CAVAT valuation report on Street Trees in Sheffield

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CONTENTS

ACKNOWLEDGEMENTS .................................................................................................................. 1

STAG members ............................................................................................................................... 1
Professional Peers ............................................................................................................................. 1
Document design ............................................................................................................................. 1
Editors ............................................................................................................................................. 1
Summary ......................................................................................................................................... 3

1 Introduction .................................................................................................................................. 4

1.1 The Project ................................................................................................................................. 4
1.2 My Involvement/Conflicts of Interest ....................................................................................... 4
1.3 Qualifications and Experience .................................................................................................. 5
1.4 Jeremy Barrell – Qualifications and Involvement. ................................................................. 5
1.5 Input from Matt Larsen-Daw - Woodland Trust ...................................................................... 5
1.6 The STAG campaign ................................................................................................................. 6

2 Inspections and Data Collection .................................................................................................. 7

2.1 Data Collection ......................................................................................................................... 7
2.2 Inspection of Tree Condition ..................................................................................................... 7
2.3 Proposed Implementation .......................................................................................................... 8
2.4 Explanation of the Reasoning Behind the CAVAT Assessment ............................................. 8

3 Conclusion .................................................................................................................................. 11

3.1 Conclusion ............................................................................................................................... 11

4 Appendix 1 Previous Report ....................................................................................................... 12
4 Appendix 2 MEASURING INSTRUCTIONS ........................................................................... 30
5 Appendix 3 CAVAT spreadsheets (samples of sheets used) ....................................................... 34
6 Appendix 4 CAVAT guide .......................................................................................................... 35
7 Appendix 5 “Master list” (Sample) ............................................................................................ 46
8 Appendix 6 CAVAT report by Christopher Neilan ................................................................. 47
SUMMARY

The following report is the result of a collaboration between several members of the Sheffield Tree Action Group (STAG) and a collection of experts, including myself. The objective was to calculate the Capital Asset Value (CAVAT) of the remaining 448 healthy trees due to be felled by the end of 2017 by Sheffield City Council (SCC) under their “Streets Ahead” Programme which is run by Amey PLC as part of a 25 year long, 2.2 billion pound Private Finance Initiative (PFI).

By only including trees placed in the “Damaging” and “Discriminatory” categories, as determined by tree inspectors employed by Amey PLC, it was assumed that all of these trees are healthy, which was confirmed upon inspection by unqualified, yet well-informed volunteers. In addition, a wide cross-section of trees in Sheffield have been inspected by myself and the other experts involved in this project. Upon this basis we were able to assign realistic values to the trees in terms of their health (Amenity Values) and Safe Useful Life Expectancy (SULE) which are both important values used in the CAVAT valuation formulas.

Volunteers from STAG compiled a comprehensive list of the remaining trees in the “Damaging” and “Discriminatory” categories, which was presented in the format of a spreadsheet. The volunteers then collected Diameter at Breast Height (DBH) measurements from all of the trees, to be used in the CAVAT calculations. Clear instructions were provided to eliminate measurement discrepancies (Appendix 2).

Using the approved CAVAT calculation spreadsheet, published by the London Tree Officers’ Association, under the guidance of the system’s creator, Christopher Neilan, I have calculated that the current asset value of the 448 trees is at least £11,400,000. Extrapolating this figure out over the other (2,147*) trees lost so far as a consequence of the Streets Ahead program in addition to the 448 due to be removed, we have an estimated total value of at least £66,100,000 in lost assets.

*Sources in section 3.1
1 INTRODUCTION

1.1 The Project

I am working as part of a collaboration consisting of: Christopher Neilan, creator of the CAVAT system and the calculations used for the valuations used in this report; Jeremy Barrell, an expert witness and experienced Arboricultural Consultant of Barrell Tree Consultancy, who helped with the structure of this report; Matt Larsen-Daw from the Woodland Trust, who have actively attempted to help SCC to find solutions to their problematic tree management strategy; and a number of individuals from STAG who have worked diligently to keep records of threatened trees and inspect and measure them for this project.

The aim of the project is to ascertain the CAVAT value of the remaining 448 healthy trees that are due to be removed as part of the Streets Ahead programme in Sheffield, in order to highlight the financial loss that will be incurred by SCC when the felling schedule is complete. We have included all trees that were present and complete at the time measurements were being taken. It is accepted that trees will continue to be felled at the time of writing and publication.

1.2 My Involvement/Conflicts of Interest

My interest in the STAG campaign is entirely personal and separate from my role as a local authority Tree Officer. I am working on this project free of charge and have not received any form of payment or reimbursement for my involvement in the campaign thus far, with no intention from either side of that ever being the case. I therefore have no vested interest in favouring one side or the other in this debate. I act as an independent expert, giving my honest opinion using my knowledge and experience in arboriculture. All opinions I have expressed are unbiased and professional. I do, however, declare and accept that I may benefit from my involvement through reputational enhancement. I also clarify that I do sometimes act as an advocate for trees, but in this instance, I am acting as an independent expert. I became interested in the campaign after joining the STAG Facebook group. Whilst reading through the comments, I could see that a number of questions were being asked that I felt able to answer using my knowledge and experience in the field of arboriculture. Since then I have continued to act in an advisory capacity, answering, to the best of my ability, any questions asked. As I began to learn more about the situation, I became increasingly concerned that mature, healthy trees were being felled without sufficient justifications. I visited Sheffield in March 2017, and spent two days travelling around the city meeting members of STAG and inspecting some of the trees. Following this visit I wrote an informal report of my findings (Appendix 1).
1.3 Qualifications and Experience

I have over 16 years’ experience in the arboriculture industry, which began by completing a two year diploma in arboriculture at the age of 17. After a varied career as a tree surgeon spanning 13 years, I returned to college to complete my Level 4 Diploma in arboriculture. Since then I have enjoyed a career as a Local Authority Arboricultural Officer for two different London boroughs.

1.4 Jeremy Barrell – Qualifications and Involvement.

“In general terms, I have been trained in tree valuation, including i-Tree, Heliwell, and CAVAT (https://www.barrelltreecare.co.uk/resources/useful-documents/career-summary-for-jeremybarrell/), and have experience using those skills in a variety of legal cases. More specifically, I was on the development panel for CAVAT, as acknowledged on page 10 of that published document (Appendix 4), and the method of tree assessment that I developed in the 1980s called Safe Useful Life Expectancy (SULE) is an integral part of the CAVAT method. My participation in that project involved detailed correspondence over several years, and attending discussion/training events”

~Jeremy Barrell BSc FArborA DipArb CBiol FICFor FRICS

In relation to the STAG campaign and his involvement thus far, Jeremy states that he has no potential gain; financial or otherwise, or vested interest in STAG, Any advice he has given during his involvement in the campaign is as an independent expert. All conclusions Mr Barrell has reached are unbiased, expert opinions only.

