

BS 5837:2012



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Trees in relation to design, demolition and construction – Recommendations

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Contents

Foreword *iii*

Introduction 1

1	Scope	3
2	Normative references	3
3	Terms and definitions	3
4	Feasibility: surveys and preliminary constraints	4
4.1	General	4
4.2	Topographical survey	4
4.3	Soil assessment	5
4.4	Tree survey	5
4.5	Tree categorization method	8
4.6	Root protection area (RPA)	10
5	Proposals: conception and design	11
5.1	General	11
5.2	Constraints posed by existing trees	11
5.3	Proximity of structures to trees	13
5.4	Arboricultural impact assessment	14
5.5	Tree protection plan	15
5.6	New planting design and associated landscape operations	16
6	Technical design	18
6.1	Arboricultural method statement	18
6.2	Barriers and ground protection	19
6.3	Site monitoring	23
7	Demolition and construction in proximity to existing trees	23
7.1	General	23
7.2	Avoiding physical damage to the roots during demolition or construction	23
7.3	Tree protection during demolition	24
7.4	Permanent hard surfacing within the RPA	25
7.5	Special engineering for foundations within the RPA	26
7.6	Subterranean construction within the RPA	27
7.7	Underground and above-ground utility apparatus	28
8	Site works, landscape operations and management	29
8.1	General	29
8.2	Drainage	29
8.3	Topsoil quality and amelioration	29
8.4	Soil compaction and remediation measures	30
8.5	Use of mulch	30
8.6	Hard surfaces	31
8.7	Use of herbicides	32
8.8	Tree management	32

Annexes

Annex A (informative)	General advice for other interested parties	34
Annex B (informative)	Trees and the planning system	38
Annex C (normative)	Measurement of tree stems	39
Annex D (normative)	Root protection area	40

Bibliography 41

List of figures

Figure 1 – The design and construction process and tree care	2
Figure 2 – Default specification for protective barrier	20
Figure 3 – Examples of above-ground stabilizing systems	21
Figure C.1 – Measurement of tree stems	39

List of tables

Table 1 – Cascade chart for tree quality assessment 9

Table 2 – Identification of tree categories 10

Table 3 – Trenchless solutions for differing utility apparatus installation requirements 28

Table A.1 – Minimum distance between young trees or new planting and structure to avoid direct damage to a structure from future tree growth 35

Table B.1 – Delivery of tree-related information into the planning system 38

Table D.1 – Root protection areas 40

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 42, an inside back cover and a back cover.

Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 April 2012. It was prepared by Technical Committee B/213, *Trees and tree work*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 5837:2005, which is withdrawn.

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- takes account of current practice regarding planning for the management, protection and planting of trees in the vicinity of structures, and for the protection of structures near trees;
- updates the guidance in relation to building regulations;
- recognizes the contribution that trees make to climate change adaptation.

This British Standard provides recommendations and guidance for arboriculturists, architects, builders, engineers, and landscape architects. It is also expected to be of interest to land managers, contractors, planners, statutory undertakers, surveyors, and all others interested in harmony between trees and development in its broadest sense.

Annex A contains general information which is expected to be of use to developers, builders and engineers.

Use of this document

This British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this British Standard is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people, for whose use it has been produced.

BSI permits the reproduction of BS 5837:2012, Figure 2 and Figure 3, to ensure compliance with the standard (e.g. when seeking planning consent).

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its 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.

Contractual and legal considerations

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.

Trees are given special consideration under the statutory planning system and in civil case law, and their protection can change with time. It is advisable to seek expert advice on the legal implications for any plans or projects that fall within the scope of this British Standard.

Introduction

Trees can offer many benefits, including:

- providing visual amenity, softening or complementing the effect of the built environment, and adding maturity to new developments;
- displaying seasonal change and providing opportunities for wildlife in built-up areas;
- making places more comfortable in tangible ways by contributing screening and shade, reducing wind speed and turbulence, intercepting snow and rainfall, and reducing glare.

Trees are also important elements of green infrastructure, contributing to urban cooling through evapo-transpiration and providing micro-climatic effects that can reduce energy demands in buildings. They therefore represent a key resource that can significantly contribute to climate change adaptation.

