

CAVAT Full Method

A Guide for Practitioners

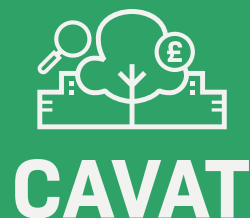


CAVAT



This Guide for Practitioners was produced to assist accurate use of the CAVAT Full Method. Version 1.2 takes effect as of July 2026. It covers revisions to date to the Full Method and is recommended for use with the latest CAVAT spreadsheet. Both are free to download from: www.ltoa.org.uk/resources/cavat.

Version 1.2



Prepared and published
by the CAVAT Group.
Hosted by the LTOA.

Summary of revisions

The Full Method is re-ordered into 10 steps, re-named for greater clarity and ease of understanding.

The assessment of functionality is now in five steps. This increases the sensitivity of valuations to changes in crown completeness and quality, particularly of reduced and pollarded trees.

The revised process is presented in [Figure 1](#) on page 7.

Summary of revisions (v1.2)

BS 5837 updated to 'BS 5837:2012' for greater clarity.

Minor typos and broken URLs corrected.

Use of the term 'public visual amenity' removed (page 14) or revised (page 15) to clarify that the focus is the tree's contribution to public amenity.

This Guide for Practitioners (v1.2) supersedes previous guidance.

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Introduction

CAVAT – Capital Asset Value for Amenity Trees – is an approach to tree valuation based on UK law and an understanding of amenity as the sum of public benefits – primarily, but not exclusively, visual benefits. It values a tree based on the replacement cost approach, extrapolated and depreciated to reflect key criteria.

CAVAT comprises both the ‘Full Method’ and the ‘Quick Method’, which together extend the ability of arboriculturists to protect and enhance the public tree stock, to establish that trees are valuable public assets, and to manage them as essential natural capital. For a fuller understanding of the background please see ‘CAVAT (Capital Asset Value for Amenity Trees): Valuing amenity trees as public assets’¹ (available at www.tandfonline.com).

The version of the CAVAT Full Method described in the above-referenced paper incorporated improvements to the original version published by the London Tree Officers Association (LTOA) in 2008. It introduced separate assessments for the completeness and quality of a tree’s crown and rationalised the adjustment of contributions to amenity to ensure they were based on innate and acquired characteristics and placement.

This newest version of the guide is the result of a comprehensive review of the methods and previous guidance. The changes to the Full Method extend consideration of completeness and quality to the primary structure of the tree and introduce a data-driven method for assessing crown completeness, allowing for improved consistency between users.

Improvements have also been made to the order and naming of the assessment steps. For example, attributes were previously considered under the heading of ‘Amenity’. They are now included in Step 4, as part of the consideration of the tree’s value in its location. The tree’s visual prominence from public places is now renamed ‘Visibility’ rather than ‘Accessibility’, to make the purpose of the assessment clearer.

This guide will help practitioners to use the Full Method accurately and with confidence, but is not a replacement for formal training.



1. Doick, K.J., Neilan, C., Jones, G., Allison, A., McDermott, I., Tipping, A., and Haw, R. (2018). CAVAT (Capital Asset Value for Amenity Trees): Valuing amenity trees as public assets. *Arboricultural Journal*, 40, 2, <https://doi.org/10.1080/03071375.2018.1454077>.

10 steps of the CAVAT Full Method

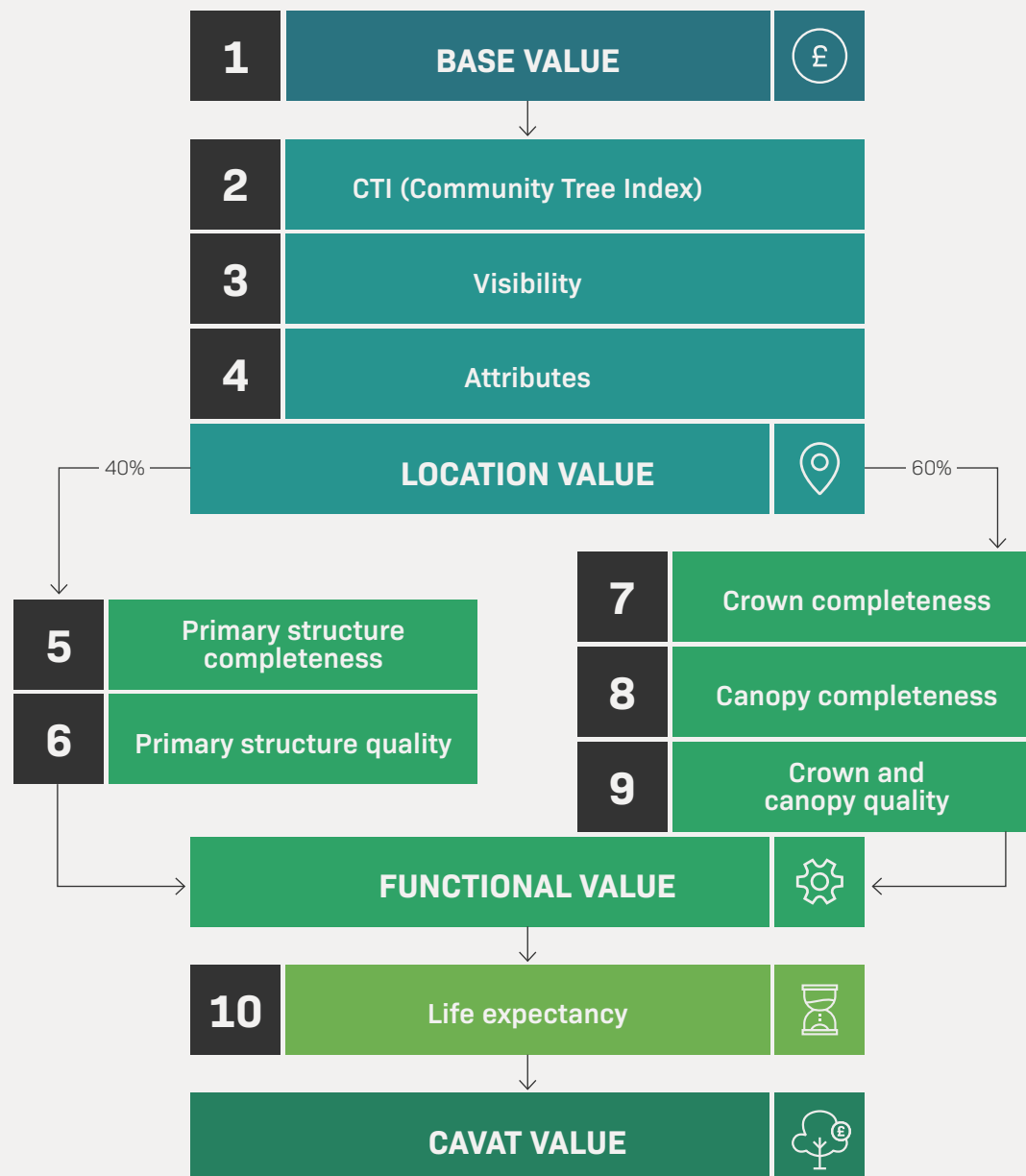


Figure 1.

Full Method: Overview

1. BASE VALUE



Measure the stem diameter according to BS 5837:2012. Enter in the spreadsheet. Ensure the unit value factor (UVF) is up to date.

LOCATION VALUE



2. Community Tree Index (CTI)

Find the appropriate CTI factor for the tree's location in the CTI table. Select the factor from the drop-down list in the spreadsheet.

3. Visibility

Select the appropriate visibility factor from the drop-down list in the spreadsheet.

- **100%:** Fully visible from at least one direction, on or immediately adjacent to public land.
- **75%:** Clearly visible from a public location, but with somewhat reduced visual contribution to public amenity.
- **50%:** Visible from a public location, but with significantly reduced visual contribution to public amenity.
- **25%:** Effectively invisible from any public space.

4. Attributes

Score the positive and negative attributes of the tree as they are expressed in its location. For each attribute score +10% or -10%, up to a maximum of +/-60%. Select the total positive and negative attributes score from the drop-down lists in the spreadsheet, and record details of each positive and negative attribute in the comment box.

FUNCTIONAL VALUE



5. Primary structure completeness

Score the completeness of the primary structure. Select from the drop-down list in the spreadsheet.

- **>75% complete** (100% of value retained)
- **51-75% complete** (75% of value retained)
- **26-50% complete** (50% of value retained)
- **1-25% complete** (25% of value retained)

6. Primary structure quality

Score the quality of the primary structure. Select from the drop-down list in the spreadsheet.

