be used where other non-invasive methods have failed to produce information that is necessary for the purposes of surveying in each case, or if it is clear that non-invasive methods are likely to be highly ineffective.

Potential trapping sites should be chosen on the basis of aerial images, site plans and knowledge from walkovers of the site. Mist net and harp traps should be located where there is a pinch point that funnels the bats into using an area. This might be where structures or the density of vegetation enable the bats' likely flight path to be predicted and intercepted with the placement of the traps.

Mist netting and harp trapping should take place during the main active season (April to October), although this is subject to the specific objectives of the surveys. Trapping surveys should avoid the time when bats are heavily pregnant or lactating unless a specific licence allows such activities, based on information needs. Traps need to be prepared in daylight, set at dusk and left in place for at least three hours, depending on the aims of the survey.

Interior woodland trapping with low and high nets assists in determining the importance of the woodland for foraging, and increases encounters with bat species that are clutter specialists. The importance of the information gained should be balanced with the needs of the survey as woodland interior is a more difficult habitat in which to set nets and bat captures are likely to be low.

The number of nets or traps set depends on the size of the site and the objectives of the survey. It is anticipated that three trapping surveys should be undertaken over the active period unless survey needs or results dictate otherwise. When mist nets are deployed, they need to be monitored for captured bats at five minute intervals and for harp traps every fifteen minutes or, for both methods, when bat activity is seen or heard. Bat detectors and night vision equipment can be used to raise awareness of the presence of bats around the net or trap.

Processing bat information (species, age class, sex, breeding status and measurements, where needed for species identification) should be carried out promptly to allow for the bat to be released as quickly as possible. Pregnant or lactating bats should be released immediately.

12.2.7 The use of an acoustic lure

Where it is important to be aware of the presence of particular bat species and gain more detailed knowledge of their use of a woodland if the species in question cannot confidently be identified by acoustic or other survey methods, then trapping can be assisted by the use of an acoustic lure. This is likely to occur most often in the range of Bechstein's bats.

Lures have been found to be effective in increasing capture rates when used with harp traps and mist nets but there are additional considerations.

a) Very little is known about the effects these devices have on the behaviour of bats and whether elements of this are negative.

b) Bats are attracted from outside the capture area and so information about where bats are found (including within woodland niche use) might be misleading.

c) Currently, few specialists are trained and licensed in this technique.

Due to the limited use of this technique and its very specialized nature, further details are not given here. To find out more about using this technique refer to the Advanced Licensed Bat Survey Techniques chapter of *Bat Surveys for Professional Ecologists – Good Practice Guidelines* [7].

12.2.8 Radio tracking surveys

Radio tracking is the most intrusive method of surveying as it involves catching and tagging individual animals. However, it can be the most informative and targeted, especially in more sensitive situations where it should be used to inform whether rarer bat species are affected (rare can refer to either nationally rare or locally rare), or where smaller isolated populations might be segregated from the surrounding environment as a result of the proposed works. It should provide detailed and accurate data on precise flight routes, foraging areas and mating sites (depending on time of year survey carried out), as well as roosting sites used by those individuals tagged (see **10.2.6** for roosts). This survey method is time consuming and only a few bats can be followed at any one time. However, it can provide an in-depth view of the activity of a proportion of the colony.

To radio track, a bat should be taken by hand or handheld static net, mist net or harp trap. Then, if the individual bat is of the target age class, of appropriate weight in relation to the tag, appropriate breeding status, healthy and of the targeted species, then a radio tag should be attached. Over the course of the following days/weeks, the radio tagged bats should be followed to determine foraging areas, commuting routes and roosts that might not have been identified in the initial surveys. This can involve either the close approach of following the bat and recording the location or triangulation where at least two surveyors in different locations at preset intervals record the direction of the bat in question. The comparison of these from known locations allows an approximate position where those lines of direction intersect. Radio tracking studies might identify that the majority of foraging habitat for the bat colony would be impacted by any works, which would detrimentally affect the colony. This sort of output might be possible providing enough of the colony has been radio tagged and tracked throughout the seasons.

NOTE Further information on all aspects of catching and marking bats can be found in Bat Surveys for Professional Ecologists – Good Practice Guidelines *[7] and the Natural England publication* Guidance on the capture and marking of bats under the authority of Natural England licence [*8].*

12.3 Skills level

These surveys should be undertaken by a bat specialist who has had training and/or experience in the techniques used. Where invasive survey techniques are to be used on bats or known bat roosts the work should only be undertaken by a licensed bat worker (see **3.20**).