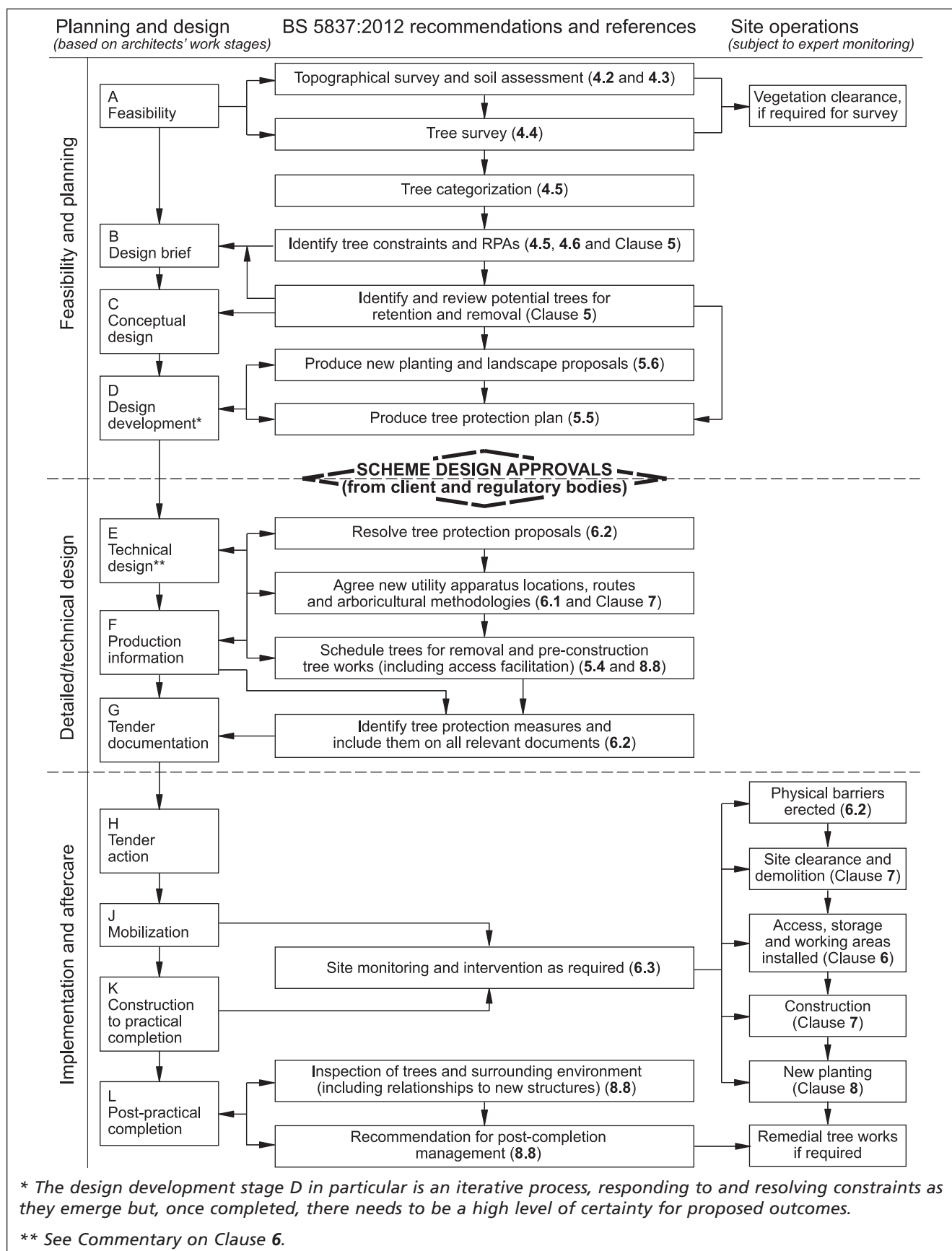
Existing trees are an important factor on construction sites, whether on or near the working areas, and trees are a material consideration in the UK planning system (see Annex B). This British Standard is intended to assist decision-making with regard to existing and proposed trees in the context of design, demolition and construction. Root systems, stems and canopies, with allowance for future movement and growth, need to be taken into account in all projects, including those that do not require planning permission. The space required for any proposed new trees to become established is an important consideration.

During their lifetime, trees will be vulnerable to disturbance, injury, environmental changes, pests and diseases. Construction work often exerts pressures on existing trees, as do changes in their immediate environment following the construction. A tree that has taken many decades to reach maturity can be damaged irreparably in a few minutes by actions that might be unwitting, negligent or wilful (see Annex A). The early provision of physical protection from damage is therefore critical.

Where tree retention or planting is proposed in conjunction with nearby construction, the objective should be to achieve a harmonious relationship between trees and structures that can be sustained in the long term. The good practice recommended in this British Standard is intended to assist in achieving this objective.