- **Excellent** (100% of value retained)
- **Good** (75% of value retained)
- **Fair** (50% of value retained)
- **Poor** (25% of value retained)

7. Crown completeness

Compare the crown to that of an optimum specimen of the same species and stem diameter. In the crown completeness calculator, enter the expected and measured crown dimensions, and take into account any additional voids in the crown. Crown completeness is rounded to the nearest 10% and automatically entered into the spreadsheet.

8. Canopy completeness

Score the completeness of the canopy, in terms of gaps or loss of density, based on what the existing crown is expected to support. Select the range from the drop-down list in the spreadsheet.

9. Crown and canopy quality

Score the crown quality, according to the woody structure and the foliage, and select from the drop-down list in the spreadsheet.

- **Excellent** (100% of value retained)
- **Good** (75% of value retained)
- **Fair** (50% of value retained)
- **Poor** (25% of value retained)

10. LIFE EXPECTANCY



Assess the life expectancy of the tree using standard methodology. Select a life expectancy range from the drop-down list in the spreadsheet.





Step by step guidance





Step 1: BASE VALUE



Step 1: Base value

What the practitioner does

Measure the stem diameter according to standard principles and enter the result (rounded down to the nearest centimetre) into the CAVAT spreadsheet. The base value is calculated by the spreadsheet.

(See [Note 1: CAVAT documents](#))

Step 1: Base value

How Step 1 works

CAVAT uses a unit value factor (UVF) (*for details of how the UVF is calculated see [Note 2: The Unit Value Factor](#)*). At Step 1, the UVF is multiplied by the stem area of the subject tree to give the base value that is modified over the nine further steps to complete the valuation. The base value increases in direct proportion to the stem area.

Why measure stem diameter?

CAVAT is a depreciated replacement cost approach. Most trees are too large for practicable replacement and so it is necessary to extrapolate from the cost of a newly planted tree. Stem area, calculated from stem diameter, is normally proportional to the tree's overall size and crown area. Where this is not the case, a value adjustment is required. In CAVAT, these adjustments occur through the functionality assessment (Steps 5 to 9).

Watch points

- Stem diameter should be measured according to BS 5837:2012.²
- Ensure that the up-to-date UVF is used (see [Note 1: CAVAT documents](#)).
- Care is needed to take a representative value, for example by adjusting the height of the measurement to avoid projections or swellings of the trunk (see [Note 3: Practical points](#)).
- For multi-stemmed trees each stem is measured.
- The CAVAT spreadsheet contains a calculation sheet specifically for multi-stemmed trees. Each stem diameter is recorded separately and the results are amalgamated by the spreadsheet to give a single base value.

2. BS 5837:2012 Trees in relation to design, demolition and construction: Recommendations. British Standards Institute, London.



Steps 2–4: LOCATION VALUE

Steps 2, 3, and 4 establish the location value.
These steps modify the base value to reflect the impact
of the tree's siting on its provision of public amenity.





LOCATION VALUE



Step 2: Community Tree Index (CTI)



Step 2: Community tree index (CTI)

What the practitioner does

Find the tree's location in the CTI table and the corresponding CTI factor. Select the appropriate adjustment factor in the drop-down list in the CAVAT spreadsheet; the value will automatically update.

(Note: the CTI table details population densities for all UK local authority areas and is contained within the CAVAT spreadsheet for reference.)

(See also [Note 4: Community Tree Index](#))

Step 2: Community tree index (CTI)

How Step 2 works

At Step 2, the base value is adjusted to take account of population density. The adjustment adopts a banded approach. There are seven CTI bands (see Table A) and the adjustment ranges from 100% (no change) for populations up to 20 people per hectare to a maximum 250%, for population densities greater than 119 people per hectare.

Table A. CTI factors

POPULATION DENSITY (PEOPLE PER HECTARE)	CTI FACTOR (%)
<20	100
20 – 39	125
40 – 59	150
60 – 79	175
80 – 99	200
100 – 119	225
>119	250

Why consider population density?

Although CAVAT takes a depreciated replacement cost approach, it modifies value not as property but according to a tree's contribution to public amenity. Step 2 is the first part of adjusting the value according to the tree's location. This step considers the human context: how large is the community that experiences benefits provided by the tree? Using official statistics ensures the approach is robust (*for further background, see [Note 4: Community Tree Index](#)*).

Watch points

- Use the population density for the whole local authority area not, for example, per ward. CTI values can be readily accessed from the dedicated tab in the CAVAT spreadsheet.





LOCATION VALUE



Step 3: Visibility



Step 3: Visibility

What the practitioner does

Assess the tree's public visibility and select the appropriate option from the drop-down list in the CAVAT spreadsheet; the value will automatically update.

(See also [Note 5: Visibility assessment considerations](#))

Step 3: Visibility

How Step 3 works

At Step 3, the value is adjusted to reflect the tree's public visibility. For trees that have reduced public visibility the value is decreased proportionately. The adjustment ranges from 100% public visibility (no depreciation) to 25% public visibility (75% depreciation).

The adjustment uses a banded approach as shown in Table B. Trees with full visibility score 100%. Trees that stand adjacent to public land, with unrestricted visibility from at least one direction, also score 100%. Trees that are effectively invisible from a public place are still awarded a score, albeit the minimum of 25%, as they may contribute to public amenity in a number of other ways – as hosts for biodiversity or by cleaning the air of pollutants, for example.

For intermediate cases, the practitioner takes into account the tree's visibility, proximity, and public impact in a single assessment. The assessment should be made from the land giving the fullest view of the tree.

Why consider visibility?

All trees contribute to public amenity, which comprises both visual and non-visual amenity. Trees that make the greatest contribution are those that may readily be seen and appreciated, whether they are on publicly accessible or private land. The understanding that a tree's amenity value is primarily determined by the visual benefit it provides to the public is well established in UK planning law and practice. Step 3 ensures that a less publicly visible tree, which provides less public amenity, has a lower CAVAT value.



Table B: Visibility assessment

VISIBILITY	CONTRIBUTION TO PUBLIC AMENITY	DEPRECIATION (%)	VISIBILITY FACTOR (%)
Fully visible from at least one direction, on or immediately adjacent to public land	High	0	100
Clearly visible from a publicly accessible location, but with somewhat reduced visual contribution to public amenity	Moderate	25	75
Visible from a publicly accessible location, but with significantly reduced visual contribution to public amenity	Low	50	50
Effectively invisible from any publicly accessible place	Negligible	75	25

Watch points

- If in doubt, use the greater depreciation factor.
- Take a pragmatic approach to what counts as publicly accessible land in assessing visibility. If there is established and unrestricted access to land, likely to continue for the foreseeable future, it may be used in the assessment.
- Future growth (and the potential for the tree to become more visible over time) does not alter the current score: the tree is valued in its current context.
- Trees in rural areas are considered using the same process.
- Trees on major transport corridors should be treated as being on public land, even where there is no general access on foot.
- Trees on minor roads, along footpaths, on nature reserves, and in parkland should be treated as being on public land.



EXAMPLES OF VISIBILITY

Image 1. Example of a street tree in an open setting, fully visible to the public; awarded a visibility factor of 100%.

Image 2. Example of a tree in church grounds, visible to the public from an adjacent road; awarded a visibility factor of 100%.



Image1



Image 2

EXAMPLES OF VISIBILITY

Image 3. Example of a tree in a back garden, with significantly restricted public views; awarded a visibility factor of 50%.

Image 4. Example of a tree effectively invisible from any publicly accessible place; the conifer tree is awarded a visibility factor of 25%.



Image 3



Image 4



LOCATION VALUE



Step 4: Attributes



Step 4: Attributes

What the practitioner does

Using Table C as a guide, assess and record the natural and acquired attributes of the tree and their impact on its setting. Enter the appropriate adjustments into the CAVAT spreadsheet using the drop-down lists provided. The value will automatically update.

(See also [Note 6: Assessing attributes](#))

How Step 4 works

Step 4 adjusts the value to account for the impact of a tree's attributes on its location. Each positive attribute scores +10%, with the exception of veteran or ancient trees, which score +30%. Each negative attribute scores -10%, and the sum of all attributes gives the adjustment factor. The final adjustment ranges from -60% to +60%.

Why take account of attributes?

Along with population density (Step 2) and visibility (Step 3), the natural and acquired characteristics of a tree can enhance or detract from the amenity it provides, according to the impact on its location. Step 4 further adjusts the location value to take these impacts into account.

