Twickenham Riverside
CAVAT Assessment

LONDON BOROUGH OF
RICHMOND UPON THAMES

July 2021

Design Team

Applicant	London Borough of Richmond upon Thames
Project Manager	Arcadis
Architect	Hopkins Architects
Landscape Architect	LDA Design
Structural Engineer	Webb Yates Engineers
Mechanical & Electrical Engineer	Skelly & Couch
Transport Consultant	WSP
Quantity Surveyor	Arcadis
Planning Consultant	Savills
Townscape & Heritage Consultant	Iceni Projects
Sustainability Consultant	Method Consulting
Accessibility Consultant	Lord Consultants
Fire Consultant	FDS Consult UK
Ecology Consultant	BSG Ecology
Arboricultural Consultant	Thomson Environmental Consultants
Daylight & Sunlight Consultant	GIA Chartered Surveyors
Acoustic Consultant	TetraTech
Air Quality Consultant	Entran
Land Contamination Consultant	Geosphere Environmental
Archaeological Consultant	AOC Archaeology Group
Viability Consultant	Lambert Smith Hampton
Principal Designer	Nick Perry Associates
BIM Consultant	BIM Technologies

Twickenham Riverside

CAVAT Valuation

For

London Borough of Richmond upon Thames

Project No.: AALP/002/001/001

July 2021

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Project Number	Report No.
AALP152/002	001

Revision No.	Date of Issue	Author	Reviewer	Approver
001		Andrew Poynter	Neil Francis	Simon Mackrell

Contents

1. Introduction

1.1 Background

1.1.1 London Borough of Richmond upon Thames is proposing the redevelopment of 1, 1A, 1B and 1C King Street; 2-4 Water Lane; the site of the former swimming pool and associated buildings, The Embankment; the Diamond Jubilee Gardens, Twickenham, London (see Figure 1), hereafter refered to as the site.

1.1.2 Arcadis LLP commissioned Thomson Environmental Consultants to undertake an arboricultural survey of up trees within and adjacent to the site. The arboricultural survey was carried out in accordance with BS5837:2012 '*Trees in Relation to Design, Demolition and Construction – Recommendations'* (BS5837:2012).

1.1.3 All trees were categorised in accordance with the cascade chart for tree quality assessment in BS5837:2012 (see Appendix 2). Trees were given a ranking of A, B or C in descending order of value and assigned one or more subcategories qualifying the basis of that value as either arboricultural, landscape or cultural. Trees with only short-term remaining value or that require immediate removal for safety or management reasons are given a U rating..

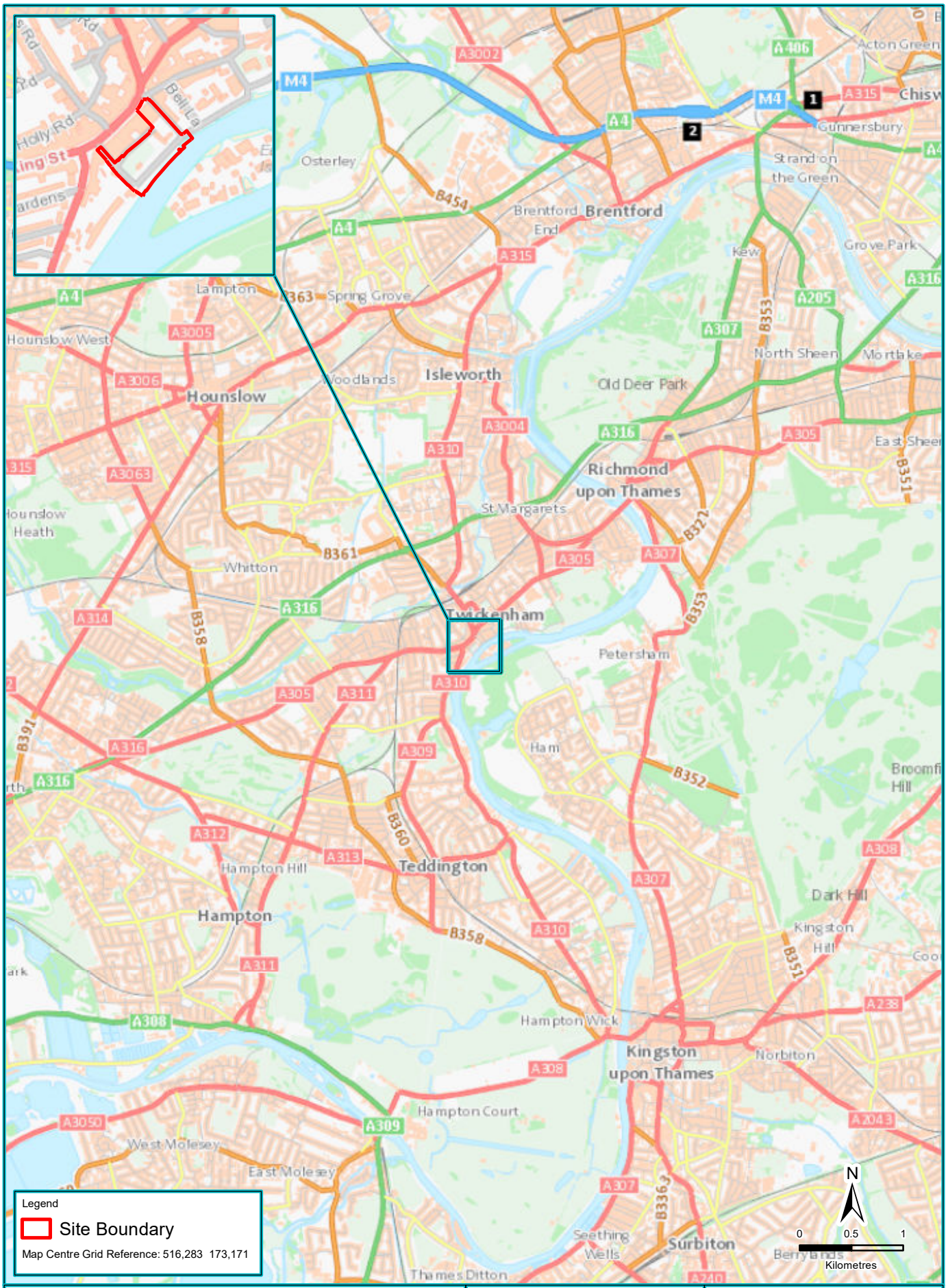
1.1.4 Along with the Arboricultural Impact Assessment and Arboricultural Method Statement the council have requested a CAVAT valuation of the trees to be removed for the redevelopment of the site. These are identified within the Thomson Environmental Consultants report reference AALP152/001/001/003.

1.1.5 Capital Asset Valuation of Amenity Trees (CAVAT) was developed by Chris Neilan and the London Tree Officers Association (LTOA) in 2008 and is regarded as one of the principal methods of tree valuation in the UK. The CAVAT system was designed particularly for Councils and other Public Authorities to allow them to value trees in monetary terms rather than as liabilities.

1.1.6 The CAVAT system has been designed to assess the public amenity value of trees in-situ, rather than simply calculating the replacement cost of buying the same size trees directly from a tree nursery. This approach values all the benefits to local residents associated with trees, and the tree management costs faced by a Council.

1.2 The Brief and Objectives

1.2.1 Arcadis LLP commissioned Thomson to undertake a CAVAT valuation on the trees proposed for removal as part of the development proposals. The purpose of the valuation was to assess the condition of the trees, ascertain their monetary value and inform the design team of the cost implications of removing trees compared with retention or employing alternative engineering solutions.



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		Date: 21/07/2020	Date: 21/07/2020

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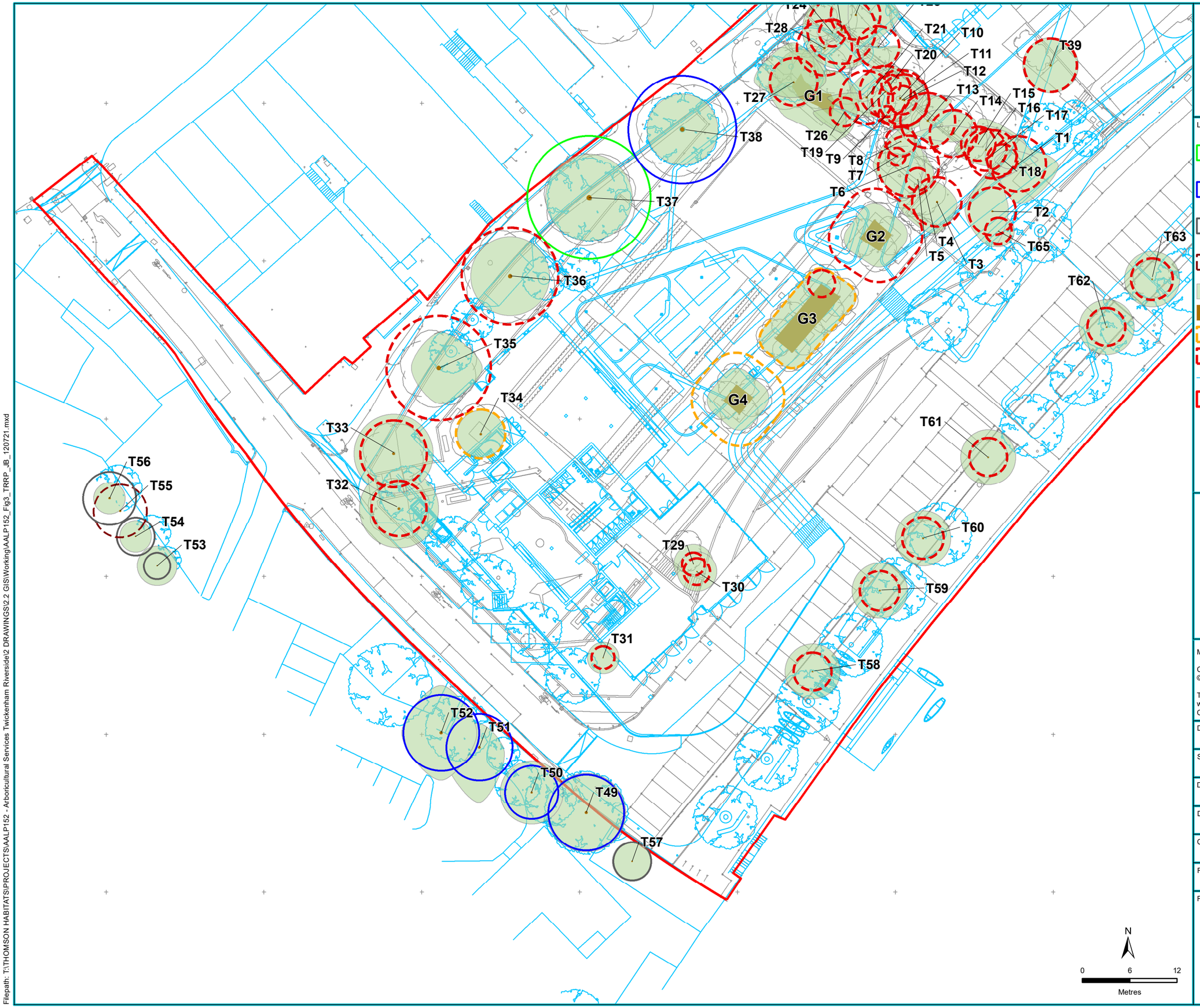