1.5 Input from Matt Larsen-Daw - Woodland Trust

“Many of the things that trees on our streets do for us go unseen and unremarked. Anyone viewing a mature tree is unlikely to have ever seen that site without the tree - our lives are short in comparison with these mighty organisms. It is difficult to really appreciate the impact of something that has always been there - we don't remember life without it. Surveys like this are vital to bring the contribution being made by trees to light. They can't capture and quantify the way that trees lift the spirits, create a spirit of place, and act as a familiar comforting companion to those whose lives they touch. The findings from such surveys, however, remind us that trees are not passive decoration, but active agents of change working for the benefit of wildlife, people and the environment. Our relationship with the trees around us is challenged. If they are working hard for us, shouldn't we be prepared to work hard to help them survive and thrive?

The measurements that fuelled this survey were recorded by local residents who gave up their time to stand with their treasured trees and help them get the recognition they deserve. Local networks of tree
champions, guided by skilled professionals, are the hope for the future of trees in the UK. In an ideal world Local Authorities will be integral to these networks, but it is important that awareness of the presence, value and management requirements of trees is not restricted to one agency but is shared across all levels of society to ensure trees and people always get the best deal.

The Charter for Trees, Woods and People seeks to encourage this local cooperation and to draw into one place all the incredible things trees do for us and the wider ecosystem so that their true value can be appreciated and protected locally and nationally. At its root is the connection between people and trees that exists below the surface and needs to be visible to influence decision-making. Nowhere in the UK is that deep connection more visible at the moment than in Sheffield, where people have been motivated to articulate their love of trees to explain their anger at the loss of so many healthy tree companions.

Well done to all who played a part in assembling the data and compiling the findings for this integral report. Knowledge is power, and only when the value of trees is understood can they be celebrated, protected and managed for the benefit of all.”

~Matt Larsen-Daw - Project Lead - Tree Charter Woodland Trust - TreeCharter.uk

1.6 The STAG campaign

“The history of the Sheffield Street Tree Debacle has been a story of confusion and incomprehension. After years of protests citizens are still at a loss to understand why so many healthy trees are being removed. Attempts to understand the technical or financial reasons for the City Council’s policies become lost in a maze of secrecy and contradiction. Official policy statements talk about contractual obligations, potential financial hazards and vague assertions about budgets but no hard facts.

In all this mess it’s important to keep looking for reliable knowledge. There is powerful scientific evidence for the health benefits of street trees and independent highway engineers tell us that retaining most healthy trees should not be a burden on a public authority, despite the strange costings offered up by the monopoly contractor.

So against that background it is of huge value that Ian Dalton and his expert colleagues have been able to come up with an objective valuation of our street trees. They have shown that the authorities are destroying something of huge value for reasons that we cannot objectively verify, not least because there is so much secrecy in the Streets Ahead contract. All through our campaign arborists across the country have given their independent and objective support for retaining healthy street trees in our city and once again we are deeply grateful to have this support in such a practical and factual form. “

~Professor Chris Rust, Co-Chair of STAG Steering Group
2 INSPECTIONS AND DATA COLLECTION

2.1 Data Collection

Given the distance between Sheffield and my home town of Crawley, West Sussex, it would be impractical for me to inspect and measure the trees myself. Therefore, I enlisted the help of 24 volunteers to collate a list of threatened trees. A volunteer by the name of Dr Helen Kemp has worked diligently throughout the campaign to keep accurate records of all of the threatened trees in Sheffield, which was key to our ability to carry out this project. The other 23 volunteers measured each tree to obtain its DBH to be used in the CAVAT valuations. All volunteers were given clear written instructions explaining how to carry out the measurements and enter the data into the CAVAT spreadsheets. (Appendix 2).

2.2 Inspection of Tree Condition

The trees chosen for inclusion in this valuation were all placed in the “Damaging” and “Discriminatory” categories by SCC and Amey with the exception of one, which is a twin-stemmed Alder that was placed into the “Dangerous” category by SCC. I inspected this tree when I visited Sheffield in March and I dispute the reasons given for this categorisation. My justifications are listed in my previous report (appendix 1). It is assumed that all trees in these categories have been inspected by competent arborists within the last 3 years by SCC in order for them to be categorised in this manner. I have also taken into account the general condition of the trees I saw during the two days I spent in Sheffield in March. I saw a wide cross-section of trees across the city and concluded that Sheffield has an impressive street tree population made up of mature, healthy trees forming some immaculate and unbroken avenues of trees, as well as many trees of notable status such as a rare, veteran Elm, and avenues of WWI memorial plantings (appendix 1) - all of which are threatened with removal. Using this logic, we are able to justify the Safe Useful Life Expectancy (SULE) and amenity factors as explained by Chris Neilan in section 2.5. In addition to this, the instructions that the volunteers received also contained a list of possible defects to look for when inspecting the trees that may affect the SULE and amenity factors allocated to them. No such features were identified by any volunteers. It should also be noted, that in general, members of STAG hold a more than basic competence in the field of arboriculture.
2.3 Proposed Implementation

This project required careful management and good communication to ensure that the correct trees were included in the valuation, and that trees were not duplicated or missed. Communication occurred by means of a group email, while the “master list” of trees compiled by Dr Kemp was saved as an online document where it could be edited by all (samples shown in appendix 5, full spreadsheet available here: https://goo.gl/vFiYBY). As the trees were measured and inspected, they were marked as complete on the shared spreadsheet and the DBH data added. The volunteers then either added the values into the CAVAT spreadsheet to be submitted for inclusion in the final amount, or passed these to Dr Kemp who transferred the data to the correct spreadsheet. There are a large number (110) of CAVAT spreadsheets showing the valuations of every tree. These sheets have been made publically available in full (here: https://goo.gl/5JLNQR), although a sample of those used can be found in appendix 3.