Watch points

- Record only those attributes, positive or negative, that make a significant difference to a tree's contribution to public amenity.
- Attributes not visible at the time of inspection but intrinsic to the species, e.g. spring blossoms or autumn leaf colour should be scored.
- Potentially negative attributes (e.g. heavy fruiting or pollen production) should only be scored if there is evidence of a general public impact.
- Impacts of damage (e.g. obvious wounds), management (e.g. poorly executed pruning), or of pests and diseases, (e.g. horse chestnut miner) are assessed under *functionality*, so should not be recorded here to avoid double counting.
- Ensure that the justification for the score is accurately recorded in the comments boxes in the spreadsheet.
- Be mindful to avoid double counting of positive or negative attributes, for example veteran characteristics.
- If in doubt, don't count it.



Table C: Attributes

CONSIDERATIONS	EXAMPLES OF POSITIVE ATTRIBUTES	EXAMPLES OF NEGATIVE ATTRIBUTES
Species or cultivar attributes expressed in the setting	Notably attractive or distinctive innate characteristics that significantly increase public amenity value, such as flowers, leaf, winter stems, bark, fruit, or form	Notably undesirable innate characteristics that significantly lower public amenity value, such as flowers (very rarely), thorns, leaf, bark, fruit, surface roots, form, or basal projections
Acquired attributes displayed in the setting	Characteristics acquired, generally through skilled pruning, that significantly increase public amenity value. For example, sheared or pleached trees	Acquired characteristics that significantly lower public amenity value, such as obvious topping points or basal suckering
Provision of habitat	A tree hosting desirable wildlife by, for example, providing a nesting site, roost, or food for desirable bird species, mammals, or insects, especially designated NERC Section 41 species ³	A tree hosting undesirable wildlife that causes significant problems, for example by providing a nesting site, a roost, or honeydew, or food for undesirable bird species, mammals, or insects
Setting	A tree that enhances its wider setting by, for example: → being integral to or enhancing a designed landscape, avenue, or garden → being part of a wider grouping of trees that give character to the area, including long-maintained street pollards → contributing to the setting of an important place or building	A tree that detracts from its wider setting by, for example: → detracting from a designed landscape, avenue, or garden → detracting from a wider grouping of trees, such as long-maintained pollards, which give character to the area → detracting from the setting of an important place or building
Heritage	A tree making a notable positive contribution to local or national heritage. For example: → a tree in a conservation area where the trees have contributed to the designation → a commemorative or memorial tree or a tree known to be planted by a notable person → a locally designated, landmark, favourite, or notable tree	A tree that detracts significantly from local or national heritage. For example: → inappropriate species detracting from a conservation area → damaging a locally or nationally important building or monument → harming a locally designated tree by overshadowing

3. The Natural Environment and Rural Communities Act 2006 (NERC Act, 2006) is a United Kingdom Parliament Act. Section 40 of the Act places a duty on public authorities in England to conserve biodiversity; Section 41 requires the publication of lists of species and types of habitats of principal importance. For Wales, a similar list is produced under Section 42.



EXAMPLES OF
POSITIVE ATTRIBUTES

Image 5. Prominent and attractive individual flowers on this small hibiscus tree greatly enhance this street scene.

Image 6. This cherry on a housing estate provides a sense of place and clear visual amenity at this time of year.

Step 4: **Attributes**



Image 5



Image 6



**EXAMPLES OF
POSITIVE ATTRIBUTES**

Image 7. A line of laburnums adds notably attractive and distinctive flowers to this street scene.

Image 8. A variegated privet adds notably attractive and distinctive foliage to the street scene.



Image 7



Image 8



EXAMPLES OF POSITIVE ATTRIBUTES

Image 9. A sweet gum provides autumn colour.

Image 10. The bark of this cherry adds to the aesthetics of the street scene.



Image 9



Image 10



**EXAMPLES OF
POSITIVE ATTRIBUTES**

Image 11. The unusual and distinctive stem formation of this elm adds a notably attractive and distinctive feature to the street scene.

Image 12. Example of bark, here from a birch, adding to the aesthetics of the street scene.



Image 11



Image 12

EXAMPLES OF POSITIVE ATTRIBUTES

Image 13. Bright red and yellow fruit on this single rowan add to the street scene.

Image 14. Example of a plaque identifying a heritage tree. This plaque refers to the beech in Image 2.

Image 15. The collective impact of this avenue of uniform urban pollards notably adds to the street scene.



Image 13



Image 14



Image 15



EXAMPLES OF NEGATIVE ATTRIBUTES

Image 16. Wind-blown pollen from certain trees, such as this willow, can cause hay fever and other illnesses in some people.

Image 17. Prominent thorns on this street tree are a potential hazard to pedestrians.

Image 18. Honeydew from aphids drops in considerable quantities onto vehicles parked for long periods under the canopy of this tree.



Image 16



Image 17



Image 18



EXAMPLES OF NEGATIVE ATTRIBUTES

Image 19. Excessive basal growth on lime projects into the footpath, restricting space for pedestrians and requiring annual pruning.

Image 20. Fruit falling onto the footpath and vehicles parked beneath the canopy leaves debris on the otherwise clean surfaces and causes a potential slip hazard.



Image 19

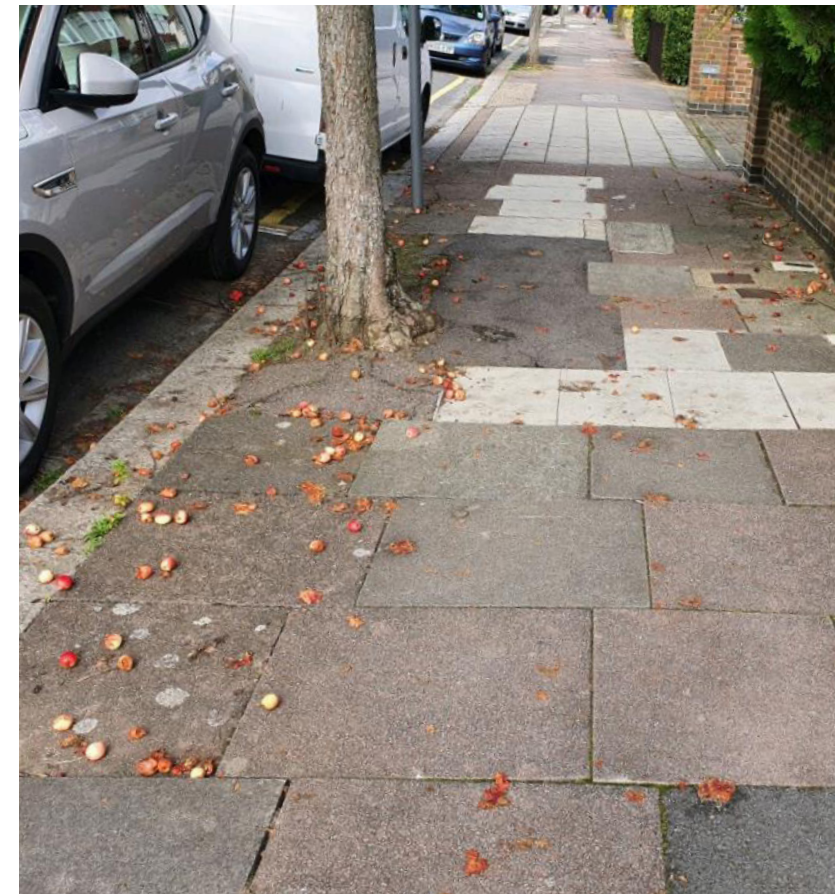


Image 20



EXAMPLES OF NEGATIVE ATTRIBUTES

Image 21. This tree's large, superficial roots have uplifted the tarmac, creating an uneven footpath surface and a barrier to some users.

Image 22. The obvious topping points in this tree are visually unattractive.



Image 21



Image 22



Steps 5–9: FUNCTIONALITY



Steps 5–9: Functionality

The effect of the functionality assessment

The functionality assessment steps depreciate the tree's value for any factors affecting its physiology that compromise its ability to function as a public asset.

Steps 5–9: Functionality

How is functionality assessed?

The assessment of functionality has five steps:

Step 5: Primary structure completeness

Step 6: Primary structure quality

Step 7: Crown completeness

Step 8: Canopy completeness

Step 9: Crown and canopy quality

Steps 5 and 6 depreciate up to 40% of the location value.

Steps 7, 8, and 9 depreciate up to 60% of the location value.

The output of these steps is the functional value.