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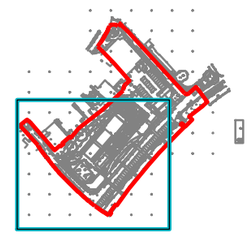
Legend

- Root Protection Area of Category 'A' Tree
- Root Protection Area of Category 'B' Tree
- Root Protection Area of Category 'C' Tree
- Root Protection Area of Category 'U' Tree
- Tree Canopy Extents
- Tree Stem Location
- Trees to be Relocated
- Trees to be Removed
- Proposed Layout
- Site Boundary



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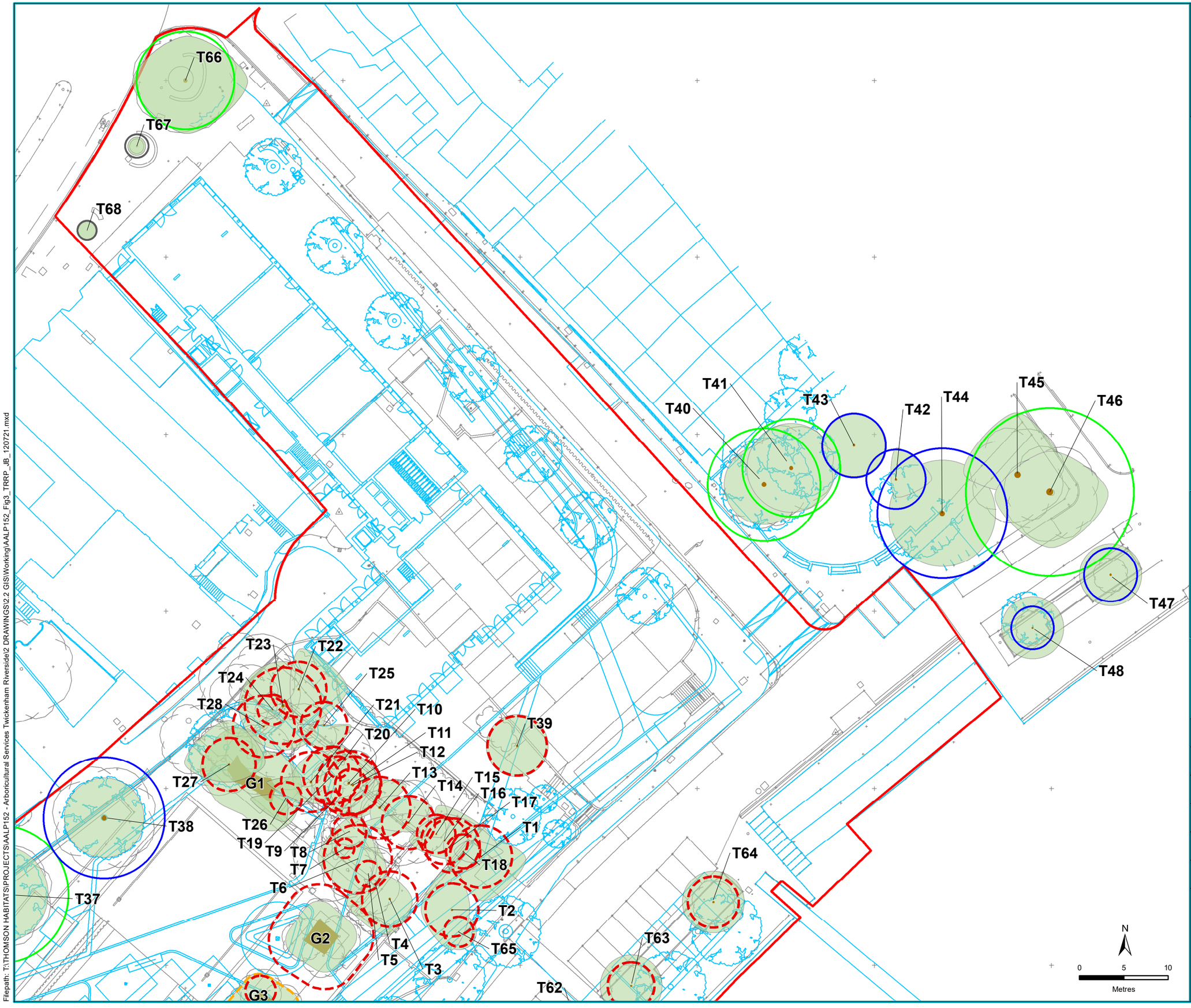
Date: 12/07/2021	Date: 12/07/2021
Client	Arcadis LLP
Figure Number	3a

Figure Title

Tree Removal and Retention Plan



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Legend

- Root Protection Area of Category 'A' Tree
- Root Protection Area of Category 'B' Tree
- Root Protection Area of Category 'C' Tree
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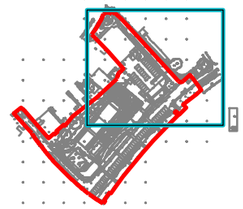

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Date: 12/07/2021	Date: 12/07/2021
Client	Arcadis LLP
Figure Number	3b

Figure Title

Tree Removal and Retention Plan

2. Methodology

2.1 Site Visit

2.1.1 The site was visited by Andrew Poynter BSc (Hons) FArborA, MICFor, MCIHort on 4th May 2021.

2.2 Weather Conditions

2.2.1 The weather conditions at the time of survey were dry and sunny. Deciduous trees were in bud burst.

2.3 Tree Inspection

2.3.1 The tree surveyed was inspected from ground level only and no internal investigations were undertaken.

2.3.2 The information recorded for the trees can be seen in the report AALP152/001/001/003 at Appendix 1.

2.4 CAVAT Assessment

2.4.1 The CAVAT system was designed particularly for Councils and other Public Authorities to allow them to value trees in monetary terms rather than as liabilities. The system has been designed to assess the public amenity value of trees in-situ, rather than simply calculating the replacement cost of buying the same size trees directly from a tree nursery. This approach values all the benefits to local residents associated with trees, and the tree management costs faced by a Council.

2.4.2 There are two versions of CAVAT systems. Full CAVAT is recommended for use in cases concerning individual trees or groups, when precision is required and sufficient time is available for a full assessment. The second, referred to as the Quick Method, is intended specifically as a strategic tool for management of the stock as a whole, as if it were a financial asset of the community.

2.4.3 For the purposes of this report, the Full Method has been employed to assign a monetary value to the individual tree selected for removal as part of the proposed repair works. A copy of the Full Method: User's Guide can be found in Appendix 2.

3. Results

3.1 Desk Study

3.1.1 It was confirmed using the London Borough of Richmond Upon Thames online mapping, on 26th July 2021 the site is located within the Twickenham Riverside Conservation Area. Whether trees are covered by TPOs is yet to be confirmed.

3.1.2 Under the Town and Country Planning (Tree Preservation) (England) Regulations 2012 it is prohibited to cut down, top, lop, uproot, wilfully damage or wilfully destroy; or cause or permit the cutting down, topping, lopping, uprooting, wilful damage or wilful destruction of any tree, or group of trees, subject to a TPO or that is located within a Conservation Area except with the consent of the local authority. However, statutory undertakers can, at their discretion, use their statutory powers to bypass these protections and carry out works to trees without prior permission from the Local Authority.

3.2 Tree Survey

3.2.1 The previous tree survey was reviewed and updated following feedback from the pre-application process.

3.2.2 The changes comprised minor updates to species identification.

3.3 CAVAT valuation

3.3.1 The current scheme proposed within the Twickenham Riverside Landscape and Public Realm Strategy document dated July 2021

3.3.2 The valuation has been completed using the online calculation sheet and this is include at Appendix 1

3.3.3 Five of the London Plane tree within groups G2, G3 and G4 are to be removed with the remaining 11 being relocated. The value of the five to be removed has been included as ive individual trees.