The standard follows a logical sequence of events that has tree care at the heart of the process. This is summarized as a flow diagram in Figure 1. The full sequence of events might not be applicable in all instances; for example, a planning application for a conservatory might not require the level of detail that needs to accompany a planning application for the development of a site with one or more dwellings.

Figure 1 The design and construction process and tree care



1 Scope

This British Standard gives recommendations and guidance on the relationship between trees and design, demolition and construction processes.

It sets out the principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures.

The standard is applicable whether or not planning permission is required.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are 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.

Standards publications

BS 3998:2010, *Tree work – Recommendations*

Other publications

[N1] NATIONAL JOINT UTILITIES GROUP (NJUG). *Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees*. Volume 4, issue 2. London: NJUG, 2007.

3 Terms and definitions

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

3.1 access facilitation pruning

one-off tree pruning operation, the nature and effects of which are without significant adverse impact on tree physiology or amenity value, which is directly necessary to provide access for operations on site

3.2 arboricultural method statement

methodology for the implementation of any aspect of development that is within the root protection area (3.7), or has the potential to result in loss of or damage to a tree to be retained

3.3 arboriculturist

person who has, through relevant education, training and experience, gained expertise in the field of trees in relation to construction

3.4 competent person

person who has training and experience relevant to the matter being addressed and an understanding of the requirements of the particular task being approached

NOTE A competent person is expected to be able to advise on the best means by which the recommendations of this British Standard may be implemented.

3.5 construction

site-based operations with the potential to affect existing trees

3.6 construction exclusion zone

area based on the root protection area (3.7) from which access is prohibited for the duration of a project

3.7 root protection area (RPA)

layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority

3.8 service

any above- or below-ground structure or apparatus required for utility provision

NOTE Examples include drainage, gas supplies, ground source heat pumps, CCTV and satellite communications.

3.9 stem

principal above-ground structural component(s) of a tree that supports its branches

3.10 structure

manufactured object, such as a building, carriageway, path, wall, service run, and built or excavated earthwork

3.11 tree protection plan

scale drawing, informed by descriptive text where necessary, based upon the finalized proposals, showing trees for retention and illustrating the tree and landscape protection measures

3.12 veteran tree

tree that, by recognized criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned

NOTE These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem.

[BS 3998:2010]

4 Feasibility: surveys and preliminary constraints

4.1 General

All plans should be to scale and should state to which ISO A paper size the scale relates, as well as showing a scale bar and a north point. When plans are drawn in colour, they should carry the following statement (or similar): "The original of this drawing was produced in colour – a monochrome copy should not be relied upon".

4.2 Topographical survey

4.2.1 An accurately measured topographical survey should be undertaken showing all relevant features.

NOTE 1 A method of carrying out topographical surveys is given in RICS specification Surveys of land buildings and utility services at scales of 1:500 and larger [1].

NOTE 2 Prior to commencing the topographical survey, it might be appropriate to seek the advice of an arboriculturist on its scope, particularly where there are woodlands or substantial tree groups present.

4.2.2 Where clearance of undergrowth is essential to facilitate the survey process, it is important that this is undertaken in consultation with relevant professionals, in order to avoid damage to, for example, arboricultural, archaeological or ecological features. Where appropriate, this should include expert attendance on site during the works.

4.2.3 The survey should be made available as scale drawings and preferably also in a commonly recognized digital format. It should be used to inform all design and planning decisions.

4.2.4 The survey should record:

- a) spot levels at the base of trees and throughout the site at an interval appropriate to meet design requirements, recorded as a grid and interpolated as contours, ensuring that any abrupt changes, embankments, ditch inverts and retaining features are recorded;
- b) the position of all trees within the site with a stem diameter of 75 mm or more (see Note), measured at 1.5 m above highest adjacent ground level;

NOTE In the case of woodlands or substantial tree groups, only individual trees with stem diameters greater than 150 mm usually need be plotted.

- c) the position of trees with an estimated stem diameter of 75 mm or more that overhang the site or are located beyond the site boundaries within a distance of up to 12 times their estimated stem diameter;
- d) for individual trees, the crown spread taken at four cardinal points; for woodlands or substantial tree groups, the overall extent of the canopy;
- e) the extent, basal ground levels and height of shrub masses, hedges, hedgerows and stumps;
- f) other relevant landscape features and artefacts, such as streams, buildings and other structures, boundary features and means of enclosure, trenching scars near to trees, and overhead and underground utility apparatus, including drainage runs with manholes and invert levels.