The aim of the functionality assessment

The aim of the functionality assessment is to depreciate for any lack of completeness or quality in the subject tree, using a method that is consistent between practitioners and that accurately reflects the impact of completeness and quality on the amenity provided by the tree.

The subject tree is assessed against that of an optimum specimen that:

- is of the same species and stem diameter, and
- fully expresses the characteristic growth patterns of its species or variety in a location where it can reach its potential.

Why consider functionality?

The completeness and quality of the subject tree is important to determine the tree's amenity value. See individual steps for more details.



The model of the tree

For valuation purposes in the Full Method, the structural model of the tree has two parts:

- the primary structure, and
- the crown, including the canopy.

See Figure 2 for a schematic of the structural model of the tree.

The primary structure and the crown can contribute up to 40% and 60% of the functional value, respectively (see Figure 1 on page 5).

The primary structure is assessed at Step 5 (completeness) and Step 6 (quality). The canopy is seen as a component of the crown. Crown volume completeness is assessed at Step 7, and canopy completeness is assessed at Step 8. Crown and canopy quality are considered together in Step 9.

The crown, by definition, contains branches that are also part of the primary structure (see Figure 2). These branches contribute to the amenity provided by the primary structure as well as by the crown, and are therefore taken into account in the assessments of both parts of the tree.

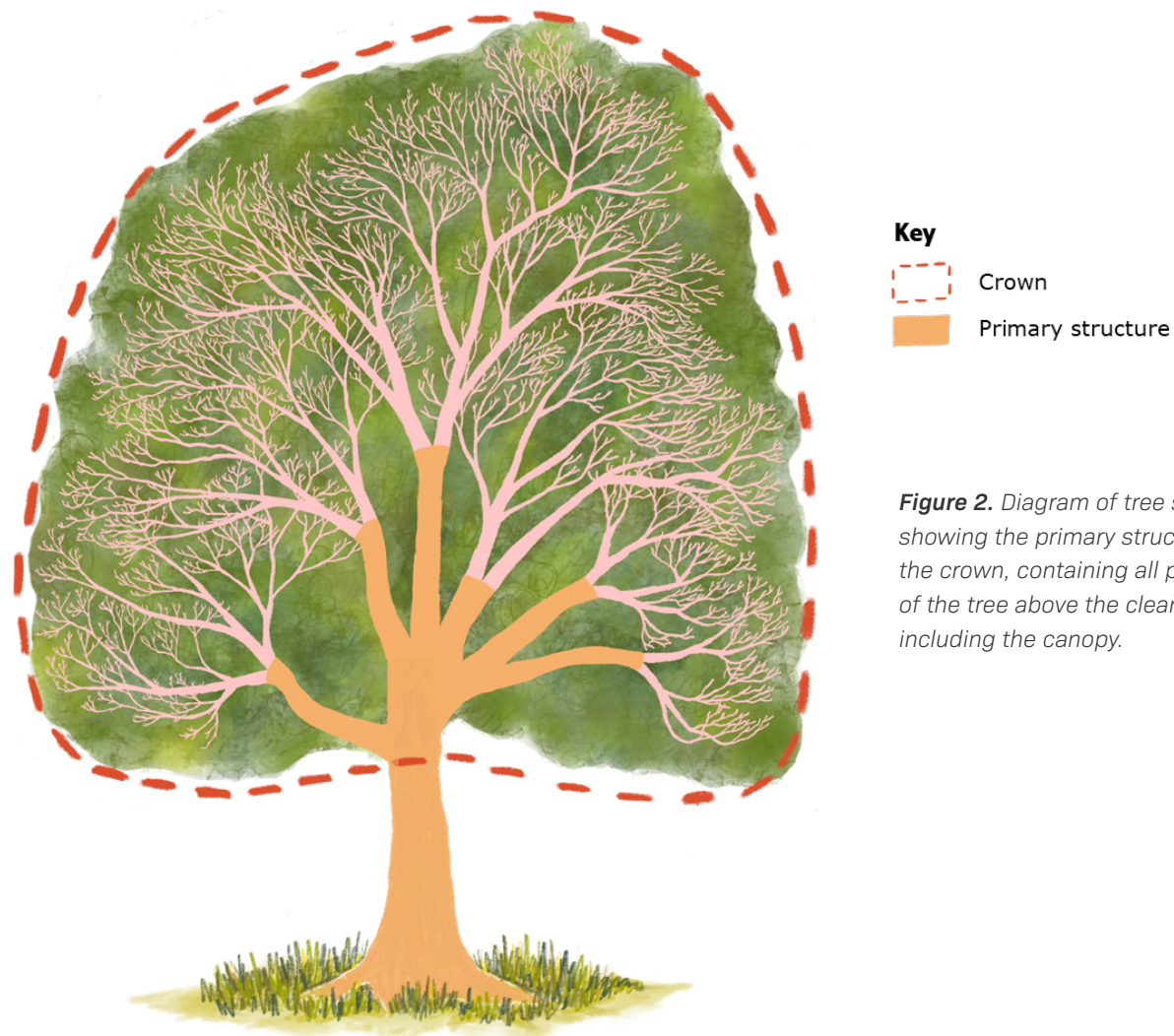


Figure 2. Diagram of tree structure showing the primary structure and the crown, containing all parts of the tree above the clear stem, including the canopy.



FUNCTIONAL VALUE

Step 5: Primary Structure Completeness



Step 5: Primary structure completeness

What the practitioner does

Assess the completeness of the primary structure of the tree and enter the appropriate adjustment into the CAVAT spreadsheet using the drop-down list provided. The value automatically updates.

Step 5: Primary structure completeness

How Step 5 works

At Step 5, the value is adjusted to reflect the completeness of the primary structure. The adjustment ranges from 100% (no change) to 25%.

The primary structure is defined as the trunk and weight-bearing stems and branches to the point where they begin to divide.

- In a tree exhibiting natural growth characteristics it will be a matter of judgement, but the extent of the primary structure is generally two-thirds of the tree height and one-third of the spread.
- For a pollard or urban pollard the primary structure is the parts below and within the pollard points.

The primary structure is assessed as being:

- More than 75% complete (100% of value retained)
- Between 51% and 75% complete (75% of value retained)
- Between 26% and 50% complete (50% of value retained)
- Between 1% and 25% complete (25% of value retained)

Trees that have grown naturally and whose primary structure displays the species' expected growth characteristics score 100%. The assessment is relative to the expected dimensions, in height and spread, of an optimum specimen of the same species/cultivar, with the same trunk diameter, while recalling that the form of the primary structure can be highly variable.

Where a tree has suffered significant damage, die-back, reduction affecting the primary structure, or has been managed to control its full development (such as a pollard) the practitioner makes a qualitative assessment of the completeness of the primary structure. Scoring reflects the completeness, irrespective of the cause.

Why consider primary structural completeness?

A tree's stem and inner branches are recognised as more than a supporting framework for the crown. They contribute substantially to a tree's visual amenity, particularly in winter as an architectural element of the landscape. An assessment of a tree's value would be incomplete and inaccurate without consideration of the primary structure.

Watch points

- All trees need to be scored, but trees that express the expected, natural characteristics of their species will, by definition, have a complete primary structure.
- Completeness should be assessed without regard to why a structure is reduced in size.
- If the primary structure is distorted or partially incomplete, the assessment should take account of the whole primary structure present, including any compensatory growth.
- Dead branches count as missing.
- The quality of the structure is assessed at Step 6.

EXAMPLES

Image 23. Example of a tree with a complete primary structure, scoring 100%. This example exhibits the natural structural characteristics of its species; its primary structure has not been compromised. 100% of the value is retained.

Image 24. Example of a tree whose primary structure is reduced, yet remains more than 75% complete. The trees on this street have been carefully pruned to retain the height of the primary structure and most of its spread. Lower branches have been removed to give clearance to adjacent buildings and there is no compensatory growth on the other sides. 100% of the value is retained.



Image 23



Image 24



EXAMPLES

Image 25. Example of a tree whose primary structure is between 51% and 75% complete. 75% of the value is retained.

Image 26. Example of a tree whose primary structure is between 26% and 50% complete. 50% of the value is retained.

Image 27. Example of a tree whose primary structure is between 1% and 25% complete. The stem of this tree has been shortened and the weight-bearing branches removed or reduced to stumps. 25% of the value is retained.



Image 25



Image 26



Image 27





FUNCTIONAL VALUE

Step 6: Primary Structure Quality



Step 6: Primary structure quality

What the practitioner does

Undertake a qualitative assessment of the form of the primary structure, using established arboricultural principles. Select the appropriate adjustment factor in the drop-down list in the CAVAT spreadsheet and the value will automatically update.