3.3.4 The cumulative valuation of the tree stock to be removed is £144,971.00.

4. Recommendations

4.1.1 There is extensive tree planting and maintenance proposed for the site and this value should be incorporated into that budget.

5. Conclusion

5.1.1 The CAVAT valuation of the trees to be removed for this scheme is £146,744.00. This should be used towards the cost of replacement planting within the site.

6. References

6.1.1 Neilan (2018). *Capital Asset Value for Amenity Trees (CAVAT) (Updated 2018 edition).* London Tree Officers Association

Appendix 1 CAVAT Full Method Worked Calculations

Project:
Name of Surveyor:
Date:

A-ALP-152-002 (Twickenham Riverside)
Andy Poynter
2907021

CAVAT

CALCULATE VALUE OF TREE STOCK

CTI Factor (Please select): 125
Unit Value Factor 16.26

Cumulative Total: **£ 144,971**

Tree Information			Step 1: Basic Value											Step 2: CTI Value		Step 3: Locational Value		Step 4: Structural Value		Step 5: Functional Value		Step 6: Amenity Value		Step 5: Final Value	FINAL VALUE
Tree No.	Species ID	Location (I.e near tree no. 1)	Stem Diameter (1)	Stem Diameter (2)	Stem Diameter (3)	Stem Diameter (4)	Stem Diameter (5)	Stem Diameter (6)	Stem Diameter (7)	Stem Diameter (8)	Stem Diameter (9)	Stem Diameter (10)	Basic Value	CTI Factor (Please select)	CTI Value	Accessibility Factor (Please select)	Location Value	Structural Factor (Please select)	Structural Value	Functional Factor (Please select)	Functional Value	Amenity Factor (Please select)	Amenity Value	Life Expect. Factor (Please select)	
1	**Sycamore**; *Acer pseudoplatanus*		24	14	9								£ 10,893	125	£ 13,617	75	£ 10,212	30	£ 3,064	30	£ 919	0	£919	10 - <20	£506
2	**Sycamore**; *Acer pseudoplatanus*		25										£ 7,982	125	£ 9,977	75	£ 7,483	30	£ 2,245	50	£ 1,122	0	£1,122	10 - <20	£617
3	**Sycamore**; *Acer pseudoplatanus*		26										£ 8,633	125	£ 10,791	75	£ 8,093	30	£ 2,428	30	£ 728	0	£728	10 - <20	£401
4	**Sycamore**; *Acer pseudoplatanus*		8										£ 817	125	£ 1,022	75	£ 766	10	£ 77	10	£ 8	0	£8	<5	£1
5	**Sycamore**; *Acer pseudoplatanus*		8										£ 817	125	£ 1,022	75	£ 766	30	£ 230	30	£ 69	0	£69	10 - <20	£38
6	**Sycamore**; *Acer pseudoplatanus*		15	20	20								£ 13,090	125	£ 16,362	75	£ 12,272	30	£ 3,682	30	£ 1,104	0	£1,104	10 - <20	£607
7	**Sycamore**; *Acer pseudoplatanus*		9										£ 1,034	125	£ 1,293	75	£ 970	30	£ 291	30	£ 87	0	£87	10 - <20	£48
8	**Sycamore**; *Acer pseudoplatanus*		16										£ 3,269	125	£ 4,087	75	£ 3,065	30	£ 919	30	£ 276	0	£276	<5	£28
9	**Sycamore**; *Acer pseudoplatanus*		9										£ 1,034	125	£ 1,293	75	£ 970	30	£ 291	30	£ 87	0	£87	<5	£9
10	**Sycamore**; *Acer pseudoplatanus*		30										£ 11,494	125	£ 14,367	75	£ 10,775	30	£ 3,233	30	£ 970	0	£970	10 - <20	£533
11	**Goat willow**; *Salix caprea*		15										£ 2,873	125	£ 3,592	75	£ 2,694	30	£ 808	30	£ 242	0	£242	<5	£24
12	**Sycamore**; *Acer pseudoplatanus*		27										£ 9,310	125	£ 11,637	75	£ 8,728	30	£ 2,618	30	£ 786	0	£786	10 - <20	£432
13	**Goat willow**; *Salix caprea*		29										£ 10,740	125	£ 13,425	75	£ 10,069	30	£ 3,021	30	£ 906	0	£906	10 - <20	£498
14	**Sycamore**; *Acer pseudoplatanus*		25										£ 7,982	125	£ 9,977	75	£ 7,483	30	£ 2,245	30	£ 673	0	£673	10 - <20	£370
15	**Sycamore**; *Acer pseudoplatanus*		18										£ 4,138	125	£ 5,172	75	£ 3,879	30	£ 1,164	30	£ 349	0	£349	10 - <20	£192
16	**Sycamore**; *Acer pseudoplatanus*		22										£ 6,181	125	£ 7,726	75	£ 5,795	30	£ 1,738	30	£ 522	0	£522	10 - <20	£287
17	**Sycamore**; *Acer pseudoplatanus*		22	13									£ 8,339	125	£ 10,424	75	£ 7,818	30	£ 2,345	30	£ 704	0	£704	10 - <20	£387
18	**Silver birch**; *Betula pendula*		16										£ 3,269	125	£ 4,087	75	£ 3,065	30	£ 919	30	£ 276	0	£276	<5	£28
19	**Sycamore**; *Acer pseudoplatanus*		27										£ 9,310	125	£ 11,637	75	£ 8,728	30	£ 2,618	30	£ 786	0	£786	10 - <20	£432
20	**Sycamore**; *Acer pseudoplatanus*		10										£ 1,277	125	£ 1,596	75	£ 1,197	30	£ 359	30	£ 108	0	£108	10 - <20	£59
21	**Goat willow**; *Salix caprea*		28										£ 10,012	125	£ 12,515	75	£ 9,386	30	£ 2,816	30	£ 845	0	£845	<5	£84
22	**Sycamore**; *Acer pseudoplatanus*		26										£ 8,633	125	£ 10,791	75	£ 8,093	30	£ 2,428	30	£ 728	0	£728	10 - <20	£401
23	**Sycamore**; *Acer pseudoplatanus*		36										£ 16,551	125	£ 20,688	75	£ 15,516	30	£ 4,655	50	£ 2,327	0	£2,327	20 - <40	£1,862
24	**Sycamore**; *Acer pseudoplatanus*		14										£ 2,503	125	£ 3,129	75	£ 2,347	30	£ 704	30	£ 211	0	£211	10 - <20	£116
25	**Sycamore**; *Acer pseudoplatanus*		22										£ 6,181	125	£ 7,726	75	£ 5,795	30	£ 1,738	30	£ 522	0	£522	10 - <20	£287
26	**Sycamore**; *Acer pseudoplatanus*		15										£ 2,873	125	£ 3,592	75	£ 2,694	30	£ 808	30	£ 242	0	£242	10 - <20	£133
27	**Sycamore**; *Acer pseudoplatanus*		25										£ 7,982	125	£ 9,977	75	£ 7,483	30	£ 2,245	100	£ 2,245	0	£2,245	10 - <20	£1,235
28	**Sycamore**; *Acer pseudoplatanus*		29										£ 10,740	125	£ 13,425	100	£ 13,425	10	£ 1,343	100	£ 1,343	0	£1,343	<5	£134
29	**Himalayan birch**; *Betula utilis*		12										£ 1,839	125	£ 2,299	100	£ 2,299	70	£ 1,609	30	£ 483	0	£483	20 - <40	£386
30	**Himalayan birch**; *Betula utilis*		14										£ 2,503	125	£ 3,129	100	£ 3,129	70	£ 2,190	30	£ 657	0	£657	20 - <40	£526
31	**Himalayan birch**; *Betula utilis*		29										£ 10,740	125	£ 13,425	100	£ 13,425	100	£ 13,425	30	£ 4,028	0	£4,028	20 - <40	£3,222
32	**Indian bean tree**; *Catalpa bignoniodes*		29										£ 10,740	125	£ 13,425	100	£ 13,425	100	£ 13,425	100	£ 13,425	0	£13,425	20 - <40	£10,740
33	**Indian bean tree**; *Catalpa bignoniodes*		35										£ 15,644	125	£ 19,555	100	£ 19,555	100	£ 19,555	100	£ 19,555	0	£19,555	20 - <40	£15,644
35	**Hornbeam**; *Carpinus betulus*		55										£ 38,631	125	£ 48,289	100	£ 48,289	100	£ 48,289	100	£ 48,289	0	£48,289	20 - <40	£38,631
36	**Hornbeam**; *Carpinus betulus*		51										£ 33,216	125	£ 41,520	100	£ 41,520	100	£ 41,520	100	£ 41,520	0	£41,520	40 - <80	£39,444
39	**Sycamore**; *Acer pseudoplatanus*		28										£ 10,012	125	£ 12,515	100	£ 12,515	100	£ 12,515	100	£ 12,515	0	£12,515	10 - <20	£6,883

