Depreciated Replacement Cost in Amenity Tree Valuation

By Adam Hollis

FOREWORD

This provisional guidance note is intended primarily for the application to the United Kingdom & Ireland (UKI) of the valuation methods produced by the Council of Tree and Landscape Appraisers (CTLA) in America. These methods are described at length in the Guide for Plant Appraisal, 9th Edition (CTLA 2000), hereafter referred to as the guide. This note is a supplement to that guide, and is hereafter referred to as the supplement. The guide describes methods which are used to develop estimates of defined value for various plant appraisal problems. The first version was published in 1957, providing a track record of some note. Those methods discussed in this supplement are the Replacement Cost Method (RCM) and the Trunk Formula Method (TFM). These methods both employ a Depreciated Replacement Cost (DRC) approach to amenity tree value. The guide also describes other Market and Income approaches to value that may be more appropriate in circumstances where the necessary data are available.
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“Three things are needed for beauty: wholeness, harmony and radiance (Integritas, Consonantia, Claritas):

Integritas: An aesthetic image is presented to us either in space or in time. What is audible is presented in time, what is visible is presented in space. But, temporal or spatial, the aesthetic image is first luminously apprehended as self-bounded and self-contained upon the immeasurable background of space or time which is not it. You apprehend it as one thing. You see is as one whole. You apprehend its wholeness.

Consonantia: Having first felt that it is one thing you feel now that it is a thing. You apprehend it as a complex, multiple, divisible, separable thing, made up of its parts, the result of its parts and their sum, harmonious.

Claritas: When you have apprehended it as one thing and have then analysed it according to its form and apprehended it as a thing you make the only synthesis which is logically and aesthetically permissible. You see that it is that thing which it is and no other thing. The radiance is the scholastic quidditas, the whatness of a thing.”

James Joyce on Aristotle’s three aesthetic principles in ‘A Portrait of the Artist as a Young Man’
What is an RPAC?  
UK & Ireland as a region

The guide recommends that distinct geographical regions form Regional Plant Appraisal Committees (RPAC) to develop their own supplementary guidance to reflect local supply costs, industry conventions, societal preferences and statutory frameworks. Following on from an October 2005 Tree Valuation seminar in Bath, organised by the Consulting Arborist Society (CAS) a number of tree officers and consultants, mindful of obvious regional differences with the US, formed the UKI-RPAC for the United Kingdom and Ireland. The region shares similar climate zones (see Fig. 2 above), arboricultural practices and valuation standards: the DRC valuation procedures and accounting standards for the region are found in the Royal Institute of Chartered Surveyors’ (RICS) Red Book at PS 3.6, the HM Treasury Green Book, the UK Investment Performance Standard (UKIPS) 3.1 and the UKIPS 3.12 respectively.

UKI-RPAC is independent of any organisation with members drawn from the Arboricultural Association (AA), CAS, the Institute of Chartered Foresters (ICF) and the ISA UKI Chapter. The committee also includes nursery and landscape professionals. UKI-RPAC has been formally recognised by the ISA with the Committee Chair currently holding seat on the ISA Plant Appraisal and Valuation Committee (PAVC).
RPAC remit:
supplemental guidance

Providing background information

Through this supplement, the UKI-RPAC provides the professional plant appraiser with regional information to help determine replacement size and unit costs, and considers the species, condition, and location factors that influence the value of plants, to find their DRC value.

NB this document is a supplement to the guide not a replacement or substitute. Users of this supplement should have the guide and be familiar with the concepts in it. Reading this supplement alone will not provide a full understanding of the factors involved.

The guide describes an RPAC’s remit as determining the:
- geographical boundaries of the region;
- rating of plant species in the region;
- size of the largest commonly available tree;
- tree costs from regional suppliers;
- full tree installation costs;
- appropriate cost of a tree and its installation;
- median wholesale, retail and installed tree costs;
- preferred choice of wholesale, retail or installed tree costs to inform appraisals.

In fulfilling this remit, UKI-RPAC makes some minor innovations. Rather than rating each commonly available species centrally in a single published list, as other RPACs have chosen to do across the US climatic zones, this supplement provides a more flexible and systematic approach to assessing specific tree attributes, such as size, longevity, maintenance requirements and pest & disease susceptibility in the field.

It also suggests some more defining attributes of the other depreciation factors (condition & location) within a UKI framework of published references, distinguishing their overlaps and allocating score ranges.

Promoting standards

In exploring CTLA methods of appraisal, UKI-RPAC’s expectation is that their systematic approach will set tree valuation in the region on a firmer foundation, recognisable to professionals both within and outside the arboricultural industry.