Step 6: Primary structure quality

How Step 6 works

At Step 6, the value is adjusted to account for the quality of the tree's primary structure.

Primary structure quality is assessed as:

- Excellent (100% of value retained)
- Good (75% of value retained)
- Fair (50% of value retained)
- Poor (25% of value retained)

The score reflects an expert assessment of the quality of the primary structure. An 'excellent' primary structure is one that has no significant flaws and an uncompromised ability to support a full and healthy crown. Where the primary structure is flawed, the score will be depreciated proportionately. The assessment should align with relevant standards and good practice, including BS 3998:2010.⁴

Examples of high-quality forms can include:

- trees pruned in accordance with best practice
- urban pollards
- unpruned trees in open settings

Examples of depreciated forms include:

- a lean causing an obstruction of a footpath or highway
- uncorrected structural defects, such as splits and weak forks
- poor graft unions, causing congested growth or structural weakness
- poorly timed, badly targeted, or excessive pruning
- severe structural damage

Why consider primary structure quality?

A tree's stem and inner branches are recognised as being more than a supporting framework for the crown. They contribute substantially to a tree's visual amenity. An assessment of a tree's value would be incomplete and inaccurate without consideration of the primary structure's quality.

Watch points

- Veteran tree characteristics are considered as attributes at Step 4, and should not be considered as part of the quality score here to avoid double counting.
- Primary structure quality should be assessed without regard to the cause of any flaws.

4. BS 3998:2010: Tree work - Recommendations. British Standards Institute, London.

**EXAMPLES OF
HIGH-QUALITY FORMS**

Image 28. Example of a tree pruned in accordance with best practice, awarded a primary structure quality rating of 'Excellent'. 100% of the value is retained.

Image 29. Example of urban pollards with primary structure quality rated as 'Excellent'. 100% of the value is retained.



Image 28



Image 29

**EXAMPLES OF
HIGH-QUALITY FORMS**

Image 30. Example of urban pollards with primary structure quality rated as 'Excellent'. 100% of the value is retained.

Image 31. Example of an unpruned tree in open setting, with a primary structure assessed as 'Excellent'. 100% of the value is retained.



Image 30



Image 31

EXAMPLES OF DEPRECIATED FORMS

Image 32. The primary structure quality of these leaning trees is assessed to be 'Fair'. 50% of the value is retained.

Image 33. The sooty scars and loss of woody tissue through fire damage reduces the primary structure quality of this tree to 'Fair'. 50% of the value is retained.



Image 32



Image 33

**EXAMPLES OF
DEPRECIATED FORMS**

Image 34. The included bark in the stem of this tree reduces the primary structure quality to 'Fair'. 50% of the value is retained.

Image 35. Congested growth of crossing branches above the graft on this tree reduces the primary structure quality to 'Fair'. 50% of the value is retained.



Image 34



Image 35

EXAMPLES OF DEPRECIATED FORMS

Image 36. Severe structural damage to the upper part of this tree's stem results in the primary structure quality being assessed as 'Poor'. 25% of the value is retained.

Image 37. This poor-quality formative pruning reduces the primary structure quality to 'Poor'. 25% of the value is retained.

Image 38. Significant damage to the lower stem results in reduced quality of the primary structure. The primary structure quality is rated as 'Poor'. 25% of the value is retained.



Image 36



Image 37



Image 38



FUNCTIONAL VALUE

Step 7: Crown Completeness



Step 7: Crown completeness

What the practitioner does

Undertake a quantitative assessment of the completeness of the crown, relative to what is expected of an optimum specimen of the same species and stem diameter. Where the physical extent is reduced in one or more directions, enter the expected and measured dimensions into the crown volume calculator within the CAVAT spreadsheet to calculate the adjustment required. Ensure to take account of voids in the crown that are not accounted for in radial reductions. The calculated adjustment factor is rounded to the nearest 10% and automatically updated in the spreadsheet.

(See [Note 3: Practical points](#))

(See also [Note 7: Measuring crown completeness](#) and [Table D](#))

Step 7: Crown completeness

How Step 7 works

At Step 7, the value is adjusted to reflect the completeness of the crown. Depreciation of the value is proportionate to the degree of crown reduction. The adjustment ranges from 100% for a complete crown (no change in value) to 0% for an absent crown (100% reduction in value), in 10% increments.

Completeness is assessed relative to the expected dimensions of a typical specimen of the same species/cultivar and trunk diameter. It is expressed in terms of crown volume, taking into account height, spread, and any significant voids in the structure. Dead branches count as voids (see [Note 3: Practical points](#)).

Where the physical extent is reduced in one or more directions, the crown volume calculator, provided as a supplementary tab in the CAVAT spreadsheet, should be used. This tab supports accurate assessments by calculating the ratio of measured to expected crown volumes as a percentage and subtracting additional voids. The result is automatically rounded to the nearest 10% and copied into the correct cell in the spreadsheet (see also [Note 7: Measuring crown completeness](#) and [Table D](#)).

Why consider crown completeness?

CAVAT begins with the theoretical cost of a newly planted tree with the same stem diameter as the subject tree (the base value), and then adjusts for characteristics that depreciate the value. Where the overall size of the tree is smaller than expected for the stem diameter, the value must be depreciated accordingly.

Why use crown volume as the critical parameter?

It is important to have an agreed way of measuring crown volume reductions to support consistency in CAVAT valuations. It is the most appropriate measurement for the completeness of the crown, having a direct relationship to the crown's perceived size and its ability to support the expected canopy.



Watch points

- The crown should be assessed as found.
- Even small radial reductions can result in volumetric reductions relevant to scoring in Step 7 (see *Table D*). The crown volume calculator within the CAVAT spreadsheet should always be used if the crown is reduced, irrespective of the cause.
- Assessment of completeness is relative to an optimum specimen of the same species and diameter, *not* to what is expected from the existing primary structure, which may be reduced.
- Where possible, heights and widths should be measured rather than estimated.
- An optimum specimen is assumed to have undergone management in the nursery as crown lifting up to 2 m necessary for planting in some public places (see BS 3936-1:1992⁵). Assessment of crown completeness is relative to an optimum specimen of the same species and diameter, grown from nursery stock.
- *Expected height to crown base* is the height that would be expected for a tree of the same species and trunk size, grown from nursery stock.
- Crown lifting should be accounted for by entering the actual and expected crown base heights into the calculator.
- Pollards: where a crown has not started to regenerate after pruning, the crown completeness is 0%. Once the crown has started to re-generate it is measured as for any other crown. The crown completeness will be rounded to 0% until the crown volume exceeds 5% of its expected volume, when it will score 10%.
- Where a crown is asymmetrical or distorted, irrespective of the reason, the score must reflect any reduction compared to the expected volume. The assessment should allow for compensatory growth. Distortion severe enough to significantly lessen the structural integrity of the crown is considered at Step 9: Crown and canopy quality.
- Prior structural damage or pruning that is fully recovered requires no adjustment.

Table D: Impact of linear crown reduction on the volume of a spherical crown

RADIAL REDUCTION (%)	RADIUS REMAINING (%)	VOLUME REDUCTION (%)	VOLUME REMAINING (%)
0	100	0	100
10	90	19	81
25	75	44	56
50	50	75	25
75	25	94	6

5. BS 3936-1:1992 Nursery Stock: Specification for Trees and Shrubs (Part 1).
British Standards Institute, London.



**EXAMPLES OF
CROWN COMPLETENESS**

Image 39. The crown of this tree is the typical size, shape, and outline for the species and is assessed as 100% complete. 100% of the value is retained.



Image 39

EXAMPLES OF CROWN COMPLETENESS

Image 40. The void in the upper part of this crown is not typical of this species. The crown is assessed as 80% complete. 80% of the value is retained.

Image 41. Radial reduction and gaps in the crown outline result in a crown completeness of 80%. 80% of the value is retained.



Image 40



Image 41

EXAMPLES OF CROWN COMPLETENESS

Image 42. Proximity to a building has resulted in very limited growth on one side of the crown. The crown is assessed as 60% complete. 60% of the value is retained.

Image 43. Proximity to other trees has resulted in very limited growth on one side of the crown. The crown is assessed as 40% complete. 40% of the value is retained.



Image 42



Image 43

EXAMPLES OF CROWN COMPLETENESS

Image 44. The extreme dieback in this young tree gives a score of only 20% for crown completeness (dead branches count as missing). 20% of the value is retained.

Image 45. Example of a tree whose crown is minimal, rounded to 0% complete. 0% of the crown value is retained but the tree retains value in the primary structure.