12.4 Equipment

The bat detector is the most useful tool in surveying for bats. Field surveys for bat activity should not be attempted without one. Equipment to measure key weather parameters, including temperature and humidity at specific locations, should also be deployed.

Essential equipment is listed in Table 4, Table 5 and Table 6.

Equipment might fail, so spares should form part of the survey kit. Manual field surveys should always include a spare bat detector, torch and batteries.

Recording systems can be put together using commercially available components, but there can be advantages in commissioning specially-designed systems. This is particularly the case for large-scale surveys or where there are not enough observers available to provide the necessary cover within the given time or budget.

As automated systems are often left in the field unattended, they might have problems related to security and power supply, and it can often be costly to purchase secure, vandal-proof protection. It is not always possible to weatherproof the equipment completely or to find a site that remains dry. Equipment running on batteries might require regular battery changes or the use of a solar panel or other means of natural energy generation to charge the batteries.

12.5 Recording of findings

Potential bias caused by manual bat detection methods should be taken into account when interpreting the results. If the bias cannot be adjusted (or qualified) and there is a need to confirm the presence of individual species, rather than infer their presence by the habitat or nearby records, or the mitigation cannot be undertaken without confirming their presence, then the manual bat activity survey techniques should be supplemented by other survey methods, such as capture and possibly also radio tracking (see **12.2.8** for further guidance).

Section 4: Other relevant considerations

13 Development: individual trees, groups of trees and woodland

European protected species (including all UK bat species) are a material consideration to determining planning applications and will be regarded as such by local authorities. The presence of bats or bat roosts in trees, and the importance of trees for foraging and commuting bats, should be assessed prior to a planning application being made.

NOTE 1 Attention is drawn to:

- *the Natural Environment and Rural Communities Act 2006 [11] and the Planning Policy Guidance website;*
- *in England, the National Planning Policy Framework (NPPF) [12] references the Biodiversity and geological conservation – Statutory obligations 2005 [13] and* Planning for Biodiversity and Geological Conservation: A Guide to Good Practice *[14];*
- *in Wales, Technical Advice Note 5 [15];*
- *in Scotland, National planning framework 3 Natural heritage [16] and* Planning for Natural Heritage: Planning Advice Note 60 *[17]; and*
- *in Northern Ireland,* Planning Policy Statement 2 Natural Heritage *[18].*

If development proposals have the potential to adversely affect bats, their roosts or their habitats, the potential impact should be assessed prior to the planning application being submitted. As part of the planning process, surveys should be undertaken in accordance with BS 42020 by suitably qualified ecologists.

Arboriculturists undertaking tree surveys of potential development sites in accordance with BS 5837 should take into account the likely value of trees for bats within their assessment of the conservation value of trees.

*NOTE 2 For consideration of surveying where development is proposed, see Clause **7**, Clause **10** and Clause **12**.*

14 Action to be taken if bats are found during tree work operations

Bat roosts in trees can be difficult to find and there might be occasions when they are discovered after tree work has commenced, even though the correct pre-start roost assessment procedure has been followed.

In the event that bats or bat roosts are discovered during tree work operations, work should cease immediately or as soon as it is safe to do so, with the least possible further disturbance to the tree. The relevant SNCO (see **3.32**) and a licensed bat worker (see **3.26**) should be contacted as soon as possible, and the tree work should not recommence without the approval of the bat worker and any licence that might on their advice be required. At this stage it is likely that a licence might be required to continue, depending on the work proposed. The telephone numbers of the SNCO (see **3.32**) and the Bat Conservation Trust (BCT) helpline should be kept to hand.

If the work results in live bats being discovered loose on the ground they should be placed in a well ventilated dark container or box pending arrival of the bat worker and fresh water should be provided in a shallow container such as a jam jar lid. Bats should never be handled with bare hands, and clean gloves should be worn while moving them to the container.

Detailed notes (including photographs if possible) should be made in the event that bats or bat roosts are inadvertently discovered during tree work operations. The notes should include details such as the number of bats seen, the nature and location of the roost in the tree, whether the roost has been destroyed, and any other information relevant to the situation.

15 Emergency procedures for reasons of public health and safety

Under normal circumstances, a licence from the relevant licensing authority is required if work is intended to take place on a tree which is used as a bat roost, where that work is likely to result in damage to the roost or disturbance to bats. However, unplanned works that need to take place immediately, for public health and safety reasons, might not allow the time required for a licence to be obtained.