2.4 Explanation of the Reasoning Behind the CAVAT Assessment

Christopher Neilan holds the qualifications of Master of Arts (Cambridge); Master of Arboriculture, and is a professional member of the Institute of Chartered Foresters. He has been engaged in arboriculture since 1978, first as tree surgeon, then as a tree manager for Essex County Council, and currently as tree and landscape expert for Epping Forest District Council, as well as being an educator and occasional consultant. He has a particular interest in tree valuation, having invented and developed the CAVAT method of tree valuation. Recently he has collaborated with UK Forest research on a project to test and validate the CAVAT methods, and has co-authored a paper, with the Head of Forest Research and others, describing its purpose, method and intended uses. That process will result in publication of an updated version of CAVAT shortly, but the changes would not affect the results of this valuation.

In relation to the STAG campaign and his involvement with it thus far, Chris states that he has no potential gain, financial or otherwise, or vested interest in STAG, and any advice he has given during his involvement in the campaign is given as an independent expert. All conclusions he has reached are unbiased, expert opinions only. Chris has previously advised members of STAG; his earlier report is included at appendix 5.

CAVAT is now widely used in UK arboriculture as a valuation tool for amenity trees. The purposes of CAVAT are two-fold; firstly, to give a valuation for individual trees where necessary, and secondly to allow asset value management of that tree stock. CAVAT calculates a value for the tree in terms of an extrapolated and adjusted cost of replacement approach. It is modified primarily by how
strongly the tree contributes to public amenity, rather than as the property of the council, or other owner. CAVAT has been used to calculate how much would need to be spent on new planting to give effective compensation for the loss of a tree, or any number of trees. It has also been widely used to calculate appropriate compensation, rather than relying on a one for one approach, where the size and level of benefits of the new tree will inevitably bear no relation to that being lost. The research establishing the many tangible contributions of trees to health and wellbeing shows clearly that benefits are strongly related to size. In the same way, a tree’s CAVAT value is directly related to its size, (as well as other factors, including life expectancy and health).

CAVAT is intended as a professional tool, and a full valuation requires a high level of expertise; however, it is possible to make an indicative valuation by entering standard values for several of the modifying factors, providing the size is accurately known. The approach therefore was as follows:

- **Step 1 – Basic Value:** The trunk diameter for each tree was measured and input into the spreadsheet to calculate the basic value. This is a standard calculation requiring no expertise, beyond accurate measuring. Care was taken to ensure that volunteers were properly instructed and had the right equipment for this measurement to be accurate.

- **Step 2 – CTI Value:** This is a standard assessment, and uses the published table to reflect local population density. For Sheffield, the value is 100% - i.e. the basic value is not increased.

- **Step 3 – Functional Value:** This is a 2-part assessment, in which a professional arborist assesses the completeness and health of the crown against what would be expected of a perfectly grown tree with the measured trunk diameter. For this evaluation, an overall standard depreciation of 60% is proposed, based on previous surveys in Sheffield and elsewhere, as a conservative figure.

- **Step 4 – Adjusted Value:** This is again a 2-part assessment, reflecting the positive and negative contributions arising from species characteristics as expressed in the location. Again, it is an assessment requiring detailed arboricultural expertise; therefore, a standard depreciation of 90% has been used, as a conservative depreciation under this heading.

- **Step 5 – Full Value:** The final factor is life expectancy. Life expectancy is another assessment requiring specialist expertise, however from surveys in Sheffield and elsewhere it is possible to apply a standard depreciation factor, reflecting the fact that most highway trees can be expected to be in a safe condition, having been regularly inspected. In this case 40-80 years has been chosen as a realistic life expectancy range. Most trees in the survey group would be confidently expected to have life expectancies of 40-80 years, or more than 80, but this choice reflects that some trees in relatively poor condition are known to be present.
An earlier survey, undertaken in February 2016 on a pro bono basis is included at appendix 6. This is important because it was based on a full site inspection of a sample of the trees affected by the felling program. I draw attention to his conclusions as to the average value of the 20 trees concerned, which he found to be £21,590 (my interpretation of his results). He noted that the average CAVAT value was significantly reduced by the presence of 2 trees in a seriously degraded condition. Otherwise it would have been £23,350. This survey is supportive of the current survey, the values found and the methodology adopted.

The full CAVAT method is described in appendix 4

The CAVAT calculations consist of 110 spreadsheets and is available in full here: https://goo.gl/5JLNQR also a sample of the spreadsheets used can be found in appendix 3.
3 CONCLUSION

3.1 Conclusion

Based on the aforementioned methodology, my calculation of the capital asset value of the 448 trees surveyed (shown on the master spreadsheet in appendix 3) is at least £11,400,000, this figure has been calculated from the CAVAT spreadsheet (included in appendix 4).

Extrapolating this figure out over the trees lost so far as a consequence of the Streets Ahead program, including those surveyed and found to be already absent (2,147** additional trees/2,595 in total), gives us an estimated total value of at least £66,100,000 in lost assets.

Allowing for a successful one-for-one tree replacement program, of 12/14cm girth trees, which would have a CAVAT value of £200 each at time of planting, I find the immediate loss of community asset to be £65,600,000. Assuming a high standard of tree care for successful establishment and growth, and using the methodology explained in appendix 6, the net loss of asset value even after 20 years – and assuming that the value of the present asset value will be maintained, not increased – would be likely in excess of £59,600,000, were the program to be followed to its conclusion.

However, not all that loss is inevitable; a significant proportion of the loss could be saved, were the program to be reviewed and the criteria for felling revised in-line with general best arboricultural practice. The net value which could be saved, with an immediate cessation of felling would be at least £11,300,000.

** Table Showing the Data Used for Determining the Total Number of Trees that are “Damaging” or “Discriminatory”, Together with the Sources of this Data

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Damaging (footpath, kerb, carriageway, structures)</td>
<td>1703</td>
<td>272</td>
<td>9</td>
<td>1</td>
<td>1985</td>
</tr>
<tr>
<td>Discriminatory</td>
<td>157</td>
<td>7</td>
<td></td>
<td></td>
<td>164</td>
</tr>
</tbody>
</table>

[1] Data from FOI to SCC - trees felled up to and including 11-4-2017
[2] Data from SCC Household Survey 2015-2016. Included in this figure is 93 trees that when surveyed for this report were found to have already felled.
[3] Data from FOI - trees listed for felling since July 2016
[4] Unlisted trees that have been felled because they are damaging
Any overlap between the lists has been accounted for
These data are for trees that we know have been felled
4 APPENDIX 1 PREVIOUS REPORT