Image 44



Image 45



FUNCTIONAL VALUE

Step 8: Canopy Completeness



Step 8: Canopy completeness

What the practitioner does

Undertake an expert assessment of the completeness of the canopy, judged against reasonable expectations for the existing crown, species, and season. Select the appropriate factor from the drop-down list in the CAVAT spreadsheet and the value will automatically adjust.

Step 8: Canopy completeness

51

How Step 8 works

At Step 8, the value is adjusted to reflect the completeness of the canopy. Reduced canopy completeness results in a proportionate reduction of the tree's value. The range of adjustment is from 100% to 0%, in 20% increments.

Assessment of canopy completeness should be based on the quantity of foliage present at the time of inspection relative to the potential of the existing crown (as scored at Step 7), species/cultivar, and season.

Why consider canopy completeness?

An incomplete canopy reduces the tree's contribution to amenity and therefore compromises its value.

Watch points

- Canopy completeness is based on the potential of the existing crown, not on what would be expected from an optimum specimen. A reduced crown can still have a complete canopy.
- The appearance of the canopy does not affect its score for completeness; its visual quality will be assessed at Step 9.
- Cyclical occasional effects, such as defoliation by insects in early summer, may be disregarded where the practitioner reasonably expects the tree to recover.
- In winter, the assessment of deciduous trees is based on the health and vigour of the shoots and the characteristic development of the buds. In effect, it is an assessment of the completeness of the canopy expected in the coming spring and summer.



**EXAMPLES OF
CANOPY COMPLETENESS**

Image 46. Here a portion of the crown is missing, however the canopy is 100% complete. 100% of the value is retained.

Image 47. The reduced foliage on the living branches of this tree results in a canopy completeness of between 80 and 100%. 100% of the value is retained.



Image 46



Image 47

EXAMPLES OF CANOPY COMPLETENESS

Image 48. The canopy of this oak tree is between 41% and 60% complete, judged by the amount of foliage in the existing crown. 60% of the value is retained.

Image 49. The crown of this tree is alive. The foliage is almost absent, reducing the canopy completeness to between 1% and 20%. 20% of the value is retained.



Image 48



Image 49



FUNCTIONAL VALUE



Step 9: Crown and Canopy Quality



Step 9: Crown and canopy quality

What the practitioner does

Undertake an expert judgement of the quality of the crown, including its health and condition, compared to reasonable expectations for the species and season. Select the appropriate factor from the drop-down list in the CAVAT spreadsheet and the value will update automatically.

Step 9: Crown and canopy quality

How Step 9 works

At Step 9, the value is adjusted to reflect the quality of the crown, including the canopy. It completes the assessment of functionality.

Crown and canopy quality is assessed as:

- Excellent (100% of value retained)
- Good (75% of value retained)
- Fair (50% of value retained)
- Poor (25% of value retained)

The practitioner will examine both the crown's woody structure and the canopy and then make a combined assessment of the quality of the whole crown. The assessment should be based on the quality of crown present at the time of inspection, judged against what would be expected of an optimum tree of the same species/cultivar and stem diameter.

Why consider crown and canopy quality?

Crown and canopy quality can be impacted by many issues with significant adverse effects on the structure or appearance of the crown. These range from structural problems such as weak forks to canopy problems such as poor leaf size or colour. A lower-quality crown reduces the tree's contribution to amenity and therefore compromises its value.

Watch points

- When looking at the woody structure, take account of the guidance given for the quality of the primary structure.
- When looking at the canopy, assess only what is present; gaps should be accounted for at Step 8.
- The assessment is intended for living trees. If the crown is absent but the tree has the potential to recover, the crown and canopy quality should be counted as zero, but the valuation continued. [NB. If the whole tree is dead, it will score zero at Step 10: Life expectancy, and therefore zero CAVAT value].
- In winter, the assessment of deciduous trees is based on the health and vigour of the shoots and the characteristic development of the buds. In effect, it is an assessment of the quality of the canopy expected in the coming spring and summer.
- Long-term or persistent canopy problems, such as peach leaf curl, anthracnose of London plane, or horse chestnut leaf miner, all reduce the crown and canopy quality.

**EXAMPLES OF CROWN
AND CANOPY QUALITY**

Image 50. An example of crown and canopy quality rated as 'Excellent'. 100% of the value is retained.

Image 51. Example of horse chestnut leaf blotch damaging the appearance of the foliage of this tree and reducing crown and canopy quality to 'Fair'. 50% of the value is retained.

Image 52. Example of horse chestnut leaf miner leading the crown and canopy quality to be assessed as 'Fair'. 50% of the value is retained.



Image 50



Image 51



Image 52



Step 10:

LIFE EXPECTANCY



Step 10: Life expectancy

What the practitioner does

Assess the life expectancy using standard methodology and select the appropriate band from the drop-down list in the CAVAT spreadsheet. The value automatically updates.

Step 10: Life expectancy

How Step 10 works

At Step 10, the functional value is adjusted to take account of life expectancy. The value reduces with decreasing life expectancy and the adjustment ranges from 100% to 10%.

Life expectancy is a professional assessment of the duration for which it is reasonably expected that a tree may be safely retained in its current context.

The life expectancy adjustment adopts a banded approach. There are six life expectancy bands (see Table E). The adjustment factors are based on an exponential curve, with no loss of value for a life expectancy of 80 years or more, increasing to 90% where there is no life expectancy. The width of the age bands reflects a judgement that the greater the life expectancy the less accurately it can be predicted.

Table E: Life expectancy adjustment

LIFE EXPECTANCY (YEARS)	% VALUE RETAINED
> 80	100
40 – < 80	95
20 – < 40	80
10 – < 20	55
5 – < 10	30
< 5	10

Why consider life expectancy?

CAVAT is a depreciated replacement cost approach. It begins with the theoretical cost of a newly planted tree with the same stem diameter as the subject tree (the base value) and then adjusts for characteristics that depreciate the value. One of those characteristics is life expectancy (how long it may be owned or enjoyed), taking into account the typical life span of the species, disease, decay, and suitability to the location.

Watch points

- Tree species known to be vulnerable to a given disease are assessed as seen, not as if already infected.
- Trees should be assessed in their current context. Planned groundwork or land use change should not be taken into account.
- If the life expectancy of the tree is assessed as zero, the CAVAT value is zero.



**EXAMPLES OF
LIFE EXPECTANCY**

Image 53. Example of a weak fork reducing the life expectancy of this tree.

Image 54. Damage to the stem of this tree reduces its strength, impairs biological function, and provides an entry point for disease, reducing its life expectancy.

Image 55. This horse chestnut adjacent to a road has multiple fruiting bodies, reducing its life expectancy.



Image 53



Image 54



Image 55





WORKED EXAMPLES



Acer davidii.
East Hants, England



	STEPS	QUANTITIES	CALCULATED VALUES	COMMENTS
	Step 1: Base value			
	Measured trunk diameter (cm)	9.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£1,173.10	
	Step 2: CTI			
	Community tree index (CTI) factor	100%		
	Step 3: Visibility			
	Visibility factor	100%		Roadside
	Step 4: Attributes			
	Positive attributes factor	10%		Striped bark
	Negative attributes factor	0%		
	Overall attributes factor		110%	
	LOCATION VALUE		£1,290	
	Step 5: Primary structure completeness			
	Primary structure completeness factor	> 75%		One branch missing
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		Crossing branches
	Step 7: Crown completeness			
	Crown completeness factor	80%		Some branches removed
	Step 8: Canopy completeness			
	Canopy completeness factor	61–80%		Sparse. Some dieback
	Step 9: Crown and canopy quality			
Crown and canopy quality factor	Fair			
FUNCTIONAL VALUE		£635		
	Step 10: Life expectancy			
	Life expectancy factor	10 – <20 years		Likely to get overshadowed
	CAVAT VALUE		£349	



Ligustrum lucidum ‘Excelsum Superbum’
Stanley Road, Woodford, London E18



	STEPS	QUANTITIES	CALCULATED VALUES	COMMENTS
P	Step 1: Base value			
	Measured trunk diameter (cm)	10.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£1,448.27	
O	Step 2: CTI			
	Community tree index (CTI) factor	150%		
	Step 3: Visibility			
	Visibility factor	100%		
L	Step 4: Attributes			
	Positive attributes factor	10%		Variegation
	Negative attributes factor	0%		
	Overall attributes factor		110%	
	LOCATION VALUE		£2,390	
G	Step 5: Primary structure completeness			
	Primary structure completeness factor	> 75%		
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		Crossing branches
G	Step 7: Crown completeness			
	Crown completeness factor	100%		
	Step 8: Canopy completeness			
	Canopy completeness factor	81–100%		
G	Step 9: Crown and canopy quality			
	Crown and canopy quality factor	Excellent		
	FUNCTIONAL VALUE		£2,151	
H	Step 10: Life expectancy			
	Life expectancy factor	40 – <80 years		
	CAVAT VALUE		£2,043	