Acting without a licence is likely to be justifiable only where there is a serious and immediate threat to public safety and where all other appropriate options (such as fencing and warning signs) cannot resolve the problem satisfactorily (see *European Protected Species: Mitigation Licensing - How to get a licence* [19]). The tree's condition should be assessed by an arboriculturist experienced in tree risk assessment. In this situation, if a roost is known or suspected, the relevant SNCO (see **3.32**) or a bat specialist should be contacted prior to work commencing and the police informed of the proposed operation. If this is not possible, they should be contacted as soon as possible afterwards. The following details should be recorded:

a) the condition of the tree and why emergency work was required to it;

b) the nature of the known or suspected roost;

c) bats seen including species, if known;

d) the number and details of bat casualties; and

e) any mitigation measures undertaken, such as the careful lowering of timber sections likely to contain roosts with the timber lowered at the same angle to which it was growing.

Ideally, a bat worker should be in attendance during the work to provide guidance as necessary. Care should be taken to avoid unnecessary damage to bats and roosts during such tree work operations, and mitigation measures should be implemented where safe to do so.

Annex A The UK Forestry Standard

The *UK Forestry Standard* [1] is the reference standard for sustainable forest management in the UK produced by the Forestry Commission. It outlines the context for forestry in the UK and the approach of the UK Government to sustainable forest management. It is supported by a series of guidelines.

The UK Forestry Standard guidelines series covers the following subject areas:

a) biodiversity [20];

b) climate change [21];

c) historic environment [22];

d) landscape [23];

e) people [24];

f) soil [25]; and

g) water [26].

The biodiversity guidelines [20] have sections on the following:

1) protected habitats and species;

2) woodland management and biodiversity, and biodiversity in the wider landscape;

3) ecological processes;

4) forest and stand structure;

5) veteran trees and deadwood;

6) open scrub and edge habitats; and

7) riparian zones and monitoring.

For new forest and woodland proposals, the guidelines include an assessment of the potential impacts on priority habitats and species as part of the forest planning process.

The *UK Forestry Standard* [1] and guidelines have been developed by the Forestry Commission in Great Britain and the Forest Service, an agency within the Department of Agriculture and Rural Development in Northern Ireland. The UK Forestry Standard guidelines have been endorsed by the UK governments and apply to all UK forests and woodland. Together with the national forestry policies and strategies of England, Scotland, Wales and Northern Ireland, the *UK Forestry Standard* [1] provides a framework for the delivery of international agreements on sustainable forest management, alongside policies on implementation.

Electronic copies of the guidelines can be found at the government's forestry website [4)], as well as the biodiversity guidelines [20].

Printed copies of the *UK Forestry Standard* [1] and guidelines can be ordered from FC Publications [5)].

4) <http://www.forestry.gov.uk/ukfs> [viewed 14 September 2015]
5) <http://www.forestry.gov.uk/forestry/HCOU-4VXJ5N> [viewed 14 September 2015]

Annex B Sources of distribution data and local records

*COMMENTARY ON **ANNEX B***

Most records held are for buildings and relatively few tree roosts have information about them held as records.

The following are actual and potential sources of distribution data and local records:

- site-specific sources from any existing woodland estate office records, estate ecological assets plans, aerial photographs and estate workers;
- online sources of distribution data including the National Biodiversity Network [6];

  NOTE 1 The likelihood is that not all records exist on such databases and not all parts of the UK have been surveyed, so the data coverage might be patchy.

- local biological record centres (known as LRCs or BRCs);

  NOTE 2 These are found in most counties and can, for a fee, undertake a data trawl of their records. A list of active LRCs can be found on the National Federation for Biological Recording (NFBR) website. [7]

- biodiversity officers, nature conservation officers, countryside officers or ecologists in local, county, district or unitary councils;

  NOTE 3 They are employed by some local, county or district councils.

- local bat groups, which usually hold a database of bat records;

  NOTE 4 The secretary might be able to provide the name and contact details of the member who maintains the database. The local bat group contact details can be obtained from the BCT website [8] *or by calling the BCT National Bat helpline.*

- local wildlife trusts;

  NOTE 5 Sometimes the local bat group is part of the local wildlife trust, so the information can be from the same source.

- county mammal recorders; and

  NOTE 6 These are volunteer recorders who collate records sent to them about mammal sightings in their county. Contact details are available from the Mammal Society website. [9]

- local or national mining history or caving groups and clubs, and caving councils, which might have useful information (see the British Caving Association [10] for details).

  NOTE 7 A number of cave systems have biological recorders and records are often published in club or regional journals.

More recent records might exist but not be represented. There might also be restrictions on the commercial use of certain resources.

NOTE 8 An absence of records does not mean that there is an absence of roosts or bats.