Sheffield Street Trees

Photo Credit: Andrew Stringer
INTRODUCTION

My name is Ian Dalton, I am an experienced Arborist qualified to Dip Arb Level 4. I have over 16 years of experience in the Arboriculture industry which includes over two years’ experience working as a Tree Officer for two London Boroughs. I developed an interest in the Sheffield tree campaign group via the online forums. It caught my attention because it seemed like some of the decisions taking place regarding tree removal seemed to be questionable from an Arboricultural standpoint. I feel obliged as a qualified Arborist to promote good Arboricultural practice wherever I can because I recognise the importance of ensuring the preservation of urban street tree populations through good management. Trees provide the following benefits (credit: Dr Deepa Shetty):

1. Carbon capture
2. Air pollution reduction
3. Flood prevention (Sustainable Urban Drainage System - SUDS)
4. Temperature regulation
5. Biodiversity
6. Habitat
7. Health and Well-Being (evidence growing of significant effect)
8. Property price, 10-17%
9. Noise buffering
10. Wind buffering
11. Carbon sequestration
12. Crime reduction
13. Highway performance enhancement
14. Placing
15. Visual amenity
16. Speed reduction
17. Oxygen production

I visited Sheffield on the 17th March 2017 and met some of the local residents who showed me around the city to look at some of the trees that have been marked for removal. The following is a brief, informal report on my findings. Caveat: the findings highlighted in this report represent the kinds of issues that are found consistently throughout the City. I saw many examples of the individual issues raised.
REPORT

There seems to be a distinct lack of consistency regarding the decisions to remove trees in Sheffield. Footway damage and kerb displacement seem to be widely used reasons for tree removal across the City. Although as the following images show, trees are being removed for causing relatively small amounts of damage, whilst others are being retained for causing more significant damage. This kind of inconsistency and use of fallacious arguments for removal leads me to question the legitimacy of decisions made to fell so many trees in Sheffield.

Firshill Road

This tree, opposite 29 Firshill Road is to be removed for alleged footway disturbance:
However this tree outside 27 Firshill Road is not being felled, yet the damage appears to be worse.

It is important to add that during my role as a Tree Officer, I have rarely encountered instances where trees have been removed for causing footway or kerb disturbance. When I receive a complaint about roots damaging the footway, I simply forward the enquiry on to the highways inspector. They then visually assess the damage and carry out the necessary repairs. This consists of solutions such as simply removing and relaying the tarmac to create a smooth surface, which I understand can be slightly raised and still be acceptable according to the guidelines they work to, replacing the kerb with a thinner stone or removing it altogether, replacing paving slabs with tarmac etc. Roots can even be shaved down or pruned if necessary, as long they work in line with industry guidelines and root pruning requires Arboricultural input if the roots severed are over 35mm in diameter. In exceptional circumstances, for example if the damage is so severe that the damage cannot be repaired without harming the tree or where there are particular problems relating to wheelchair access that cannot be remedied by other means, further Arboricultural input may be required, and removal of the tree has to be considered. However I have only encountered a small number of instances where removal of the tree has to be considered due to footway damage alone.
COTSWOLD ROAD

This tree outside 51 Cotswold Road has been issued with a tree replacement notice with the reason for removal being damage to footway. However as this photo clearly shows, the footway has been repaired and is perfectly flat and smooth. Therefore the reason for removal of this healthy, mature tree is no longer valid.
RIVELIN VALLEY ROAD

Rivelin Valley Road is one of the longest Lime tree Avenues in the country. Avenues of trees, particularly Lime tree Avenues are an integral part of the UK’s heritage. They can be found at many of our prestigious heritage sites across the country. The trees along this road should be managed as such and retained wherever possible. There are several gaps along the road that would benefit from extra tree planting to continue the legacy of this historical and beautiful Lime tree Avenue. I continued to be shocked and confused by the sight of healthy trees marked for removal with no Arboricultural justification whatsoever. The picture below is the only tree I saw out of the hundreds of trees I saw over the duration of my two day visit that I felt should be felled. It is badly decayed and poses a risk to people and/or property. I personally would ensure that a tree in this condition be removed as a matter of urgency, yet I understand that this tree was inspected several months previously and has been left in situ whilst healthy trees have been removed instead. I see this as a reckless disregard for the Council’s Duty of Care.
Upon arrival at Nether Edge, I was taken aback by the decision to remove this beautiful veteran Elm tree. Dutch Elm Disease has wiped out 25 million Elm trees in the UK alone since 1967. All of our remaining Elms should therefore be protected, a fact that seems to be self-evident. There are no Arboricultural justifications for the removal of this tree and several seemingly obvious reasons to retain it.
NETHER EDGE – ANCIENT LIME AVENUES

The roads of Nether Edge boast some of the most impressive, intact and stunning avenues of Limes trees I have ever seen. The trees blend in seamlessly with their surroundings and form the basis for the unique character and charm of the area. I saw more of the same fallacious reasons for removal of huge chunks of these magnificent Avenues of healthy, mature Lime trees. These trees have the potential to continue to provide the charm and character that is so important to this area for many years to come and they could, and should be enjoyed for generations to come. With good management, there is absolutely no reason why this could not be possible.
WESTERN ROAD

On Sunday 18th March I had the pleasure of meeting Cllr Gamble Pugh on Western Road who took me through a detailed inspection of every threatened tree on Western Road. I saw all the same kind of inconsistencies and fallacious arguments for the removal of healthy trees. My findings are as follows:

72 Western Road

This is one of the trees that has been subject to an underground inspection of the roots by Amey PLC. Cllr Gamble Pugh stated that his notes from a previous inspection mentioned that this tree was one of the worst examples of “humping” of the footway on the entire road. As you can see, following the excavation works carried out during the root inspection, the ground level has changed. The discolouration of the stem denotes that old level of the tarmac, which now lays perfectly flat. This is clear proof that simple excavation works using standard techniques and materials can easily rectify problems relating to damage to footways from tree roots. This is exactly the kind of work I and all other local authorities authorise on a daily basis in order to mitigate against the problem of trees damaging pavements with a view to retaining healthy street trees.
63 Western Road

This is another example of simple and effective engineering solutions being employed (albeit seemingly inadvertently). The tarmac has been reinstated perfectly flat and smooth and the kerb could simply be replaced, a slimmer kerb stone could be used if necessary.
92 Western Road