																CAVI - Project Method										
58	**Pin oak**; *Quercus palustris*		20										£ 5,108	125	£ 6,385	100	£ 6,385	100	£ 6,385	20	£ 1,277	0	£1,277	<5	£128
59	**Pin oak**; *Quercus palustris*		21										£ 5,632	125	£ 7,040	100	£ 7,040	100	£ 7,040	20	£ 1,408	0	£1,408	<5	£141
60	**Pin oak**; *Quercus palustris*		22										£ 6,181	125	£ 7,726	100	£ 7,726	100	£ 7,726	20	£ 1,545	0	£1,545	<5	£155
61	**Pin oak**; *Quercus palustris*		20										£ 5,108	125	£ 6,385	100	£ 6,385	100	£ 6,385	20	£ 1,277	0	£1,277	<5	£128
62	**Pin oak**; *Quercus palustris*		20										£ 5,108	125	£ 6,385	100	£ 6,385	100	£ 6,385	20	£ 1,277	0	£1,277	<5	£128
63	**Pin oak**; *Quercus palustris*		22										£ 6,181	125	£ 7,726	100	£ 7,726	100	£ 7,726	20	£ 1,545	0	£1,545	<5	£155
64	**Pin oak**; *Quercus palustris*		14										£ 2,503	125	£ 3,129	100	£ 3,129	100	£ 3,129	20	£ 626	0	£626	<5	£63
65	**Hornbeam**; *Carpinus betulus*		14										£ 2,503	125	£ 3,129	100	£ 3,129	100	£ 3,129	100	£ 3,129	0	£3,129	20 - <40	£2,503
69	**London plane;** *Platanus x hispanica*	G2 - one of four trees	16										£ 3,269	125	£ 4,087	100	£ 4,087	100	£ 4,087	100	£ 4,087	0	£4,087	20 - <40	£3,269
70	**London plane;** *Platanus x hispanica*	G2 - one of four trees	16										£ 3,269	125	£ 4,087	100	£ 4,087	100	£ 4,087	100	£ 4,087	0	£4,087	20 - <40	£3,269
71	**London plane;** *Platanus x hispanica*	G2 - one of four trees	16										£ 3,269	125	£ 4,087	100	£ 4,087	100	£ 4,087	100	£ 4,087	0	£4,087	20 - <40	£3,269
72	**London plane;** *Platanus x hispanica*	G2 - one of four trees	16										£ 3,269	125	£ 4,087	100	£ 4,087	100	£ 4,087	100	£ 4,087	0	£4,087	20 - <40	£3,269
73	**London plane**; *Platanus x hispanica*	G3 - one tree	16										£ 3,269	125	£ 4,087	100	£ 4,087	100	£ 4,087	100	£ 4,087	0	£4,087	20 - <40	£3,269

Appendix 2 CAVAT – Full Method: User's Guide and update

CAVAT

(Capital Asset Value for Amenity Trees)

Full Method: Users' Guide

Group of lime and London Plane, Epping: values from £160K- £265K

Christopher Neilan

This guide has essential information for all users of the CAVAT Full method. It is freely provided. However please be aware that CAVAT is an expert tool; all potential users are advised to ensure that they are properly trained.

Contents:

General Introduction

CAVAT (Capital Asset Value for Amenity Trees) provides a basis for managing trees in the UK as public assets rather than liabilities. It is designed not only to be a strategic tool and aid to decision-making in relation to the tree stock as a whole, but also to be applicable to individual cases, where the value of a single tree needs to be expressed in monetary terms.

It is intended particularly for councils and other Public Authorities and primarily for publicly owned trees. However, it may be used by other public bodies, including the courts, and by private institutions and individuals. It complements other tools of arboricultural analysis, such as single tree hazard assessment systems. So far as possible it draws upon objective evidence and published data, but it also relies on expert arboricultural knowledge and in some cases assessments that are specific to CAVAT. It should therefore only be used by arboriculturists who have received relevant training, and who have the relevant skills and experience.

The Town and Country Planning Act 1990 (sections 198 & 199) establishes that trees have value as a public amenity and that local planning authorities have a duty to act to protect trees in the public interest. The legislation itself does not specify how their amenity is to be assessed, leaving it open for the value of trees to be expressed in the most appropriate way for the intended purpose, and not necessarily in monetary terms. Because CAVAT is specifically designed as an asset management tool for trees that are publicly owned, or of public importance, it expresses value in monetary terms, and in a way that is directly related to the quantum of public benefits that each particular tree provides. Applied to the tree stock as a whole it enables it to be managed as if it were a financial asset of the community. Applied to single trees it both values the subject tree and allows a comparison to be made with the value of other public trees. CAVAT complements other forms of assessment of trees' amenity.

CAVAT takes the replacement value approach, extrapolating from known planting costs and adjusting for a short series of relevant factors. Spreadsheets are freely available to assist practitioners. The assessment has been refined to allow the final value to reflect realistically the contribution of the tree to public welfare through tangible and intangible benefits. (*See note 1*).

The Two Methods

CAVAT is based upon an expert inspection and assessment of individual trees. It may be integrated with a wider survey of the tree stock of a particular area, or used for specific cases. There are two versions of the CAVAT method, called the Full and Quick methods accordingly. Both share a common structure. The basic value is calculated from the measurement of stem diameter, giving a cross-sectional area which is multiplied by the current Unit Value Factor. *(See notes 2 & 3).* The location, size and life expectancy are then taken into account, but with variations. Essentially the Quick Method has been simplified to meet the desirability for speed in the assessment of large numbers of trees, and for clarity of results.

The Quick Method is intended specifically as a strategic tool for management of the stock as a whole, as if it were a financial asset of the community. The Guide to the Quick Method is published separately.

The Full Method is recommended for use in cases concerning individual trees or groups, when precision is required and sufficient time is available for a full assessment. It has proved useful in a variety of situations, including for calculation of compensation where trees have been destroyed or damaged, or for the quantum of new planting in planning cases. It is also useful as an aide to management decisions, for example cost benefit analysis of different potential pruning regimes of street trees. In relation to cases involving subsidence, according to the JMP (Joint Mitigation Protocol) the levels of evidence to be submitted in cases involving public trees will be set by reference to a full CAVAT valuation to be undertaken by the Local Authority. CAVAT may also be used to calculate the structural value of the asset, as part of a i-Tree assessment; the Full method should then be used, subject to the assessors' level of competence.

The Full Method

General Introduction

The Full Method is used in situations when a more detailed and precise assessment of the value of trees as individuals is required. For example, it would be used when reviewing the management options available for an individual tree or a group or avenue.

The Full Method involves a site inspection, and may in occasional cases involve further investigation, including internal decay detection or a climbing inspection. A full record of the inspection must be retained with appropriate evidence, including photographs.

Purposes

CAVAT is widely used now to establish a replacement value to enable realistic replacement and/ or compensation to be achieved in relation to:

- development control/ management functions,
- management decisions, including for trees subject to TPOs, or in conservation areas,
- assist in legal proceedings, (for example to advise a court as to the value of a tree, either publicly or privately owned, in proceedings following it having been illegally removed or damaged, or in planning enquiries or appeals) and
- management of the tree stock, to allow agreement as to adequate funding of replacement planting.

General Instructions

Although the method is designed to be robust, prospective users need to be aware of certain key principles and the need for training to ensure consistency and accuracy of results.

Steps 1 and 2 in both methods rely on measurement, government data, and the conversion formula, updated annually to take account of inflation, but also the assessment of accessibility which is specific to CAVAT. Step 3, Functionality, relies on expert assessment, also specific to CAVAT. For example, when the health of the tree is assessed the key judgement is not whether it has flaws to the arboricultural expert, but to what extent those flaws detract from its current performance as a public amenity. Where there is no loss of performance no penalty is imposed. Any potential shortening of life expectancy, say as a result of structural weakness, would be considered separately at Step 5.

Steps 4 and 5 apply only to the Full Method. At Step 4 the adjustments for amenity rely on observation, but also plant knowledge; at Step 5 the assessor requires a good understanding of tree health, and the ability to estimate reliably the safe life expectancy of the tree.

Assessors must also be aware that CAVAT does not discount the value of trees generally to account for indirect problems that they may cause, such as the potential to cause structural damage, nor additional costs of management to resolve any such problems. This is because it is designed to give a cost/benefit analysis, and to allow for these costs within the method would lead to a form of double accounting. However, the Full Method does discount value as part of Step 4, Adjusted Value, when it is found that there is an intrinsic problem, that is to say direct harm is being caused by the tree without it being resolved by management.

The Variables

The Full Method involves five steps, and sets of key variables:

1. Basic value/unit value x size;
2. CTI value/location, in terms of population and use, and accessibility;
3. Functional value/functional status;
4. Adjusted value/amenity factors, both positive and negative; and
5. Full value/life expectancy.

Step by Step

Step 1: Basic Value

The basic value is calculated using trunk area as key measure of size. The trunk area is calculated by using the measured trunk diameter, converted to give the cross sectional stem area. (*See notes 2 and 3*). The current unit value factor allows the basic value to be calculated

A spreadsheet, updated annually in May, is available separately to make the calculations.

Step 2: Community Tree Index (CTI) Value

There are two operations in Step 2. Firstly, the basic value is adjusted to take account of the population density using the Community Tree Index (CTI) factor (*see note 4, and Table A*). Then the modified basic value is discounted by up to 60%, according to how accessible the tree is in the particular location.

Operation 1.
The CTI index gives the basic adjustment for the Local Authority. The effective CTI value factor is that given in the final column of the table. In some instances, however, the area may not be typical of the Local Authority's overall area. In that case the ward figure, also available form the ONS website, may be used, with the CTI index factor values as shown in Table A.

Operation 2.
The second operation is to consider the relative accessibility to the public of the tree in its particular location. Most publicly owned trees will be not be discounted in value for a lack of accessibility; however the operation allows CAVAT to be applied to trees on private land, for example to TPO trees, or to trees in more remote public areas. Where a tree does not retain 100% of its value it may be discounted by up to 60%.

Taken together, these 2 operations give the CTI value.

Step 3: Functional Value

Functionality is the main assessment in the CAVAT Full method. The tree's value is modified to reflect how well it is performing biologically, as against what would be expected of a well-grown and healthy tree of the same species and girth. This is an expert assessment, requiring a good knowledge of species characteristics and potential.

The surveyor must consider crown completeness and functional condition sequentially. These combine to give the overall functional value. Precision is required in the assessment, either maintaining the value at 100% or reducing it proportionately in increments of 10%. Detailed advice is given in note 5.