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[6] <http://jncc.defra.gov.uk/page-6189> [viewed 14 September 2015]
[7] <http://www.nfbr.org.uk/wiki/index.php?title=Local_Records_Centres> [viewed 14 September 2015]
[8] <http://www.bats.org.uk/pages/find_your_local_bat_group.html> [viewed 14 September 2015]
[9] <http://www.mammal.org.uk/county_mammal_recorders> [viewed 14 September 2015]
[10] <http://british-caving.org.uk/wiki3/doku.php?id=start> [viewed 14 September 2015]

Annex C Information on associated structures that bats might use

Information about the types of structures bats use and the appropriate surveying and mitigation is given in Table C.1.

Table C.1 **Information relating to bats in roosts and habitats other than woodland and trees**

Subject	Publication or website	Availability	Comments
Surveying for bats	*Bat Surveys for Professional Ecologists – Good Practice Guidelines* [7]	Downloadable from BCT website	All roost types, habitats and scenarios are covered. The third edition, published in September 2015, is aligned with BS 8596.
Mitigation for bats	*Bat mitigation guidelines* [27]	Downloadable from Natural England website	This is aimed at those involved in land-use planning and developments, and has mitigation guidance for built structures and case studies. It is due to be updated but no date has been confirmed.
	Roost [28]	Available on BCT website	*Roost* is a web-based resource developed by the BCT to aid in the gathering of information on bat roost mitigation, compensation and enhancement techniques.
Bats and buildings	*Bats and buildings* [29]	Downloadable from BCT website	Information with further related links on the BCT website.
	Bats: European protected species [30]	Available on London Biodiversity Partnership website	This publication is a general information note that includes use of buildings.
	Scotland's Wildlife: Bats and people [31]	Available on Scottish Natural History website	This is a guide for building professionals.
	Bats and development [32]	Available on Northern Ireland Department of Environment website	This Northern Ireland Environment Agency publication covers buildings and trees.
Under-ground sites	*Underground sites* [33]	Available on BST website	This publication provides a small amount of information on the use of underground sites by bats.
	Protecting and managing underground sites for bats [34]	Available on Eurobats website	This is a Eurobats publication on all aspects of underground sites.

NOTE The information contained in these is correct at the time of publication.

Annex D Legislation protecting bats and their roosts

*COMMENTARY ON **ANNEX D***

This annex describes the regulatory regimes and associated guidance available at September 2015. It is provided for information only. The situation might have changed since the annex was prepared. Readers cannot rely on this annex to provide a complete account of the current legal position or the relevant guidance and need to make sure that they have up-to-date information.

D.1 General

Table D.1 contains the current key pieces of legislation that protect bats in the UK.

Table D.1 **Legislation on protecting bats and their roosts**

England Wales	Scotland	Northern Ireland
Wildlife and Countryside Act 1981 [35]	The Conservation (Natural Habitats &c.) Regulations 1994 as amended [36]	The Conservation (Natural Habitats etc.) Regulations (Northern Ireland) (1995) as amended [37]
UK Habitat Regulations 2010 [3]	—	—
Countryside and Rights of Way Act 2000 [38]	—	—
Natural Environment and Rural Communities Act 2006 [11]	—	—

D.2 The Wildlife and Countryside Act (1981) – England and Wales

The Wildlife and Countryside Act 1981 [35] makes it an offence to disturb, damage or destroy bats or their roosts (even if bats are not present in the roost at the time of any incident).

The Act is amended by the Countryside and Rights of Way Act 2000 [38] in England and Wales. This adds "recklessness" to the offence of disturbing a bat while it is occupying a place of shelter or protection.

However, for practical purposes, the protection of bats and their roosts now falls mostly under the UK Habitat Regulations 2010 [3]. Additional areas of protection given by the Wildlife and Countryside Act 1981 [35] include the intentional or reckless obstruction of access to a roost.

D.3 The UK Habitat Regulations

The UK Habitat Regulations 2010 [3] implement the European Habitats Directive 1992 [2]. This directive aims to conserve various species of plant and animal which are rare across Europe, and it requires Member States to provide legal protection for these species.

All UK bats are included in Schedule II of The UK Habitat Regulations 2010 [3]. Bechstein's bat, barbastelle, greater horseshoe bat and lesser horseshoe bat are additionally listed in Annex II of the UK Habitat Regulations 2010 [3], which gives additional protection that includes the designation of a special area of conservation (SAC) where this can make a contribution to securing favourable conservation status for the UK Habitat Regulations 2010 [3] species.