Cllr Gamble Pugh mentioned that concerns had been raised with him about the use of narrow kerb stones, the problem being that they are difficult to securely attach to the footway and their subsequent tendency to become loose. Whilst I accept that this may be an issue, it is certainly no justification for the removal of healthy trees. Trees and highways require management to keep them in an acceptable condition and this kind of minor repair comes under that category.
THE VERNON OAK, VERNON ROAD

The Vernon Oak is one of the many examples of stunning veteran trees that are in good health and should be retained for as long as possible. The problems this tree is causing to the footway is a minor inconvenience, not a justification for removal of this beautiful tree.
ALDER ON ALDHAM WAY

I was asked to inspect this Alder tree on Aldham Way because it is due to be felled, the reason given being that it is unsafe due to the twin stemmed nature of the tree. Whilst twin stemmed trees can be a problem, this tree appears to be within normal safety parameters. In cases where the stems grow too close to each other, they can often begin to push each other apart as they grow and expand. However these stems have sufficient space between them and the union that joins them is a strong “U-shaped” union that is much stronger than a “V-shaped union”. Strong U-shaped unions can be found elsewhere in nature, most notably on deer antlers that are of course very strong. This tree is an excellent feature of this urban landscape and should be retained. There is no Arboricultural or health and safety justification for removal. Some minor pruning of the crown to reduce the size of the crown by approximately 25% would, in my professional opinion be sufficient to ensure the continued and safe enjoyment of this tree for many years to come.
PLANTING TECHNIQUES

Arguably the single most important element of good tree management is species selection and good planting techniques to ensure that trees can be given the best opportunity to live to maturity so that they may offer the many benefits that mature trees can give us. I witnessed countless examples of poor planting practices during my time in Sheffield. The roots of the previous tree have not always been removed properly which means that the trees have not been planted to the correct depth making them unstable in the ground. The tree stakes are too short and are subsequently not driven deep enough into the ground to offer the tree the support it needs to establish a stable root structure. The tree ties are poorly attached and are often very loose and are not serving the purpose that they are designed for. In the example below it is evident that the stakes have become loose and can be easily removed from the ground, also the ties have been rubbing against the stem which has damaged the bark and could prevent the tree from drawing up the nutrients it needs to survive.
Here is an example of the type of planting we have been employing this year in my local Borough. Typically the tree stakes are driven into the ground several feet deep. They are surrounded by high quality cages to protect them from vandalism and they have watering bags attached which help to ensure that they have sufficient amounts of water to allow them to survive the first few years of their life in their new location that is so vital to their establishment and continued good health through to maturity. This initial investment is easily justified and in many ways necessary to the survival of newly planted trees. We have planted over 1000 trees across the Borough this year using this technique.
CONCLUSION

It seems clear to me that there have been several failings in relation to the tree management program in place in Sheffield. All good Arboricultural practices have been abandoned and trees are being felled unnecessarily. SCC list their possible engineering solutions available to them to remedy the problems caused by trees. These engineering solutions are simply not being employed where they should be and I see no valid reason for this. These engineering solutions are standard practice and are widely used across the country. We are all facing severe budget cuts yet are still able to employ these simple solutions instead of felling huge swathes of healthy trees. The scale of the problem is striking and I was shocked when faced with the seemingly random and indiscriminate felling of healthy trees across the city. I deal with complaints about trees on a daily basis, complaints ranging from tree detritus blocking gutters and trees blocking light, to trees causing severe structural damage due to subsidence. In every case I use my knowledge of trees and training to find a solution to the many problems people face that do not involve the removal of the tree. Regardless of the complaint raised, there is almost always a solution that can be explored as an alternative to removing the tree, and these alternative solutions are always employed wherever necessary by myself and my colleagues and peers. It is important for people to understand that the problems caused by trees are hugely outweighed by the benefits they bring. This kind of reasoning seems to be absent in Sheffield, as is any expertise that is so vital to properly managing an urban tree population. I see this as a significant problem that has to be remedied. A culture of removing mature, healthy trees for causing minor problems, or for having the potential to cause problems in the future has to be avoided at all costs. It is a deeply worrying trend that has the potential to cause irreparable damage to our environment and to the health and wellbeing of the people of the UK. The tree management contract is flawed and not fit for purpose. Democracy has failed the people of Sheffield and they are being ignored and good, law abiding people have been arrested for standing up for what they believe in by resorting to taking part in peaceful, lawful protests. The decisions being made in Sheffield in relation to their street trees undermines everything the Arboricultural industry stands for. I and many other Arborists have invested huge amounts of time, effort and resources into becoming qualified and knowledgeable professionals, because we feel passionately about promoting good Arboricultural practice because we understand the importance of trees in the urban environment and we know how vital they are for so many reasons. The obvious disregard for the hard work my industry has invested in research, training and the accumulation of knowledge with the aim of managing trees effectively is an insult to us all. Jeremy Barrell has spoken out on behalf of the Arboriculture industry, the message he sends is clear; PFI contracts should not be used for trees. There is clearly a desperate need for the felling to stop and for the flawed contract to be renegotiated or cancelled in the interests of the people of Sheffield, their health and the environment. It’s time that the financial gains of Amey PLC are put aside in favour of
the needs and wants of the people of Sheffield, their health, wellbeing and that of their children and grandchildren.

Photo Credit: Andrew Stringer
4 APPENDIX 2 MEASURING INSTRUCTIONS

MEASURING INSTRUCTIONS

1. **Measuring the trees** – If you have access to a DBH tape, you simply need to put the tape around the stem and take the reading, just as if you were meaning anything normally. That gives you the diameter of the stem in centimetres. If you are using a normal measuring tape, you will need to convert the measurement which will be the circumference, into the diameter. You can do this using a calculator and Pi if you know how, or you could an online calculator like this one: [http://www.onlineconversion.com/circlesolve.htm](http://www.onlineconversion.com/circlesolve.htm)

Simply take the measurement of the stem in Centimetres and type that number into the “Circumference” box on the table and click solve others. Then just copy the Diameter into the spreadsheet I’ve provided.

![Circular Measurement Table](http://www.onlineconversion.com/circlesolve.htm)

When choosing where to measure the stem, just aim for around chest height, it doesn’t have to be accurate. Anywhere between 1.2 and 1.5 meters will be fine. The important thing is to try and avoid any lumps and bumps in the stem and try to measure the tree where the stem is the most even, this will give the most accurate readings.