4.3 Soil assessment

4.3.1 A soil assessment should be undertaken by a competent person to inform any decisions relating to:

- the root protection area (RPA);
- tree protection;
- new planting design; and
- foundation design to take account of retained, removed and new trees.

4.3.2 The assessment should determine whether the soil is shrinkable. If it is, trees and other vegetation have the potential to cause indirect damage to structures (see Annex A). In such cases, desiccation assessments should be carried out at a specialist laboratory to check the extent to which existing vegetation has dehydrated the soil.

4.3.3 Soil structure, composition and pH should be included in the assessment for the purpose of designing new planting and landscape proposals.

4.4 Tree survey

4.4.1 Timing

4.4.1.1 A tree survey should be undertaken by an arboriculturist to record information about the trees on or adjacent to a site. The results of the tree survey, including material constraints arising from existing trees that merit retention, should be used (along with any other relevant baseline data) to inform feasibility studies and design options. For this reason, the tree survey should be completed and made available to designers prior to and/or independently of any specific proposals for development.

4.4.1.2 Tree surveys undertaken after a detailed design has been prepared can identify significant conflicts: in such cases, the nature of and need for the proposed development should be set against the quality and values of affected trees. The extent to which the design can be modified to accommodate those trees meriting retention (see Clause 5) should be carefully considered.

4.4.1.3 Where proposed development is subject to planning control, a tree survey should be regarded as an important part of the evidence base underpinning the design and access statement. Accordingly, local planning authorities should not rely on planning conditions to secure a tree survey (see Annex B), as by this stage in the formal planning process its findings might not be capable of influencing design, potentially resulting in uncontrolled arboricultural impacts.

NOTE The risk of project delay due to material constraints being identified only at a late stage is avoided by the early procurement of a tree survey.

4.4.2 Parameters

NOTE Prior to a full tree survey, a pre-purchase arboricultural site appraisal can be useful to inform likely developable area.

4.4.2.1 The tree survey should include all trees included in the topographical survey (see 4.2), as well as any that might have been missed [e.g. on shrinkable soils, additional off-site trees that could have an effect on foundation design (see Annex A)]. The trees should be sequentially numbered and, where appropriate, tagged, with the tags being placed as high as is convenient on the stem of each tree.

4.4.2.2 Individual trees, groups of trees and woodlands should be assessed for their quality and benefits within the context of proposed development, in a transparent, understandable and systematic way. The quality of each tree or group of trees should be recorded by allocating it to one of four categories (see 4.5). The categories should be differentiated on the tree survey plan by colours (see 4.5 and Tables 1 and 2), and/or by suffixing the category adjacent to the tree identification number on the tree survey plan (e.g. 217-A, 218-C etc; see 4.4.2.1).

4.4.2.3 Trees growing as groups or woodland should be identified and assessed as such where the arboriculturist determines that this is appropriate. However, an assessment of individuals within any group should still be undertaken if there is a need to differentiate between them, e.g. in order to highlight significant variation in attributes (including physiological or structural condition).

NOTE The term “group” is intended to identify trees that form cohesive arboricultural features either aerodynamically (e.g. trees that provide companion shelter), visually (e.g. avenues or screens) or culturally, including for biodiversity (e.g. parkland or wood pasture), in respect of each of the three subcategories (see 4.5).

4.4.2.4 The categorization of a group or woodland can reflect a future potential that is contingent on appropriate management being undertaken to promote the development of the better specimens, based upon established arboricultural and silvicultural principles. Such management requirements should be noted under “general observations” within the schedule and included within the post-development management plan (see 8.8.3).

NOTE Typically, the works will need to be phased over a number of years so as to maintain the necessary degree of companion shelter.

4.4.2.5 A schedule to the survey should list all the trees or groups of trees. The following information should be recorded (see **4.4.2.6** for measurement conventions):

- a) sequential reference number (to be recorded on the tree survey plan);
- b) species listed by common name, with a key provided to scientific names;
- c) height;
- d) stem diameter, measured in accordance with Annex C;
- e) branch spread, taken as a minimum at the four cardinal points, to derive an accurate representation of the crown (to be plotted on the tree survey plan);
- f) existing height above ground level of:
 - 1) first significant branch and direction of growth (e.g. 2.4-N);
 - 2) canopy,to inform on ground clearance, crown/stem ratio and shading;
- g) life stage (e.g. young, semi-mature, early mature, mature, over-mature);
- h) general observations, particularly of structural and/or physiological condition (e.g. the presence of any decay and physical defect), and/or preliminary management recommendations;
- i) estimated remaining contribution, in years (<10, 10+, 20+, 40+);
- j) category U or A to C grading (see **4.5** and Tables 1 and 2), to be recorded on the tree survey plan.