The committee is respectful of other methods of valuation that have informed the UKI industry, such as the Helliwell System (Helliwell 2003) and more recently, the CAVAT System (Neilan 2007). Indeed, the former has informed the depreciation factors within this supplement. It is hoped that CTLA methods will add another tool to the valuation toolkit that is complementary, rather than antagonistic to these methods.

However, UKI-RPAC’s use of universal DRC valuation methods and standards should hopefully gain it credibility outside that arboricultural toolkit. The explicit aim of UKI RPAC is not to compete within a niche, where everyone values trees by default, but to step outside this circle and gain the support of other more sceptical, tangential professions.

As an arboricultural tool, where CTLA methods proceed from concrete costs, they may be better placed for financial assessments than landscape planning or broader resource management decisions: CTLA methods were expressly conceived for financial appraisal. This supplement will help inform regional usage of the guide for the valuation of plant casualties, for insurance purposes, real estate transactions, plant condemnation actions, and a variety of tree inventories.

The methods involved go beyond the traditional visual amenity assessment, offering a more global appraisal of tree functions. The system can even be applied to dead trees.
The supplement’s further goal is to make explicit the connection between CTLA methods of plant appraisal and wider international methods of valuation, adopted by other professions within the region. The purpose in so doing, is to take tree valuation in the UKI out of a niche arboricultural context, and place it in a wider inter-disciplinary setting that is both recognisable and intelligible to other professionals; e.g. surveyors, accountants or lawyers.

The best systems fall down, when developed in isolation without a more universal credibility. The principal advantage of joining recognised systems of valuation is that their practice is already established with a body of guidance and standards. Regulation and accountability are the hallmarks of a profession. Thus, although any valuation must involve personal judgment, the appraiser can move over solid bases of value to what Aristotle (Metaphysics IV) called a properly justified true belief or knowledge.

What is DRC?

International Valuation Standards Guidance Note (IVS GN) 8.3.1. defines DRC as:

The current cost of replacing an asset with a modern equivalent asset less deductions for physical deterioration and all relevant forms of obsolescence and optimisation.

The DRC approach is based on the economic theory of substitution: it involves comparing the asset being valued with another. DRC is normally used in situations where there is no directly comparable alternative. The comparison therefore, has to be made with a hypothetical substitute, described in IVS GN8 as the modern equivalent asset.

DRC has nothing to do with historic costs, which are sunk and irrelevant to current value. The underlying theory is that a potential or hypothetical buyer would not pay any more to acquire the asset being valued than the cost of acquiring an equivalent new one. The technique involves assessing all the costs of providing a modern equivalent, using costing at the date of valuation. In order to assess the amount, this buyer would bid for the actual asset, depreciation adjustments must be made to the gross replacement cost to reflect the differences between it and the modern equivalent. These differences can reflect factors such as the comparative age or remaining economic life of the actual asset, its comparative running costs and its comparative efficiency and functionality.

How do CTLA methods follow DRC?

In the CTLA equivalent, current replacement cost (involving plant cost and installation costs of delivery, planting, irrigation and warranty) is depreciated by both internal factors such as species characteristics (cf. comparative running costs above) and specimen condition (cf. asset life above) and also by external factors such as location (cf. comparative efficiency and functionality above).

These factors are weighed up as percentages in an explicit and transparent process, outlined in the guide and summarised below (Table 3, p15). The object of depreciation is to make the connection between the value of the appraised tree and the equivalent replacement tree.

Fig. 3 below, illustrates parallels between CTLA and Royal Institute of Chartered Surveyors (RICS) methods. The depreciation factors of Species, Condition and Location also bear more than a passing resemblance to Aristotle’s three principles of aesthetic perception (Wholeness, Harmony and Radiance) quoted on p.3 above. However, CTLA methods are concerned with a wider basket of benefits than the purely visual or aesthetic.

Amenity trees provide a number of benefits beyond the purely visual, including architectural, engineering, environmental and social functions. Using replacement tree costs as the starting point of valuation helps to capture the wider basket of benefits attributed to the appraised tree by replacing them (whatever they were) without specifically isolating or quantifying those benefits. Depreciation makes the connection to the value of the appraised tree.
Figure 3: parallels between RICS & CTLA

**RICS Red book**

- **Asset Appraisal**
  - Size of property
  - No. bedrooms

- **Replacement Cost Determination**
  - Materials Cost
  - Construction Cost
  - Phasing of work
  - Incidental Costs
  - Contract Variations

- **Depreciation**

- **Economic Obsolescence**
  - Comparative running costs, the impact of changing economic conditions on the demand for goods or services produced by the asset;