When you are writing down the readings, you will need to include the following information only:

- Tree number (you can allocate your own numbers as you go along, 1,2,3 etc..)
- Tree location – just use abbreviations like “os” for outside and “opp” for opposite then a house name or number.
- Tree species – the species will be on the main list of trees, just copy the names across.

If you need any help with this you can call me anytime.

2. **Entering the data** – When you have all the readings written down, you’ll need to put the data into the spreadsheet I’ve provided.
You will need a separate sheet for each road you do. Complete the information at the top of the spreadsheet with the relevant information, and save the spreadsheet as the road name you have surveyed.

<table>
<thead>
<tr>
<th>Tree No.</th>
<th>Species ID</th>
<th>Location (i.e. near tree no. 1)</th>
<th>Stem Diameter (Manual entry)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
<td></td>
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<td></td>
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<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The spreadsheet looks complicated, but the only columns you need to worry about are these three. Just fill out the Species names in the “Species ID” column next to the relevant tree number, and add the location in the “location” column. Then put in the DBH measurements into the “stem diameter” column (make sure it’s in centimetres). That’s it! Just complete one spreadsheet like this for each road, save the files as the relevant road names and email them to me directly (please don’t use the group email chain for this) iangdalton84@gmail.com

3. **Multi-stem trees** – As far as I know this will only apply to Sally’s Alder so everyone else can ignore this section unless you come across a tree that has two stems that split at a height lower than 1 meter.
In the bottom left corner of the spreadsheet you will see a tab that says “Multi Stemmed Alder”. Click on that (see diagram on next page).

This will give you the following page:

![CAVAT spreadsheet](image)

### CAVAT

**SPREADSHEET TO CALCULATE VALUE OF MULTI-STEMMED TREE STOCK (FULL)**

Only error data in the green boxes

<table>
<thead>
<tr>
<th>CAVAT</th>
<th>Quantities you measure/stock up</th>
<th>Calculated Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1: Basic Value</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stem Diameter (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit Value Factor</td>
<td>15.08</td>
<td></td>
</tr>
<tr>
<td>Basic Value</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>
All you need to do is measure each stem as normal, and add in the measurements to the first two boxes highlighted above, the spreadsheet will do everything else for you. Then save the spreadsheet with the road name and you’re done.

If anyone needs any help with anything, please feel free to email me, message me on Facebook or call me, I’m also on WhatsApp so you can message me there or send normal text messages. If I don’t respond straight away, I’ll get back to you as soon as possible.

jangdalton84@gmail.com

077xxxx-xxxx

Good luck!

Ian
5 APPENDIX 3 CAVAT SPREADSHEETS (SAMPLES OF SHEETS USED)

Spreadsheets available in full here: https://goo.gl/5JLNQR
CAVAT

(Capital Asset Value for Amenity Trees)

Full Method: User’s Guide

Christopher Neilan

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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, 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 can therefore only be used by arboriculturists who have received relevant training, and who have the relevant skills and experience.

It is established in UK law, in the Town and Country Planning Act 1990 Section 198, that trees have value as a public amenity and therefore local planning authorities are given a duty to protect trees in the public interest. The legislation itself does not specify how 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 does express 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 gives a value that is meaningful in itself but allows a comparison to be made with the value of other public trees.

CAVAT works by calculating a unit value for each square centimetre of tree stem, by extrapolation from the average cost of a range of newly planted trees. In the Full Method this basic value is adjusted to reflect the degree of benefit that the tree provides to the local population. The adjustment is designed 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

There are two versions of the CAVAT method. The Full Method, described in this Guide, 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. The data required is limited to the minimum necessary to express the value of the tree stock as a whole, to analyse it, and to provide information to assist with management decisions. The data may be collected in conjunction with regular surveys of the tree stock.

In effect, it is designed to enable the value of the public tree stock to be expressed as an index. The index would rise or fall with changes in the quality and character of the stock over time. The tree manager would act as an asset manager, showing evidence to increase the overall value year by year, bearing in mind the particular nature and disposition of the stock, and the opportunities and resources available. The Guide to the Quick Method is published separately.

General Instructions for the Full Method.
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 Full Method

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.

In relation to cases involving subsidence, according to the JIP (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.

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.

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/safe life expectancy.

Step 1: Basic Value.
The basic value is calculated using trunk area as key measure of size. The trunk area is calculated in the standard way by using the measured trunk diameter or circumference, and converted to give the radius. The current national unit value factor is selected to allow the basic value to be calculated, using the equation:

\[ V = n \times \text{radius}^2 \times \text{unit value factor}. \] (See notes 2 and 3).

A spreadsheet – the CAVAT calculation – Full Method available separately, has been produced to make the necessary calculations for the Full Method. When using it the basic value is automatically calculated, using the diameter and the UVF.

Step 2: 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). Then the modified basic value is discounted by up to 60%, according to how accessible the tree is in the particular location.

The CTI index factor is a measure of the relative population density potentially able to benefit from the trees, derived from Office of National Statistics (ONS) information. The values of the 7 CTI bands are shown in Table A. They vary from 100%, for the majority of the country, up to a maximum of 250% according to the published population density. The results as applied nationally to England can be found in the separate National Community Tree Index Table.

(Note: The CTI factor supersedes the previous value band approach, based on differential planting costs, which no longer applies).

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 from 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 general locality. The tree may retain 100% of its value, or be discounted by up to 60%.

Taken together, these 2 operations give the CTI value.

Step 3: Functional Value.
The CTI value is then reduced according to the surveyor’s expert assessment of the tree’s functionality, i.e. 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 in that location.

The surveyor must consider crown size and crown condition (see Note 5). Only one combined adjustment of the basic value is required, giving overall functional value. Precision is required in the assessment, either maintaining the value at 100% or reducing it proportionately in increments of 10%.
Step 4: Adjusted Value.

The functional value is then adjusted to take into account the surveyor's assessment of any special amenity factors and also the tree's appropriateness to the location. One combined adjustment is made; up to ±40% is possible. (See Note 6).

Step 5: Full Value.

Finally, the value is adjusted for safe life expectancy (SLE), assessed on the principles of SULE. (See Note 7). Trees with a safe life expectancy greater than 80 years retain 100% of their adjusted value; those with a life expectancy of less than 5 years lose 90%. The SLE adjustment bands are shown in Table E.

No reduction is made for a condition, e.g. structural weakness, where life expectancy is not shortened and the tree is judged to be safe. However, if management, e.g. crown reduction is required, the functional status is adjusted accordingly under Step 3, Functional Value. A tree that cannot be safely retained has a SLE score of 0, and thus a value of £0.