NOTE 1 It is not always practical or necessary to record branch spread for every tree within a group or woodland.

NOTE 2 In some cases, layout design might be aided by the arboriculturist providing data on future tree height and crown spread.

4.4.2.6 The measurement conventions should be as follows.

- a) height, crown spread and crown clearance should be recorded to the nearest half metre (crown spread should be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m;
- b) stem diameter should be recorded in millimetres, rounded to the nearest 10 mm (0.01 m);
- c) estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) should be clearly identified as such (e.g. suffixed with a "#").

4.4.2.7 Relevant details of shrub masses, hedges, hedgerows and stumps are expected to have been recorded during the topographical survey (see **4.2**), but should be checked by the arboriculturist for inclusion in the tree survey. In the case of regularly maintained domestic hedges and the majority of shrub masses, it will normally be sufficient to record their height and species on the tree survey plan or note these in the schedule.

4.4.2.8 Hedgerows and substantial internal or boundary hedges (including evergreen screens) should be recorded in a similar fashion to groups, with the lateral spread and average (or maximum and minimum) height and stem diameter ranges recorded, to allow the potential constraints associated with the features to be fully assessed. All woody species present should be recorded. Where woody plants are present within a hedgerow that are significantly different in character from the remainder of it, these should be identified and recorded separately, especially where they comprise distinct trees.

NOTE Attention is drawn to the Hedgerows Regulations 1997 [2].

4.4.2.9 On shrinkable soils (known or suspected), if it is evident that trees or substantial stems have been removed from a hedgerow, this should be recorded, along with any apparent signs of past management, such as laying or significant height reduction. Such information can be of particular relevance to foundation design, where the current species composition and dimensions might not reflect the previous influence of a hedgerow on ground moisture levels.

4.5 Tree categorization method

4.5.1 As part of the tree survey (see 4.4), trees should be categorized using the criteria shown in Table 1.

NOTE The means of identifying each category on the tree survey plan is shown in Table 2.

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

4.5.3 For a tree to qualify under any given category, it should fall within the scope of that category's definition (U, A, B, C) and, for trees in categories A to C, it should qualify under one or more of the three subcategories (1, 2, 3). Subcategories 1, 2 and 3 are intended to reflect arboricultural and landscape qualities, and cultural values, respectively.

4.5.4 The tree survey schedule should list which subcategory applies. It is intended that each subcategory has equal weight such that, for example, an A1 tree has the same retention priority as an A2 tree. Some trees could qualify under more than one criterion.

4.5.5 When determining the appropriate category for any given tree, group or woodland (see 4.4), the arboriculturist should start by considering whether the tree falls within the scope of category U. Assuming that it does not, the arboriculturist should then proceed on the presumption that all trees are considered according to the criteria for inclusion in category A. Trees that do not meet these criteria should then be considered in light of the criteria for inclusion in category B. This process should be repeated, as required, until the appropriate quality or value assessment is reached.

4.5.6 Trees of generally high quality and/or value which have a defect or defects that do not reduce their retention span below the suggested 40 year threshold, should be placed in category A, i.e. they should not be downgraded as a result of minor imperfections.

4.5.7 Where trees would otherwise be categorized as U, but have identifiable conservation, heritage or landscape value, even though only for the short term, they may be upgraded, although they might be suitable for retention only where issues concerning their safety can be appropriately managed.

4.5.8 When categorizing a tree, the presence of any serious disease or tree-related hazards should be taken into account. If disease is likely to be fatal or irremediable, or likely to require sanitation for the protection of other trees, it might be appropriate for the trees concerned to be categorized as U, even if they otherwise have considerable value. If structural defects present an unacceptable risk to people or property, the extent to which the defects are remediable, including the effect that this might have on the tree's remaining value, will influence whether the tree be assigned to the category that it would otherwise merit.

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)	Identification on plan
Trees unsuitable for retention (see Note)		
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	- Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) - Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline - Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i>	See Table 2
1 Mainly arboricultural qualities		
2 Mainly landscape qualities		
3 Mainly cultural values, including conservation		
Trees to be considered for retention		
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees with material conservation or other cultural value
	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value