Step 4: Adjusted Value

The functional value is then adjusted to take into account the surveyor's assessment of the positive and negative impacts arising from species characteristics, as expressed in its location. These are combined into a single modification; up to +/- 40% is possible. (*See note 6*).

Step 5: CAVAT Full Value

Finally, the assessor makes an expert judgement as to its potential life expectancy in its situation, using the Life Expectancy Adjustment bands. (*See note 7 and table B*).

Notes

Note 1: CAVAT, Lifetime Benefit and the Trunk Formula Method

CAVAT follows the depreciated replacement cost (DRC) approach, also used in the Council of Tree and Landscape Appraisers (CTLA) "trunk formula method", an appraisal method widely used in the U.S.A. However the CAVAT methods are designed to express the value of trees as public assets; whereas the stated aim of the CTLA methods is to express the value of the tree as a private asset, whether of a private individual or a public authority.

CAVAT allows the value of a tree to be assessed by extrapolation from the cost of a newly planted standard tree, using the ratio between their respective trunk areas as the critical measurement. The CAVAT value allows for the contributions, positive and negative, of the tree's location, relative contribution to amenity social value and appropriateness, as well as functionality and life expectancy. Essentially, the basic value is modified by a consideration of the impact of those factors that determine the quantum of general amenity benefit. The factors which are essentially related to "wear and tear" on the tree, including a shortened life expectancy, are dealt with in terms of depreciation. On the other hand factors based on variation from an arithmetic mean, (for example the particular benefits that flow from the characteristics of the species in question) allow for a either a potential increase or decrease in value.

Its results are broadly comparable with what research in both the U.K. and the U.S.A. suggests are the tangible lifetime benefits of trees to the community as a whole. The tangible benefits link is reflected both in use of official population statistics to generate the CTI index rating, in the nature of the adjustment for Functionality and also in the scale of the adjustments throughout.

Note 2: Basic Value

The relevant measurement to calculate the basic value is DBH, from which is derived the cross sectional area of trunk at breast height, using the equation $A = \pi r^2$. The procedure is first to measure the trunk radius in centimetres, (generally by converting the circumference to a radius by a "rounded-down" tape, using the formula $r = c \div 2\pi$). The radius is then squared, and multiplied by π (pi, approx. 3.142). This is subsequently converted into the basic value by multiplying by the current UVF (unit value factor). When using the spreadsheet the basic value is calculated automatically, using the diameter and the UVF. The equation may be expressed:

$V = n \times \text{radius}^2 \times \text{unit value factor}$.

Users should ensure that they are using the up to date spreadsheet, with the current UVF. *(See note 3).*

Note 3: The Unit Value Factor (UVF)

The UVF represents the full cost of a newly planted tree in a given area, divided by its trunk area. It has two components; the nursery gate price, expressed in terms of the cost of each square centimetre of stem, (or unit area cost) and the planting cost (transport, planting, materials, immediate care and management costs, but *not* after-care). The calculation of the unit area cost is from the average cost of a basket of species rather than for each individual species, in order to eliminate differences based only on production factors or variations in demand. The initial specification used in this calculation was 12-14 cm. standard containerised trees, however prior research has subsequently demonstrated that size, as opposed to species or production methods, is not generally a critical factor in unit cost variation.

The current UVF represents the average cost per square centimetre of stem area of the ten most commonly planted species, containerised, at trade prices, and from equivalent and competitively prices nurseries including immediate planting costs. The best estimate of the planting cost factor has been found to be 150%, based on consultation with tree officers and within the wider landscape industry.

By applying the Community Tree Index factor, the national unit area value may then be modified to take account of the effects of location to the benefits received by the local population. *(See note 4).*

The unit area cost is upgraded each year in line with inflation, (using RPI/X) from an original survey in 2004/5. Again, this is to minimise fluctuations in the UVF unrelated to the tree stock's contribution to public amenity. The up to date figure is used in the current CAVAT calculations, available separately.

Note 4: Community Tree Index

To generate the CTI index factor in the Full Method the adjustment is made in two stages; first according to the population density of the wider location, and secondly according to the tree's relative accessibility in that location. Any special characteristics of the immediate location are accounted for in step 4, Adjusted Value.

Operation 1

The CTI index factor is a means to reflect in the tree stock's asset value the relative population density in the local area and thus the relative number of those potentially able to benefit from the local authority's trees. There are 7 CTI bands; their values are shown in Table A. They vary from 100%, for the majority of the country, up to a maximum of 250% in the most densely populated inner city areas, according to the published population density. The population data has been sourced from Office of National Statistics (ONS) information. The results as applied nationally to England can be found in the separate National Community Tree Index Table.

Once selected for a borough the CTI factor will generally not be varied, although some large metropolitan authorities, where population densities vary significantly across their area, may find that more accurate results will be obtained through having different CTI values for different wards, etc. This will depend upon an assessment of whether the local authority is relatively

homogenous in character overall, or whether there are significant variations from ward to ward. Ward statistics are available from the Office for National Statistics, via the ONS website, https://www.ons.co.uk/Default.asp.

Operation 2

Having applied the factor for the general character of the area, the assessor then judges the relative accessibility of the tree within that area, and whether it is fully available to contribute to the public good. The potential CTI value after operation 1 may either be retained, by a score of 100%, or further reduced by 80%, 60% or 40%.

The key considerations under operation 2 are whether the tree is:

1. Fully accessible to the public i.e. within a public highway, public park, or woodland. For these locations the accessibility score remains 100%.
2. Wholly or partially accessible from public areas i.e. in a local authority owned location such as a school, local authority building or housing estate. For these locations the accessibility score would be reduced to 80% of its original value.
3. In an area of more restricted accessibility, including;
   a. A less accessible publicly owned area i.e. a courtyard of a building,
   b. In private land, where views are partially or wholly restrictedor sheltered housing unit or private land. For these locations the accessibility score maybe reduced to 40% or 60% of its original value.

A tree that is fully accessible and visible, in a prominent and well-used setting within the general area will score 100%; a tree not publicly accessible or visible will score 40% of its original value. A degree of judgement will be necessary to assess these scores.

Note 5: Functionality

The basis of CAVAT is that the cross sectional area of a tree's trunk is linked to overall crown size, in a healthy tree where growth has not be interrupted or compromised. The Functionality adjustment is necessary to reflect variations in crown completeness and condition, as against the crown that would be expected as the natural result of the trunk size. The Functionality adjustment is made irrespective of the cause of the difference. The assessor carefully estimates the adjustment so that the assessed functional value represents as realistically as possible the actual capacity of the tree to provide public amenity. The completeness of the crown is considered first, then the functional condition. For the Full method the estimate is made to the nearest 10%.

The two considerations for the Functionality adjustment are:

1) Crown completeness.
   The value is reduced proportionately if:
   - The crown has been reduced by pruning and the tree has not fully recovered; or
   - the crown has been reduced by natural causes, e.g. storm damage or disease, and the tree has not fully recovered; or
   - the crown has failed to develop normally, e.g. because of root restriction, shading or grafting, and is smaller than would be expected from the stem size

- the crown is thin.

This is irrespective of the nature of the causative factors and whether they harm the tree's appearance.

2) Condition.
If the tree is in functionally poor condition, including disfigurement by disease obvious to the public, the value is reduced proportionately. Such conditions would include:
- Leaf or shoot disease;
- root disease, clearly affecting vitality;
- canker, or severe trunk lesions;
- fire damage.

No reduction is made at this stage for a condition, e.g. structural weakness, which does not affect the current functional status of the tree, providing that no immediate action (other than monitoring) is proposed. The value should be reduced proportionately where the assessor finds an immediate need to reduce the crown for arboricultural reasons, e.g. structural weakness, (i.e. as soon as practicably possible, and in no more than 1 year). Pests such as Horse Chestnut Scale, diseases such as bacterial wetwood, or physical conditions such as uneven form or wounding are not taken into account, unless they are sufficiently severe to adversely affect Functionality, by triggering crown reduction or by grossly affecting appearance etc.

A dead or effectively dead tree, or one requiring urgent removal, scores 0% value retained, and thus has a value of £0. Alternatively where crown reduction is proposed immediately, with the effect for example of allowing the tree to be retained rather than felled, the value may be recorded as if the tree had been pruned.

Note 6: Amenity and Appropriateness

1. Amenity

The value may be increased to take account of species characteristics that increase benefit to the community. Special factor adjustment should be used sparingly; there may be up to a maximum of 4 special factors and a maximum adjustment of 40%; (generally 10% for each amenity factor, other than Veteran/Ancient Trees, for which 30%). For example:

Townscape and visual importance:
- integral part of a designed landscape, including avenues or designed park or garden;
- contribution to the setting of an important place or building;
- in a school, or by its entrance;
- in a particularly prominent location, e.g. a town centre, or at the entrance of a major public building, etc; or
- part of a wider grouping giving character to the area, e.g. long-maintained street pollards.

National or Local designations or connections:
- in a Conservation Area, where the presence of trees has contributed to the designation;
- a locally designated tree, e.g. Landmark or Favourite Trees;
- a commemorative or memorial tree; or
- a tree known to be planted by a notable person.

Species characteristics:

- rare or unusual species; or
- attractive visual characteristics, e.g. notably attractive form, showy flowers, variegated foliage, attractive bark, etc. (N.B. count as 10% each, up to 20%); or

Nature Conservation

- particular wildlife importance, e.g. a bat roost, heronry, etc;
- designated species in local BAP (Biodiversity Action Plan); or
- a Veteran/Ancient Tree. (N.B. counts as 30% by itself).