Notes

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

CAVAT has been designed primarily as an asset management tool. However, the full version is expressly designed for cases where the value of an individual tree needs to be expressed. The premise of CAVAT is that the widely accepted approach of depreciated replacement cost is used as the basis for a calculation of value since it is suitably robust, practicable and useful for these purposes.

The basis of the method is to calculate the value of a tree by extrapolation from the cost of a newly planted standard tree, using the ratio between their respective trunk areas as the critical measurement. This approach is 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 give the value of trees as public assets in the UK in comparison to the CTLA method whose stated aim is to express the private value of the tree to its owner.

CAVAT allows for the contribution of the factors of location, relative contribution to amenity social value and appropriateness, and an assessment of functionality and life expectancy. Essentially, the planting cost basis is then modified by a consideration of the impact of those factors that contribute to the quantum of benefits that the public may expect to receive from it. 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 suggests both in the U.S.A. and the U.K. is a realistic estimate of the tangible lifetime benefits of trees to the community. The tangible benefits approach is reflected both in use of official population statistics to generate
the CTI index rating in CAVAT and the nature of the adjustment for functionality, and also in the scale of the adjustments for accessibility and amenity factors.

Note 2: Basic Value.

The relevant measurement to calculate the value for an individual tree in the Full Method is the area of trunk at breast height, using the standard CTLA Trunk Formula Methodology, from which the basic value is calculated, using equation $A = \pi r^2$. The procedure, therefore, is first to measure the trunk radius in centimetres, generally by converting the circumference to a radius by a “rounded-down” tape, or using the formula $r = \frac{C}{2\pi}$. The radius is then squared, and multiplied by $\pi$ (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.

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.

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Operation 1

The CTI index factor is a measure of the relative population density of the local authority, and thus the relative number of those potentially able to benefit from the local authority's trees. The CTI values for each Local Authority in England are shown in the separate National Community Tree Index table.

It may give more accurate results to calculate the stock value on a ward by ward basis, rather than by using the overall local authority value. 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.gov.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 to a factor of 80%, 60% or 40% of its original value.

The key considerations under operation 2 are:

1. Whether the tree is 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 is reduced to 80% of its original value.
3. A less accessible publicly owned area i.e. a courtyard of a building, sheltered housing unit or individual back gardens of local authority owned properties. For these locations the accessibility score may be 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 trunk area, but the crown area may often be reduced from what would be predicted for an average tree of the size by species characteristics, possibly exaggerated by grafting, as in many flowering cherries, or by pruning, or by natural events such as disease or branch failure. Alternatively, the crown may be fully present, but functioning poorly; in either case the assessor carefully estimates the adjustment to be made, so that the functional value represents as realistically as possible the actual capacity of the tree to provide public amenity. Only 1 adjustment is made for both crown size and condition.

The two considerations are:

1. **Crown Size.**
The value is reduced proportionately if:

- the crown is reduced by regular pruning;
- the crown area has been reduced by natural causes, e.g. storm damage or disease, and the tree has not recovered; or
- the crown has failed to develop, e.g. because of top grafting onto a stronger stock, and is smaller than would be expected from the stem size.

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 in advance where there is an immediate need for arboricultural reasons e.g. structural weakness and hence the need to reduce the crown. This should be as soon as practicably possible, and no later than 1 Year. Pests such as Horse Chestnut Scale, diseases such as bacterial webwood, or physical conditions such as uneven form or wounding are not taken into account, unless they are sufficiently severe to adversely affect biological functionality, to grossly affect appearance or to trigger crown reduction, etc.

A dead or effectively dead tree, or one requiring urgent removal, scores 0% value retained, and thus has a value of £0.

Note 6: Amenity and Appropriateness.

1. Amenity Factors

The value may be increased to take account of features of the tree that are of special benefit to the community. Special factor adjustment should be used sparingly, most trees will not have any special factor adjustment. There may be up to a maximum of 4 special factors and a total adjustment of up to 40%; (10% for each amenity factor, other than Veteran/Ancient Trees: 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:

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• 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 as for amenity factors by 10% each and by up to 40% if the species is seriously inappropriate for its location causing a problem or foreseeable direct hazard not effectively controlled by management, for example:

Inappropriate species characteristics for the location causing obstruction or inconvenience:
• 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, squarish fruit in hard surfaced area;
• honeysuckle drip e.g. in a dedicated car park or playground.

Problems relating to the particular specimen:
• a pronounced lean, causing a potential obstruction;
• tree planting out of context, for example, a visually intrusive species in an otherwise consistent avenue.

Note 7: Safe Life Expectancy Adjustment

Safe Life Expectancy (SLE) is accounted for by a potential depreciation of up to 30% of the adjusted value. The principles followed to generate the adjustment are those of SULE, but the final step relating to usefulness is omitted in order to avoid double accounting. As generally in CAVAT, the banding approach is used, for robustness and to reflect some of the practical difficulties of estimating age. The surveyor may be expected to more accurately estimate the SLE in a tree’s later years, when changes in the tree condition will have a much bigger impact on the SLE.

Trees with a safe life expectancy greater than 80 years retain 100% value; those with less than 5 years have 10% of their potential value. The weighting given to the intervening bands
is derived from an exponential curve, 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.

Tables

Table A: CTI Factors:

<table>
<thead>
<tr>
<th>Population Density / Ha</th>
<th>CTI Factor %</th>
<th>CTI Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>20 – 39</td>
<td>125</td>
<td>2</td>
</tr>
<tr>
<td>40 – 59</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>60 – 79</td>
<td>175</td>
<td>4</td>
</tr>
<tr>
<td>80 – 99</td>
<td>200</td>
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<tr>
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<td>225</td>
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<tr>
<td>&lt;119</td>
<td>250</td>
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</table>

Table B: Safe Life Expectancy Adjustment:

<table>
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<tr>
<th>Life Expectancy (Years)</th>
<th>% Value Retained</th>
</tr>
</thead>
<tbody>
<tr>
<td>80+</td>
<td>100</td>
</tr>
<tr>
<td>40 – 80</td>
<td>95</td>
</tr>
<tr>
<td>20 – 40</td>
<td>80</td>
</tr>
<tr>
<td>10 – 20</td>
<td>55</td>
</tr>
<tr>
<td>5 – 10</td>
<td>30</td>
</tr>
<tr>
<td>&lt;5</td>
<td>10</td>
</tr>
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</table>

Acknowledgements.