Under the UK Habitat Regulations 2010 [3], it is an offence to intentionally kill, injure or take any wild bat or to damage or destroy any place used by bats for shelter or as a breeding site, whether they are present or not. A further offence is to deliberately or recklessly disturb a bat in a way that would affect the ability to survive, breed, rear young or affect the local distribution or abundance of the species.

Damaging or destroying a breeding site or resting place is an absolute offence, regardless of whether the act of doing so might be considered reckless or deliberate.

For activities that would otherwise be illegal, but where a valid justification exists, EPS licences can be issued. However, these can only be granted if:

a) the licensing authority is satisfied that the activity is preserving public health or public safety;

b) there are other imperative reasons of overriding public interest;

c) there is no satisfactory alternative; and

d) the action authorized is not detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range.

These licences are issued by Natural England in England, Natural Resources Wales, Scottish Natural Heritage, and the Northern Ireland Environment Agency.

Annex E Additional information on bats and woodland

Additional information on bats and woodland is given in Table E.1.

Table E.1 **Additional information on bats and woodland**

Subject	Publication or website	Availability	Comments
Bats and woodland management (general)	*Woodland Management for Bats* [39]	Downloadable from BCT or Forestry Commission websites	—
Bats and woodland management (England)	*Guidance on managing woodlands with bats in England* [40]	Downloadable from Forestry Commission or Natural England websites	—
	Development of good practice guidelines for woodland management for bats [41]	Downloadable from Natural England and Forestry Commission Wales websites	A research report commissioned by BCT.
Bats and woodland management (Scotland)	*Guidance note 35a: Forest operations and bats in Scotland* [42]	Downloadable from Forestry Commission Scotland website	—
Bats and woodland management (Europe)	*Bats in Forests - Information and Recommendations for Forest Managers* [43]	Downloadable from Eurobats website	The Eurobats website has information on bats and woodland including this publication.
Bats and woodland management (Bechstein's bat)	*Bechstein's bat: An Introduction for woodland owners* [44]	Downloadable from BCT website	The BCT website has information about the Bechstein's bat project.
Bats and their use of tree roosts	*Bat Tree Habitat Key* [45]	Downloadable (in sections) from AEcol website	This document and the key are constantly being updated based on the authors' findings and the feedback of bat workers. It covers bats and tree roost use in depth.

Annex F Example of a roost scoping survey form for non-specialists

For a non-bat specialist carrying out a survey for the potential for bat roosts in trees, it is important to record findings of PRFs in a consistent way.

Table F.1 provides a recommended level of information and also demonstrates how this information could be recorded. Alternatively, tree work sheets could be used and adapted.

Table F.1 **Example of a tree survey reporting form if PRFs are seen during scoping survey**

Site address:					**Surveyor:**			**Date:**		
								Secondary assessment		
Tree/ GPS/ Grid ref.	**Species**	**Age class**	**Height/ Stem diameter**	**Photo ref.**	**Description of PRF(s) and position in tree**	**Tree cat.**	**Additional notes**	**Notes**	**Date**	**Tree cat.**
21 (GPS mark ref. 1)	Pediculate oak	Mature	21 m/ 750 mm	12,13	Hazard beam split in branch at 6 m on east side Woodpecker hole in stem at 12 m on south side	High/ medium risk	Tree is in park surrounded by open space and is suitable for climbing	No evidence that hazard beam is used as a roost Bat droppings seen at base of woodpecker hole	20/05/2015	Conf. roost
24 (GPS mark ref. 8)	Sycamore	Early mature	17 m/ 450 mm	14	Old tear-out wound at 13 m on NW side with cavity extending up stem	High/ medium risk	Access to PRF not possible by climbing inspection. MEWP required	Cavity does not extend deeply into stem and no evidence that it is used as a roost	20/05/2015	Low risk

*NOTE 1 For a list of PRFs, see **5.2**.*

*NOTE 2 For a list of features which indicate that the PRF is (or is likely to be) a bat roost, see **6.3** and **6.4**.*

Annex G Examples of the use of desk study findings in site walkovers

Knowing the species of bats found in an area might help in the consideration of roosts and key features to be aware of. For example, knowing through a desk study that there is a Daubenton's bat roost in an oak tree at a certain Ordnance Survey reference point, the surveyor is aware:

a) that the woodland is suitable for bat species and at least one species is present;

b) that there is already a known roost on site;

c) where within the woodland that roost is; and

d) if that roost is still present and would be disturbed, damaged or destroyed during works, a licence is required.

Once on site with this knowledge the surveyor can identify whether:

1) the tree is still there; and

2) if the roosting feature is still there within the tree.

Desk studies also highlight likely features of importance for foraging and commuting that can be checked for suitability during site walkovers.

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