2. Appropriateness to the Location

Conversely, the value may be reduced to take account of species characteristics that reduce the overall benefit to the community, being seriously inappropriate for the location, causing a problem or hazard and not effectively controlled by management. As for amenity factors reduction would normally be by 10% each, and to a maximum of 40% if the species has inappropriate species characteristics for the location causing obstruction or inconvenience, for example:

- a weeping or low spreading habit in a narrow footpath;
- obstruction, e.g. vigorous spiny suckers across a footway;
- major surface roots damaging the footpath;
- large, squashy fruit in hard surfaced area;
- honeydew drip e.g. in a dedicated car park or playground;
- a pronounced lean, causing a potential obstruction;
- detracts visually from its context, for example, a visually intrusive species in an otherwise consistent avenue, or an exotic species in a setting of native trees.

Note 7: Life Expectancy Adjustment

Trees assessed to have a life expectancy greater than 80 years retain 100% of their adjusted value; those with a life expectancy less than 80 years lose part of their Adjusted Value. Those with less than 5 years lose 90%. A judgement that the subject tree may not safely be retained reduces its value to zero.

As generally in CAVAT, the banding approach is used, for robustness and to reflect some of the practical difficulties of estimating age accurately. The weighting given to the bands is derived from an exponential curve, calculated on the basis that at less than 80 years life expectancy value is initially lost only slowly, but that towards the end of a tree's life the decline in value becomes increasingly swift. *(See Table B).* Eighty years is chosen as representing in round figures the current length of human life expectancy in the UK. The principles to be followed in assessing life expectancy are those of general arboricultural best practice.

Tables

Table A: CTI Factors

Population Density / Ha	CTI Factor %	CTI Band
<20	100	1
20 – 39	125	2
40 – 59	150	3
60 – 79	175	4
80 – 99	200	5
100 – 119	225	6
<119	250	7

Table B: Life Expectancy Adjustment

Life Expectancy (Years)	% Value Retained
80+	100
40 – 80	95
20 – 40	80
10 - 20	55
5 – 10	30
<5	10

Acknowledgements and Biographical note

The author acknowledges with gratitude the support of too many to mention here, throughout the development of CAVAT. He offers thanks in particular to past and present colleagues in Epping, including Russell Horsey, for his invaluable continuing advice, Tracy Clarke for her trial survey in Theydon Bois, and especially to Alexandra Sleet, for her work on the CAVAT spreadsheet; to the LTOA review group, for their invaluable work validating CAVAT and to past and present members of the CAVAT executive, including Jake Tibbetts, Ryan Nixon, Dave Lofthouse, Paul Maher, Matthew Searle, Ian McDermott and Andy Allison. Thanks are also owed to Becky Hesch for her continuing assistance and to John Stokes, Scott Cullen and Jeremy Barrell among others for their kind advice. Any deficiencies of course remain the author's own.

His thanks are also due to the several nurseries that assisted with information for the author's original research on unit costs, and to Mike Glover and Keith Sacre of Barchams, for their contributions to the work of the LTOA user group and for their encouragement. The author also gratefully acknowledges the work of Jeremy Barrell on SULE, the pioneering work over many years by Rodney Helliwell on the assessment of the monetary value of trees in the UK, and that of Scott Cullen in the USA.

Special mention must finally be made of Jim Smith, London Trees and Woodlands Framework Manager, for his invaluable support, advice and advocacy, and to Andy Tipping, for having sufficient faith in CAVAT to put it into practice in Barnet, for his consistent championing of the project, and amongst many contributions for advocating the inclusion of population density as an improvement to the method, and for suggesting the means to do so.

The Author

Since 1989 the author has been employed by Epping Forest District Council, in the Forward Planning and Development Management teams. He now works there part time, as Principal Officer- Green Infrastructure, Trees & Landscape Strategy. His main responsibility is to develop a Trees and GI Framework to guide development of a new, community based tree strategy for the district, linked to the councils emerging Infrastructure Plan. He has previously worked in both public and private sectors. He is now a professional member of the Institute of Chartered Foresters.

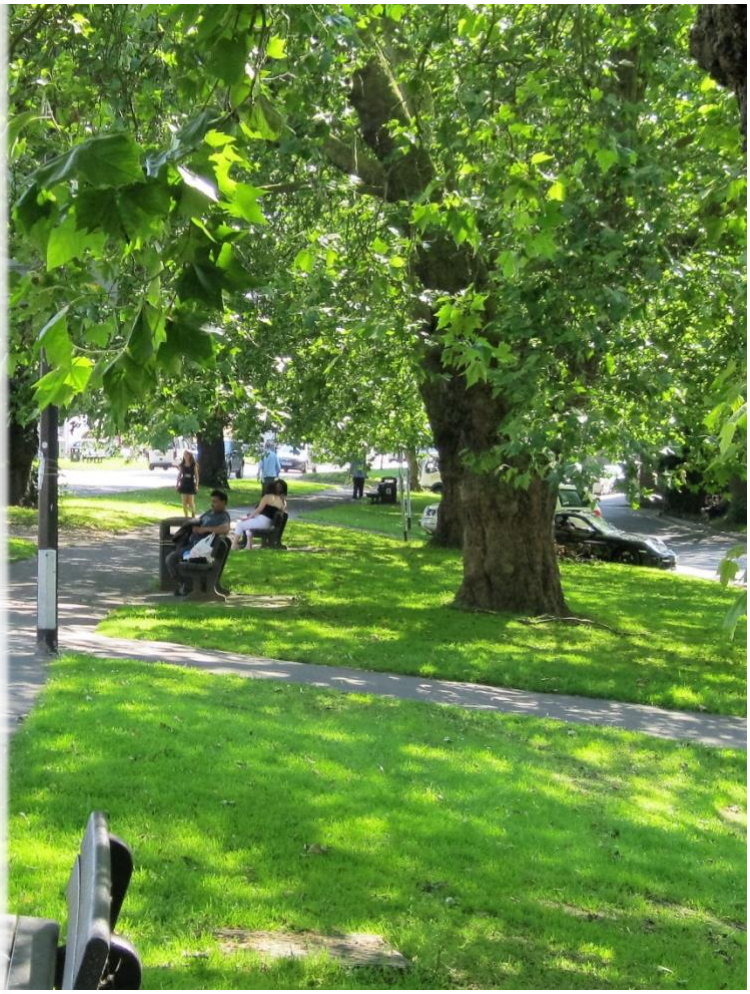
A qualified and registered teacher he entered arboriculture in 1979, as trainee apprentice tree climber for RP Denton & Co; a Colchester based firm. After a rocky start Paul Denton trusted him sufficiently to fund day release City & Guilds training at Capel Manor College. He became lead tree climber, with responsibility for all site works. At that time the firm was accepted onto the Arboricultural Association's list of approved contractors. As a result he holds City and Guilds practical qualifications, including the Certificate in Arboriculture in addition to his M.A. from the University of Cambridge, where he had studied English Literature, matriculating in 1970. On leaving RP Denton in 1984 he joined Slough BC, as charge-hand of the tree team, where he self- tutored for the Professional Diploma, passing the practical part at the second attempt. He then worked as assistant County Tree officer for Essex CC, where he supervised collection of data for an early, county wide computerized tree inventory

His interest in tree valuation began early, as a potential solution to the wholesale death and mutilation of publicly planted trees, when he became aware that published information was generally limited to a simple statement of the annual planting numbers and the pruning budget.

CAVAT Full Method- A Guide to recent updates

Christopher Neilan

2018



Summary of changes applied to the CAVAT Full Method, April 2018

Published by the LTOA for the CAVAT Executive Board

CAVAT Full Method- A Guide to recent updates

CAVAT is changing as of April 2018. It is recommended for use with the updated CAVAT Full Method spreadsheet. Download it for free here:
https://www.ltoa.org.uk/resources/cavat

The new spreadsheet has notes to help practitioners- click on the small red tabs to find them.

The Quick method is unchanged.

The revised Full method identifies two additional steps but the principles of CAVAT are unchanged. However, delineating the steps more clearly makes the process more straightforward, easier to use and more robust.

The changes have been made by the CAVAT Executive Board, following consultation with Forest Research and others, which has also lead to the publication of a paper in the Arboricultural Journal. The article can be downloaded free of charge from:
CAVAT (Capital Asset Value for Amenity Trees): valuing amenity trees as public assets

Step by step- the Full method changes

Step 1: Base Value

-What step 1 does:
Step 1 establishes a preliminary asset value, which is then modified proportionately over 6 further steps to complete the valuation.

-Changes at Step 1:
Step 1 is unchanged

-**In the spreadsheet:**
Enter the Diameter (DBH) in cm, in the upper box, using free text. Use the mouse and right click, or select enter on the keyboard, and the basic value will be calculated, using the pre-entered Unit Value Factor (UVF).

Step 2: Community Tree Index (CTI) Value

-What step 2 does:
At Step 2 the Base Value is adjusted to take account of the impact of population density on the tree's contribution to public amenity. Possible adjustment is from 100%, (i.e. no change) to 250%.

-Changes at Step 2:
The CTI value adjustment is unchanged, but the location factor adjustment is now separate.

-**What the practitioner does:**
The practitioner checks the tree's location (i.e. the city, town or borough) against the published National CTI Table. The CTI table is published separately and is available through the LTOA website (see Table A, below).

-**In the Spreadsheet:**
Select the appropriate CTI factor in the dropdown list, and the score will automatically update.

Step 3: Location Factor (LF) Value

-What step 3 does:
At step 3 the CTI Factor is adjusted to reflect whether the tree is fully accessible for public enjoyment in its location.