Quercus robur

East Hants, England



STEPS		QUANTITIES	CALCULATED VALUES	COMMENTS
	Step 1: Base value			
	Measured trunk diameter (cm)	96.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£133,472.95	
	Step 2: CTI			
	Community tree index (CTI) factor	100%		East Hants
	Step 3: Visibility			
	Visibility factor	100%		Community centre car park
	Step 4: Attributes			
	Positive attributes factor	0%		
	Negative attributes factor	0%		
	Overall attributes factor		100%	
	LOCATION VALUE		£133,473	
	Step 5: Primary structure completeness			
	Primary structure completeness factor	51–75%		Some primary branches missing
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		Minor cavities
	Step 7: Crown completeness			
	Crown completeness factor	20%		From calculator
	Step 8: Canopy completeness			
	Canopy completeness factor	81–100%		Some dieback/loss
	Step 9: Crown and canopy quality			
Crown and canopy quality factor	Excellent			
FUNCTIONAL VALUE		£46,048		
	Step 10: Life expectancy			
	Life expectancy factor	40 – <80 years		Competition; compaction
	CAVAT VALUE		£43,746	



Quercus sp.
Jockey Road, Sutton Coldfield, West Midlands



	STEPS	QUANTITIES	CALCULATED VALUES	COMMENTS
	Step 1: Base value			
	Measured trunk diameter (cm)	82.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£97,381.96	
	Step 2: CTI			
	Community tree index (CTI) factor	150%		
	Step 3: Visibility			
	Visibility factor	100%		Street tree
	Step 4: Attributes			
	Positive attributes factor	0%		
	Negative attributes factor	0%		
	Overall attributes factor		100%	
LOCATION VALUE		£146,073		
	Step 5: Primary structure completeness			
	Primary structure completeness factor	51–75%		Most major scaffold limbs still present
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		
	Step 7: Crown completeness			
	Crown completeness factor	30%		From calculator
	Step 8: Canopy completeness			
	Canopy completeness factor	81–100%		Canopy present is full and without voids
	Step 9: Crown and canopy quality			
Crown and canopy quality factor	Good			
FUNCTIONAL VALUE		£52,586		Crown present is in good quality
	Step 10: Life expectancy			
	Life expectancy factor	40 – <80 years		
	CAVAT VALUE		£49,957	



Platanus occidentalis x orientalis (P. x hispanica)
Franchise Street, Walsall, West Midlands



	STEPS	QUANTITIES	CALCULATED VALUES	COMMENTS
	Step 1: Base value			
	Measured trunk diameter (cm)	89.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£114,717.80	
	Step 2: CTI			
	Community tree index (CTI) factor	125%		
	Step 3: Visibility			
	Visibility factor	100%		
	Step 4: Attributes			
	Positive attributes factor	0%		
	Negative attributes factor	-10%		Narrowing of footpath
	Overall attributes factor		90%	
	LOCATION VALUE		£129,058	
	Step 5: Primary structure completeness			
	Primary structure completeness factor	51–75%		Largely complete; historical reduction
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		
	Step 7: Crown completeness			
	Crown completeness factor	80%		
	Step 8: Canopy completeness			
	Canopy completeness factor	81–100%		
	Step 9: Crown and canopy quality			
Crown and canopy quality factor	Good			
	FUNCTIONAL VALUE		£75,499	
	Step 10: Life expectancy			
	Life expectancy factor	>80 years		
	CAVAT VALUE		£75,499	



Quercus robur
Walsall, West Midlands



	STEPS	QUANTITIES	CALCULATED VALUES	COMMENTS
£	Step 1: Base value			
	Measured trunk diameter (cm)	103.00		
	Unit value factor (UVF)	£18.44		
	BASE VALUE		£153,647.41	
📍	Step 2: CTI			
	Community tree index (CTI) factor	125%		
	Step 3: Visibility			
	Visibility factor	100%		Car park, public access
📍	Step 4: Attributes			
	Positive attributes factor	10%		Historical value to original park
	Negative attributes factor	0%		
	Overall attributes factor		110%	
	LOCATION VALUE		£211,265	
⚙️	Step 5: Primary structure completeness			
	Primary structure completeness factor	51–75%		Complete stem, large scaffolds missing
	Step 6: Primary structure quality			
	Primary structure quality factor	Good		Tear-outs
⚙️	Step 7: Crown completeness			
	Crown completeness factor	60%		From calculator. Sparse; deadwood
	Step 8: Canopy completeness			
	Canopy completeness factor	41–60%		
⚙️	Step 9: Crown and canopy quality			
	Crown and canopy quality factor	Fair		
	FUNCTIONAL VALUE		£70,351	
⌚	Step 10: Life expectancy			
	Life expectancy factor	40 – <80 years		Years of compaction. Lorry strikes. Sparse crown
🌳	CAVAT VALUE		£66,834	



Notes

1. CAVAT documents

It is recommended that practitioners use the latest spreadsheet, available with other CAVAT documents here:

www.ltoa.org.uk/documents-1/capital-asset-value-for-amenity-trees-cavat.

2. The unit value factor (UVF)

The UVF is reviewed annually and updated to reflect inflation. The latest UVF is available from www.ltoa.org.uk/resources/cavat. It has two components: the nursery price, expressed per square centimetre of stem cross-sectional area, and the planting cost.

Nursery price

The nursery price component of the UVF is derived from an average wholesale cost of a 'basket' of the 10 most commonly planted street trees in England, increased annually to reflect inflation according to the retail price index. The most recent survey of wholesale tree prices took place in 2016/17. The aim is to update the nursery price component with a new survey of wholesale prices at least every five years.

The aim of the 'basket of species' approach is to average out price differences between species caused by (for example) production factors or variations in demand. The calculation was based on what were found to be the most popular trees for amenity planting, at the most popular sizes.

The UVF assumes that trees in nursery stock are of high quality and have an appropriate form for planting in urban environments, with a degree of crown lifting.

Planting cost component

The planting cost is set at 150% of the nursery price; this is a best estimate, based on consultation with tree officers and across the wider landscape industry. It includes the costs of transport, planting, materials, immediate care and management, but not aftercare.

3. Practical points: Measurements, timing, and estimations

Measuring trunk diameter

- Use a rounded-down diameter tape.
- Measure at 1.5 m above ground level, unless that would result in an unrepresentative measurement.
- Where the trunk divides below 1.5 m use the spreadsheet for multi-stemmed trees.
- Where trunk is swollen or there are projections at 1.5 m, take the smallest measurement below 1.5 m.

Measuring multi-stemmed trees

A revised and updated tab within the CAVAT spreadsheet is available to assist practitioners with multi-stemmed trees. Each is recorded as if it were an individual tree and the results are amalgamated, by the spreadsheet, to give a single value.

4. Community tree index (CTI)

The CTI table is included in the CAVAT spreadsheet. The underlying population data is from the Office for National Statistics.⁶ Population densities (people per hectare) at local authority level are divided into seven bands; each band has a width of 20 people per hectare. Value multipliers are applied to each band: from 100% for the lowest population density (<20 people per hectare), to 250% for the highest population density (>119 people per hectare).

6. ONS: Estimates of the population for the UK, England and Wales, Scotland and Northern Ireland. Available at: www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland.

5. Visibility assessment considerations

Three considerations are combined within a single assessment:

- **Visibility:** What proportion of the tree is visible?
- **Proximity:** How distant is the best view of the tree?
- **Impact:** How does the tree's size affect its visual impact?

The tree does not need to be on public land to score 100%. The key criterion is visibility, so trees in open, private front gardens score as highly as street trees. For this assessment the grounds of schools, hospitals, churchyards, or other areas freely used by the community should be treated as publicly accessible, where appropriate.

6. Assessing attributes

Attributes can be significant natural, intrinsic characteristics of the tree, or can be acquired because of the location, because of the relationship to other trees, through events, or through management. Assessors should keep the perspective of the public in mind when deciding whether an attribute should add to or detract from the tree's value. For example, if the tree is historically significant, is there a plaque, or equivalent? Always record and justify the rationale for the assessment.