The author is grateful to past and present colleagues in Epping, including Russell Horsey, for his past and continuing advice and assistance, and Tracy Clarke for her trial survey in Theydon Bois, Stuart Forglone, Alex Sleef and Sarah Creitzman, and to the members of the LTOA and ETALOG user groups and in particular to Dave Lofthouse, Jake Tibbetts, Ryan Nixon, Paul Maher and Matthew Searle for their encouragement, advice and assistance in developing and trialling the CAVAT method. Thanks are also owed to Becky Hesch for her support and to John Stokes, Scott Cullen and Jeremy Barrell among others for their kind advice. Any deficiencies in the work of course remain the author’s own.

Particular thanks are due to several nurseries that assisted with information for the author’s research on unit costs, and to Mike Glover and Keith Sacre of Barcham’s, 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 most of all 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 with others for providing the means to do so.
APPENDIX 5 “MASTER LIST” (SAMPLE)

<table>
<thead>
<tr>
<th>Tree position</th>
<th>Brand owner</th>
<th>Area (across local group)</th>
<th>Species</th>
<th>Reason for removal (loss)</th>
<th>Circumference at DBH in (cm)</th>
<th>Major damage at breast height in (cm)</th>
<th>Falling prone or likely to cause damage</th>
<th>Already been removed</th>
<th>Due to be removed</th>
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<td>190</td>
<td>4.00</td>
<td></td>
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</tr>
</tbody>
</table>

Full spreadsheet available here: [https://goo.gl/vFiYBY](https://goo.gl/vFiYBY)
APPENDIX 6 CAVAT REPORT BY CHRIS NEILAN

CAVAT assessment of trees in or near, Rustlings Road and Ladysmith Avenue Sheffield

Christopher Neilan: MA (Cantab.); MArb, MICFor

Brief: to value specific trees and to provide a short background report, including on their meaningful replacement

For: SORT (Save Our Roadside Trees)

INTRODUCTION

I am Christopher Neilan. I have been engaged in arboriculture since 1978, as tree surgeon, tree and landscape expert for a local planning authority, educator and consultant. I am a professional member of the Institute of Chartered Foresters. I have a particular interest in tree valuation, having invented and developed the CAVAT method of tree valuation.

On February 4th 2016 I visited Sheffield and was accompanied to 2 locations, where I valued a total of 11 mature trees, using the CAVAT Full assessment method. The results are summarised in this report, with the data presented in 2 separate spreadsheets. I am given to understand that they are all intended to be felled as part of a highways improvement program across Sheffield, although I have not verified that.

This advice is given pro bono.

RUSTLINGS ROAD

I valued a total of 8 trees, mostly common lime. The cumulative CAVAT value was £156,835.

This valuation takes into account their location, size, species characteristics, functionality and life expectancy. The spread of value was from £45,268 to £4,851; the average CAVAT value was £19,604.

Two of the trees had obvious defects and consequent significantly shorter life expectancies, reflected in lower CAVAT values, of £6,738 and £4,851. The other 6 trees, which were without obvious gross defects, had a CAVAT value of £145,246, on average £24,208 per tree.

The potential CAVAT value of a single, similar replacement tree in 20 years is £2,500. (See Note 3 for methodology) Planting of 8 replacements might reasonably be expected to yield a CAVAT value of £20,000.
It would take a significantly larger investment in new tree planting in the area to have reasonable assurance of equivalent replacement tree cover for the 8 trees within 20 years.

**LADYSMITH AVENUE**

Here I valued 3 trees. I took these to be representative of a group of 12 lime trees, 11 in Ladysmith Avenue, and one similar tree in Edgebrook Road. The cumulative CAVAT value of the 3 limes was £69,331, Over the 12 trees this would give an indicative cumulative value of **£275,000**, with an average CAVAT value of **£23,110**.

The potential CAVAT value of a single replacement tree in 20 years is also £2,500. (See Note 3 for methodology) Planting of 12 replacements might reasonably be expected to yield a CAVAT value of £30,000.

It would take a significantly larger investment in new tree planting in the area to have reasonable assurance of equivalent replacement tree cover for the 12 trees within 20 years.

**NOTE 1: CAVAT BACKGROUND**

CAVAT is an acronym for Capital Asset Value for Amenity Trees. Its product is what is known as a “structural” value. It represents the value of the trees in terms of their effective replacement cost. It does not include ecosystem services, health or other quantifiable benefits that may also accrue. It is specifically designed for the UK legal framework, and to directly respond to the relative value of trees as a public amenity— rather than their value as property.

CAVAT is reviewed in the Forestry Commission Research Note- Street Tree Valuation Systems (April 2011), The Natural England commissioned report: Green Infrastructure- Valuation Tools Assessment NECR 126, (Sept. 2013), where in both cases it is found fit for purpose. It is the tree valuation method relied on in the LTOA Risk Limitation Strategy for Tree Root Claims, (May 2007) and the subsequent Joint Mitigation Protocol (May 2008). In an earlier form it was the basis for Case Study 9, Establishing and Justifying the Tree Budget, in Trees in Towns II (DCLG, Feb 2008).

The CAVAT value is directly related to size. For comparison a newly planted urban tree would be valued at the effective cost of planting- approximately £100- 200. An average street tree would have a value of £5,000- £10,000.
NOTE 2: LIFE EXPECTANCY

The last depreciation factor in CAVAT is for life expectancy. In this case I have assumed that practicable remedies are available for associated problems, such as raised curbs and lifted pavements. The means to achieve this would be costed separately.

NOTE 3: THE VALUATION OF FUTURE GROWTH OF REPLACEMENT TREES.

Using CAVAT, it is possible to calculate a predicted value for trees at a later stage in their development. This relies on the observation that most healthy saplings increase in girth at a relatively constant rate in their early years.

For the calculation of an indicative, 20 year CAVAT value for a single replacement I make these assumptions:

1. 12-14 cm girth at planting
2. Typical street tree species choice- i.e. avoiding delicate species, and short lifetime, fast growing trees such as poplar
3. Care in planting and subsequent management, allowing
4. 1.5 cm girth increment per annum, giving a predicted girth of 43cm at 20 years, and so a DBH of 14cm

I take 20 years as a reasonable test of medium term effectiveness; in broad terms it is a quarter of a human lifetime and approximately the time from birth to adulthood.

Christopher Neilan

February 5th, 2016