-Changes at Step 3:
The location value adjustment is now separate from the CTI adjustment, and the amount of depreciation is increased. A scored assessment approach with headings has also been introduced.

-**What the practitioner does:**
The practitioner assesses whether the tree's contribution to public amenity is diminished in any significant degree by its location. Trees where this is found to be the case are judged not to be fully accessible, and the CTI value is decreased proportionately.

-**In the Spreadsheet:**
To apply the accessibility adjustment, select the appropriate option from the drop-down list, and the score will automatically adjust.

Step 4: Functional Crown Value: Part 1 - Structural Framework (FCV1)

-What step 4 does:
At step 4 the Location Value is adjusted to reflect the completeness of the woody structure of the tree.

-Changes at Step 4:
The assessment of Functionality is now split into 2 steps and the considerations have been refined, enabling a more accurate assessment, including to achieve a more

defensible estimate of the proportionate loss of canopy potential in cases involving more severe pruning, pollarding or accidental damage.

-The aim of step 4:
The aim is to assess the relative completeness of the woody, structural framework of the subject tree, as against that of a perfect specimen of the same species and DBH. To score 100% a tree would fully express the characteristic growth patterns of its species and variety in the same general climatic and soil conditions. The estimation of the remaining structure is made in 10% increments.

-Dead or Dying trees
A tree which is dead or effectively dead, or one found to require urgent removal, will have a Structural Framework factor of 0%, and thus has a value of £0.
Alternatively, where immediate crown reduction would allow the tree's retention, it may assist to produce an alternative valuation, estimating the Structural Framework factor as if the tree had already been pruned.

-**In the Spreadsheet:**
To apply the FCV1 adjustment, select the appropriate option from the drop-down list, and the score will automatically adjust.

Step 5: Functional Crown Value: Part 2 - Canopy Completeness and Condition (FCV2)

-What step 5 does:
At step 5 the SF value is adjusted to reflect the completeness, health and condition of the canopy.

-Changes at Step 5:
The consideration of the health and completeness of the canopy follows the same principles as previously but is now- as with Step 4- a step in its own right, to make the estimation more straightforward, as well as more precise.

-**What the practitioner does:**
The practitioner makes an expert assessment of two aspects of the canopy: canopy completeness and canopy health and condition.

The two aspects of the assessment are taken together; as at step 4 a banded approach is used, to the nearest 10%.

-**In the Spreadsheet:**
To apply the FCV 2 adjustment, select the appropriate option from the drop-down list and the score will automatically adjust.

Step 6: Amenity Value (AV)

-What step 6 does:
At step 6 the FCV2 value is adjusted to reflect the special positive or negative contributions the tree makes to amenity.

-Changes at Step 6:
Step 6 is organised under new headings, and the limit on potential changes to the value, positive or negative, are loosened.

-**What the practitioner does:**
The practitioner uses knowledge of the species' characteristics, together with an assessment of the other potential contributions to value the positive and negative contributions to amenity under the headings of species, setting, habitat or heritage characteristics. Each identified contribution is valued at +/- 10%.

-**In the Spreadsheet:**
To apply the AV adjustment the practitioner uses the 2 dropdown lists to register positive and negative characteristics; the score updates automatically.

Step 7: Full Value (FV)

-What step 7 does:
At step 7 the AV is adjusted to reflect the life expectancy of the tree. Life expectancy is assessed in accordance with BS 5837-2012 (see Table B, below).

-Changes at Step 7:
Step 7 is unchanged.

-**What the practitioner does:**
To apply the life expectancy adjustment, select the appropriate option from the drop-down list and the score will automatically adjust.

****

Acknowledgements

The revised CAVAT Full method reflects extensive work by the members of the CAVAT Executive, Kieron Doick (Forest Research) and Glyn Jones (Fera). The UVF review was supported by several major suppliers of trees. Their invaluable contributions are gratefully acknowledged.

CAVAT is a pro bono initiative, aimed at improving the capabilities for UK public arboriculture, overseen by a voluntary executive. The author also gratefully acknowledges the contributions of the LTOA, MTOA and Forest Research to the CAVAT Executive.

CAVAT Full Method- A Guide to recent updates

Notes

1. **CAVAT documents**
   It is recommended that practitioners use the latest available downloadable spreadsheet, available with other CAVAT documents here:
   https://www.ltoa.org.uk/documents-1/capital-asset-value-for-amenity-trees-cavat

2. **The national CTI table**
   is available to download here:
   https://www.ltoa.org.uk/documents-1/capital-asset-value-for-amenity-trees-cavat

   The underlying information, from the 2011 census, is available here:
   https://datashare.is.ed.ac.uk/handle/10283/2556

   More detailed population statistics are available from the Office for National Statistics, via the ONS website:
   https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/wardlevelmidyearpopulationestimatesexperimental

Tables

Table A: CTI Factors

Population Density / Ha	CTI Factor %	CTI Band
<20	100	1
20 – 39	125	2
40 – 59	150	3
60 – 79	175	4
80 – 99	200	5
100 – 119	225	6
<119	250	7

Table B: Life Expectancy Adjustment

Life Expectancy (Years)	% Value Retained
➢ 80	100
40 – < 80	95
20 – < 40	80
10 - < 20	55
5 – < 10	30
<5	10

Appendix 3 National Community Tree Index Values

National Community Tree Index

Local Authority	Pop per ha	CTI factor	CTI Band
Adur	14.3	100%	1
Allerdale	0.8	100%	1
Alnwick	0.3	100%	1
Amber valley	4.4	100%	1
Arun	6.4	100%	1
Ashfield	10.2	100%	1
Ashford	1.8	100%	1
Aylesbury Vale	1.8	100%	1
Babergh	1.4	100%	1
Barking & Dagenham	45.4	150%	3
Barnet	36.3	125%	2
Barnsley	6.6	100%	1
Barrow-in-Furness	9.2	100%	1
Basildon	15.1	100%	1
Basingstoke and Deane	2.4	100%	1
Bassetlaw	1.7	100%	1
Bath and North East Somerset UA	4.9	100%	1
Bedford	3.1	100%	1
Berwick-upon-Tweed	0.3	100%	1
Bexley	36	125%	2
Birmingham	36.5	125%	2
Blaby	6.9	100%	1
Blackburn with Darwen UA	10	100%	1
Blackpool UA	40.7	150%	3
Blyth Valley	11.5	100%	1
Bolsover	4.5	100%	1
Bolton	18.7	100%	1
Boston	1.5	100%	1
Bournemouth UA	35.4	125%	2
Bracknell Forest UA	10	100%	1
Bradford	12.8	100%	1
Braintree	2.2	100%	1

Breckland	0.9	100%	1
Brent	60.9	175%	4
Brentwood	4.5	100%	1
Bridgnorth	0.8	100%	1
Brighton and Hove UA	30	125%	2
Bristol; City of UA	34.7	125%	2
Broadland	2.1	100%	1
Bromley	19.7	100%	1
Bromsgrove	4	100%	1
Broxbourne	16.9	100%	1
Broxtowe	13.4	100%	1
Burnley	8.1	100%	1
Bury	18.2	100%	1
Calderdale	5.3	100%	1
Cambridge	26.7	125%	2
Camden	90.8	200%	5
Cannock Chase	11.7	100%	1
Canterbury	4.4	100%	1
Caradon	1.2	100%	1
Carlisle	1	100%	1
Carrick	1.9	100%	1
Castle Morpeth	0.8	100%	1
Castle Point	19.2	100%	1
Charnwood	5.5	100%	1
Chelmsford	4.6	100%	1
Cheltenham	23.6	125%	2
Cherwell	2.2	100%	1
Chester	2.6	100%	1
Chesterfield	15	100%	1
Chester-le-Street	7.9	100%	1
Chichester	1.4	100%	1
Chiltern	4.5	100%	1
Chorley	5	100%	1
Christchurch	8.9	100%	1
City of London	24.8	125%	2

Colchester	4.7	100%	1
Congleton	4.3	100%	1
Copeland	0.9	100%	1
Corby	6.6	100%	1
Cotswold	0.7	100%	1
County of Herefordshire; UA	0.8	100%	1
County of Herefordshire; UA	0.8	100%	1
Coventry	30.5	125%	2
Craven	0.5	100%	1
Crawley	22.2	125%	2
Crewe and Nantwich	2.6	100%	1
Croydon	38.2	125%	2
Dacorum	6.5	100%	1
Darlington UA	5	100%	1
Dartford	11.8	100%	1
Daventry	1.1	100%	1
Derby UA	28.4	125%	2
Derbyshire Dales	0.9	100%	1
Derwentside	3.1	100%	1
Doncaster	5.1	100%	2
Dover	3.3	100%	1
Dudley	31.2	125%	2
Durham	4.7	100%	1
Ealing	54.2	150%	3
Easington	6.5	100%	1
East Cambridgeshire	1.1	100%	1
East Devon	1.5	100%	1
East Dorset	2.4	100%	1
East Hampshire	2.1	100%	1
East Hertfordshire	2.7	100%	1
East Lindsey	0.7	100%	1
East Northamptonshire	1.5	100%	1
East Riding of Yorkshire UA	1.3	100%	1
East Staffordshire	2.7	100%	1
East Sussex County	2.9	100%	1