7. Measuring crown completeness: Supplementary spreadsheet

How does the supplementary spreadsheet work?

The spreadsheet calculates the crown completeness factor based on measured or estimated data, which is entered by the assessor. The spreadsheet calculates the expected and actual crown volumes based on expected and measured (or estimated) crown radii and heights, and expresses the ratio of expected: actual crown volume as a percentage. Additional voids not accounted for by radial reductions are added to the result, and the final crown completeness is automatically entered in the Full Method spreadsheet.

How accurate is the calculator?

The calculation will work for most trees, to help correct a tendency to underestimate the impact of crown reduction on crown volume. Caution will be needed for trees with heavily distorted crown shapes. The calculation only accounts for radial reductions; an estimate of the impact of voids in the crown resulting from thinning or loss of major branches, or compensatory growth, will need to be included.

Using the crown completeness calculator

The practitioner enters the measured and expected tree heights, then selects the best approximation of the actual and expected crown shapes from the following options:

- **Cone** (upright) (see [Figure 3. Examples of cone-shaped, or upright, crowns.](#))
- **Cylinder** (columnar) (see [Figure 4. Examples of cylinder-shaped, or columnar, crowns.](#))
- **Hemisphere** (half-rounded) (see [Figure 5. Examples of hemisphere-shaped, half-rounded, or spreading, crowns.](#))
- **Sphere** (rounded) (see [Figure 6. Examples of sphere-shaped, or rounded, crowns.](#))
- **Ellipsoid** (rounded) (see [Figure 7. Examples of ellipsoid-shaped, or rounded, crowns.](#))



Figure 3. Examples of cone-shaped, or upright, crowns.



Figure 4. Examples of cylinder-shaped, or columnar, crowns.



Figure 5. Examples of hemisphere-shaped, half-rounded, or spreading, crowns.



Figure 6. Examples of sphere-shaped, or rounded, crowns.



Figure 7. Examples of ellipsoid-shaped, or oval, crowns.

The assessor then records the actual and expected height to crown base, and the actual and expected crown radii. Again, the comparison is against an optimum specimen of the same species/cultivar and trunk diameter, fully expressing its natural potential.

The calculation requires four radial measurements from the centre of the trunk(s) in cardinal directions. Where this is impractical, radii may be estimated or measured at alternative directions (at 90 degrees to each other), to achieve the best representation of the crown shape. When the crown spread is symmetrical in all directions only one measurement is required.

The assessor enters additional voids in the crown, which are not accounted for by radial reductions, as a percentage of the expected crown volume. The spreadsheet calculates the crown completeness, and the result is automatically entered into the CAVAT calculation sheet.

Glossary of Terms

acquired characteristic	a non-heritable change in a function or structure of a tree caused by disease, injury, accident, deliberate modification, misuse, or an environmental influence
amenity	a positive element or elements that contribute to the overall character or enjoyment of an area ⁷ see also visual amenity
ancient tree	a tree in the final stage of its life, which is old relative to others of the same species, and which has biological, aesthetic, or cultural value because of its great age ⁸
branch	a division of a tree's stem, or of another branch
canopy	buds, shoots, and leaves supported by the crown, offering shade, shelter, and other benefits
community tree index (CTI)	a value adjustment factor based on population density data at local authority level, produced by the Office for National Statistics
crown	all parts of a tree above the clear section of the stem; includes branches, live foliage, and the upper portion of the primary stem(s) that support them and, therefore, contains part of the primary structure
crown base	the average height above ground level where the leaf canopy is held note: crown base is not the height on the stem where the lowest branches originate
crown lifting	in pruning, the selective removal of lower branches from a tree crown to provide clearance
crown reduction	method of reducing the height and/or spread of a tree crown by making appropriate pruning cuts

7. Planning Portal Glossary. Available at: www.planningportal.co.uk/services/help/glossary#amenity. Accessed 25 January 2023.

8. Woodland Trust (2008). Practical Guidance - Ancient Tree guide 4: What are ancient, veteran and other trees of special interest? Available at: <https://www.woodlandtrust.org.uk/media/1836/what-are-ancient-trees.pdf>.

crown shapes (as used in Step 7):

cone (pyramidal)	triangular in outline, broadest at the base and narrowest towards the top ⁹
cylinder (columnar)	upright growth enhanced by pruning, occurring in a cultivar, or occurring naturally in varieties a cylindrical or columnar tree typically has a central leader with upright branch structure providing vertical interest the height of the crown greatly exceeds the width
hemisphere (half-rounded, or broad)	rounded top with a flattened or broad base; height is less than width
sphere (rounded, or globular)	rounded and as wide as it is tall
ellipsoid (rounded, ovoid, obovoid)	rounded but taller than it is wide, or wider than it is tall, resembling a rugby ball or egg in appearance
cultivar	cultivated variety; a plant bred to promote expression of desirable traits or characteristics
depreciation	a reduction in the value of an asset
graft unions	the point on a plant or tree where the graft is joined to the rootstock or stem
green infrastructure	multi-functional blue and green spaces/features, which can deliver improvements in quality of life and environmental benefits to communities
node	position on a stem where a leaf, bud, or branch arises
notable tree	a tree recorded as having special amenity or significance in its local environment ⁸

9. Hiron, A. D. and Sjöman, H. (2019). *Tree Species Selection for Green Infrastructure: A Guide for Specifiers*. Trees and Design Action Group (TDAG). Available at: www.tdag.org.uk/tree-species-selection-for-green-infrastructure.html.

pleached	a tree that has undergone the practice of intertwining branches to create a narrow canopy, screen or hedge
pollard	a tree whose top branches have been cut back close to the stem so that it may produce a dense growth of new shoots a tree that has formed a crown consisting of numerous branches arising from the same height on a main stem or principal branches ¹⁰
pollarding	pruning to create or maintain a tree in a pollard form (see pollard) cutting a tree to encourage formation of numerous branches arising from the same height on a main stem or principal branches ⁶ note: this process is initially carried out on trees that have not yet reached maturity. The form of the tree can then be maintained by cycles of cutting. This is not the same as topping ⁶
primary structure	the supporting framework for the crown, being the trunk and weight-bearing stems, and branches to the point where they begin to divide (see Figure 2)
replacement cost approach	extrapolation from the average cost of a newly planted tree, using the proportionate increase in cross-sectional stem area as the basis to calculate value
species	the fundamental category of taxonomic classification, ranking below a genus or subgenus
stem	single or multiple above-ground supporting axis of a tree, bearing branches and further sub-divisions

10. BS 3998:2010 Tree work: Recommendations. British Standards Institute.

11. BS 5837:2012 *Trees in relation to design, demolition and construction: Recommendations*. British Standards Institute.

stem diameter	diameter of the stem (or trunk) measured at 1.5 metres above ground, according to the UK arboricultural standard and as specified in BS 5837:2012 ¹¹ note 1: also referred to as DBH: diameter at breast height note 2: DBH is measured at 1.4 m (4.5 feet) above ground in the United States, Australia (arboriculture), and New Zealand; and when using the <i>Guide for Plant Appraisal</i> (9th ed.), at 1.3 m (4.3 feet) above ground in Australia (forestry), Canada, the European Union, and the UK
topping	removal of tops of vertical stems that are generally larger than 25 mm diameter, with pruning cuts made between nodes, exposing heartwood/central wood beyond the network of living cells
trunk	see stem
urban pollard	an established urban tree that has been topped at a relatively mature stage, with pruning wounds exceeding 25–50 mm diameter (BS 3998:2010 ⁶), before being placed into a pollarding cycle. Topping heights are locally prescribed. The practice is largely confined to <i>Tilia</i> and <i>Platanus</i> species.
unit value factor (UVF)	the average cost of a newly planted tree per unit of stem cross-sectional area (i.e., £ per cm ²). Its derivation has two components: the nursery price (for the 10 top-selling trees collated from survey of nurseries) and the planting cost. Its value is updated annually
veteran tree	a tree that has developed some of the habitat features found on ancient trees such as decay, fungi, cavities, and dead wood. Veteran trees are usually only in their mature stage of life. Features have developed because of the tree's life or environment, not necessarily a consequence of age ⁸
visual amenity	the contribution made by a tree to appealing or pleasant aesthetic qualities of a landscape the contribution made by a tree to the quality and nature of views and surroundings that create the backdrop to an area ¹²

12. Landscape Institute (2019). Residential Visual Amenity Assessment (RVAA). Technical Guidance Note 2/19. Available at www.landscapeinstitute.org/technical-resource/rvaa/. Accessed 20 August 2021.

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