Eastbourne	20.3	125%	2
Eastleigh	14.6	100%	1
Eden	0.2	100%	1
Ellesmere Port and Neston	9.2	100%	1
Elmbridge	12.8	100%	1
Enfield	33.8	125%	2
Epping Forest	3.6	100%	1
Epsom and Ewell	19.7	100%	1
Erewash	10	100%	1
Exeter	23.6	125%	2
Fareham	14.5	100%	1
Fenland	1.5	100%	1
Forest Heath	1.5	100%	1
Forest of Dean	1.5	100%	1
Fylde	4.4	100%	1
Gateshead	13.4	100%	1
Gedling	9.3	100%	1
Gloucester	27.1	125%	2
Gosport	30.2	125%	2
Gravesham	9.7	100%	1
Great Yarmouth	5.2	100%	1
Greenwich	45.3	150%	3
Guildford	4.8	100%	1
Hackney	106.4	225%	6
Halton UA	14.9	150%	3
Hambleton	0.6	100%	1
Hammersmith and Fulham	100.8	225%	6
Harborough	1.3	100%	1
Haringey	73.2	175%	4
Harlow	25.8	125%	2
Harrogate	1.2	100%	1
Harrow	41	150%	3
Hart	3.9	100%	1
Hartlepool UA	9.4	100%	1
Hastings	28.6	125%	2

Havant	21.1	125%	2
Havering	20	125%	2
Hertsmere	9.3	100%	2
High Peak	1.7	100%	1
Hillingdon	21	125%	2
Hinckley and Bosworth	3.4	100%	1
Horsham	2.3	100%	1
Hounslow	37.9	125%	2
Huntingdonshire	1.7	100%	1
Hyndburn	11.2	100%	1
Ipswich	29.7	125%	2
Isle of Wight UA	3.5	100%	1
Isles of Scilly	1.3	100%	1
Islington	118.3	225%	6
Kennet	0.8	100%	1
Kensington and Chelsea	131	250%	7
Kerrier	2	100%	1
Kettering	3.5	100%	1
King's Lynn and West Norfolk	0.9	100%	1
Kingston upon Hull; City of UA	34.1	125%	2
Kingston upon Thames	39.5	125%	2
Kirklees	9.5	100%	1
Knowsley	17.4	100%	1
Lambeth	99.2	200%	5
Lancaster	2.3	100%	1
Leeds	13	100%	1
Leicester UA	38.2	125%	2
Lewes	3.2	100%	1
Lewisham	70.8	175%	4
Lichfield	2.8	100%	1
Lincoln	24	175%	2
Liverpool	39.3	125%	2
Luton UA	42.5	150%	3
Macclesfield	2.9	100%	1
Maidstone	3.5	100%	1

Maldon	1.7	100%	1
Malvern Hills	1.3	100%	1
Manchester	34	125%	2
Mansfield	12.8	100%	1
Medway UA	13	100%	1
Melton	1	100%	1
Mendip	1.4	100%	1
Merton	50	150%	3
Mid Bedfordshire	2.4	100%	1
Mid Devon	0.8	100%	1
Mid Suffolk	1	100%	1
Mid Sussex	3.8	100%	1
Middlesbrough UA	25	125%	2
Milton Keynes UA	6.7	100%	1
Mole Valley	3.1	100%	1
New Forest	2.2	100%	1
Newark and Sherwood	1.6	100%	1
Newcastle upon Tyne	22.9	125%	2
Newcastle-under-Lyme	5.8	100%	1
Newham	67.3	175%	4
North Cornwall	0.7	100%	1
North Devon	0.8	100%	1
North Dorset	1	100%	1
North East Derbyshire	3.5	100%	1
North East Lincolnshire UA	8.2	100%	1
North Hertfordshire	3.1	100%	1
North Kesteven	1	100%	1
North Lincolnshire UA	1.8	100%	1
North Norfolk	1	100%	1
North Shropshire	0.8	100%	1
North Somerset UA	5	100%	1
North Tyneside	23.3	125%	2
North Warwickshire	2.2	100%	1
North West Leicestershire	3.1	100%	1
North Wiltshire	1.6	100%	1

North Yorkshire County	0.7	100%	1
Northampton	24.1	125%	2
Norwich	31.2	125%	2
Nottingham UA	35.8	125%	2
Nuneaton and Bedworth	15.1	100%	1
Oadby and Wigston	23.7	125%	2
Oldham	15.3	100%	1
Oswestry	1.5	100%	1
Oxford	29.4	125%	2
Pendle	5.3	100%	1
Penwith	2.1	100%	1
Peterborough UA	4.5	100%	1
Plymouth UA	30.2	125%	2
Poole UA	21.4	125%	2
Portsmouth UA	46.4	150%	3
Preston	9.1	100%	1
Purbeck	1.1	100%	1
Reading UA	35.4	125%	2
Redbridge	42.3	150%	3
Redcar and Cleveland UA	5.7	100%	1
Redditch	14.5	100%	1
Reigate and Banstead	9.8	100%	1
Restormel	2.1	100%	1
Ribble Valley	0.9	100%	1
Richmond upon Thames	30	125%	2
Richmondshire	0.4	100%	1
Rochdale	13	100%	1
Rochford	4.6	100%	1
Rossendale	4.8	100%	1
Rother	1.7	100%	1
Rotherham	8.7	100%	1
Rugby	2.5	100%	1
Runnymede	10	100%	1
Rushcliffe	2.6	100%	1
Rutland UA	0.9	100%	1

Ryedale	0.3	100%	1
Salford	22.2	125%	2
Salisbury	1.1	100%	1
Sandwell	33.1	125%	2
Scarborough	1.3	100%	1
Sedgefield	4	100%	1
Sedgemoor	1.9	100%	1
Sefton	18.5	100%	1
Selby	1.3	100%	1
Sevenoaks	3	100%	1
Sheffield	13.9	100%	1
Shepway	2.7	100%	1
Shrewsbury and Atcham	1.6	100%	1
Slough UA	36.6	125%	2
Solihull	11.2	100%	1
South Bedfordshire	5.3	100%	1
South Bucks	4.4	100%	1
South Cambridgeshire	1.4	100%	1
South Derbyshire	2.4	100%	1
South Gloucestershire UA	4.9	100%	1
South Hams	0.9	100%	1
South Holland	1	100%	1
South Kesteven	1.3	100%	1
South Lakeland	0.7	100%	1
South Norfolk	1.2	100%	1
South Northamptonshire	1.3	100%	1
South Oxfordshire	1.9	100%	1
South Ribble	9.2	100%	1
South Shropshire	0.4	100%	1
South Somerset	1.6	100%	1
South Staffordshire	2.6	100%	1
South Tyneside	23.7	125%	2
South Yorkshire (Met County)	8.2	100%	1
Southampton UA	43.6	150%	3
Southend-on-Sea UA	38.4	125%	2

Southwark	84.9	200%	5
Spelthorne	20.1	125%	2
St. Albans	8	100%	1
St. Edmundsbury	1.5	100%	1
St. Helens	13	100%	1
Stafford	2	100%	1
Staffordshire County	3.1	100%	1
Staffordshire Moorlands	1.6	100%	1
Stevenage	30.7	125%	2
Stockport	22.6	125%	2
Stockton-on-Tees UA	8.7	100%	1
Stoke-on-Trent UA	25.8	125%	2
Stratford-on-Avon	1.1	100%	1
Stroud	2.3	100%	1
Suffolk	1.8	100%	1
Suffolk Coastal	1.3	100%	1
Sunderland	20.4	125%	2
Surrey	6.4	100%	1
Surrey Heath	8.4	100%	1
Sutton	41	150%	3
Swale	3.3	100%	1
Swindon UA	7.8	100%	1
Tameside	20.6	125%	2
Tamworth	24.2	125%	2
Tandridge	3.2	100%	1
Taunton Deane	2.2	100%	1
Teesdale	0.3	100%	1
Teignbridge	1.8	100%	1
Telford and Wrekin UA	5.5	100%	1
Tendring	4.1	100%	1
Test Valley	1.7	100%	1
Tewkesbury	1.8	100%	1
Thanet	12.3	100%	1
Three Rivers	9.3	100%	1
Thurrock UA	8.8	100%	1

Tonbridge and Malling	4.5	100%	1
Torbay UA	20.6	125%	2
Torridge	0.6	100%	1
Tower Hamlets	99.2	200%	5
Trafford	19.8	100%	1
Tunbridge Wells	3.1	100%	1
Tynedale	0.3	100%	1
Uttlesford	1.1	100%	1
Vale of White Horse	2	100%	1
Vale Royal	3.2	100%	1
Wakefield	9.3	100%	1
Walsall	24.4	125%	2
Waltham Forest	56.2	150%	3
Wandsworth	76	175%	4
Wansbeck	9.2	100%	1
Warrington UA	10.6	100%	1
Warwick	4.5	100%	1
Watford	37.2	125%	2
Waveney	3	100%	1
Waverley	3.4	100%	1
Wealden	1.7	100%	1
Wear Valley	1.2	100%	1
Wellingborough	4.4	100%	1
Welwyn Hatfield	7.5	100%	1
West Devon	0.4	100%	1
West Dorset	0.9	100%	1
West Lancashire	3.1	100%	1
West Lindsey	0.7	100%	1
West Lindsey	0.7	100%	1
West Oxfordshire	1.3	100%	1
West Somerset	0.5	100%	1
West Sussex	3.8	100%	1
West Wiltshire	2.3	100%	1
West Yorkshire (Met County)	10.2	100%	1
Westminster	84.4	200%	5

Weymouth and Portland	15.2	100%	1
Wigan	16	100%	1
Winchester	1.6	100%	1
Windsor and Maidenhead UA	6.8	100%	1
Wirral	19.9	100%	1
Woking	14.1	100%	1
Wokingham UA	8.4	100%	1
Wolverhampton	34.1	125%	2
Worcester	28.1	125%	2
Worthing	30	125%	2
Wychavon	1.7	100%	1
Wycombe	5	100%	1
Wyre	3.7	100%	1
Wyre Forest	5	100%	1
York UA	6.7	100%	1