- **Physical Deterioration**
  - The decline in value of an asset of a similar age for which there is a market compared to the value of new assets in that market

- **Functional Obsolescence**
  - The degree to which the design or specification of the asset no longer fulfils the function for which it was originally designed

- **Depreciated Replacement Cost Indication**

**CTLA 9th Guide**

- **Plant Appraisal**
  - Stem Diameter
  - Height

- **Replacement Cost Determination**
  - Supply
  - Delivery
  - Planting
  - Maintenance
  - Warranty

- **Depreciation**

- **Species Factor**
  - Adaptability
  - Lifespan
  - Size
  - Maintenance
  - Pest & Disease Susceptibility

- **Condition Factor**
  - Remaining asset life / Specimen life expectancy

- **Location Factor**
  - Site Rating
  - Contribution
  - Placement

- **Depreciated Replacement Cost Indication**
Terms of engagement: setting the terms

General terms of contract - members of professional bodies should always follow their guidance on standard terms of contract and conduct as a minimum requirement e.g. the ICF (http://www.charteredforesters.org/intro.html) members’ charter, but the following paragraphs based on current RICS guidance (Red Book Part 3 Chapter 2 PS2.1) and those in Table 1 below should also be considered specifically in relation to appraisal.

Identification of the client – It is important to identify the client both in terms of fee confirmation (as necessary) and also in terms of understanding the client’s preferences and the purpose and use of the appraisal, even though instructions for an appraisal may arise from a third party.

The type of tree(s) and how it is used or classified by the client – the appraiser should determine the functional roles provided by the trees (e.g. architectural, engineering, ecological etc.) and the client’s preferences for those variable benefits.

The purpose and use of the appraisal – The appraiser should always confirm the purpose and the use of the appraisal. The purpose is the appropriate basis or type of value (e.g. market value, use value, insurance etc.) sought. The use is the reason the appraisal is undertaken (e.g. a damage claim, asset valuation for budgeting purposes, TPO, etc.). The use may indicate the appropriate basis or type of value.

The subject of the appraisal and the interest to be valued – the specific trees/plants to be valued should be agreed with the client and his/her interest in them, including any statutory rights affecting that interest (Occupiers Liability Act 1957 % 1984, Town & Country Planning Act 1990, Highways Act 1980, Electricity Act 2003).

The date of the appraisal – replacement costs are obviously time-specific, as are observations on tree condition and other depreciation factors.

Disclosure of any material previous involvement – it is vital that the appraiser provides an independent and objective appraisal, particularly in legal cases.

Any assumptions, reservations, special instructions or departures – although a CTLA DRC appraisal endeavours to reflect actual replacement costs, there may be practical difficulties in obtaining specific quotes for the job from contractors, where there is no intention of replacing the tree(s). The appraiser may have to rely on generic costs, with the knowledge that no job is ever the same.

The extent of the appraiser’s investigations – to avoid misunderstandings, it is important to clarify the appraiser’s duty and ability to obtain or verify material information e.g. will condition assessment be based on Visual Tree Assessment alone?

The nature and source of information to be relied upon by the appraiser – it is important to agree upon the information that will be supplied by the client (particularly in illegal felling and removal claims) or third parties (e.g. nurseries and landscape contractors) and the degree to which it can be relied upon as being complete and correct (e.g. average or specific planting costs).
Settling the terms of engagement is paramount in legal cases, if the appraisal is to hold any validity (see Bryant v. Macklin, below or at [http://www.bailii.org/ew/cases/EWCA/Civ/2005/762.html](http://www.bailii.org/ew/cases/EWCA/Civ/2005/762.html)). Since CTLA methods are not yet widely used in the UK region, there is little legal record to date. Specifically, CTLA methods have been used successfully in the UK region in out of court settlements, and evidence using the Trunk Formula Method was accepted by the court in the form of a part 35 compliant report for Hutton Mount v Laing Homes Ltd (2004). Interestingly, the Installed Unit Costs (full cost of replacing a tree divided by trunk area - see p.15 below) discussed by both experts appear to have been in the region of £20.00 +VAT, which makes this Supplements’ Unit Costs of £12.42 +VAT seem conservative by comparison.

Other reported attempts have been less successful, where the appraisers have confused a number of approaches to value (market, income and cost) and/or the use of depreciation has not been explicit. In Bryant & Anor v Macklin & Anor [2005] EWCA Civ 762 (23 June 2005), the two appraisers pursued both a cost and market approach simultaneously, without clear distinction. Moreover, there does not appear to have been any reference to depreciation in the cost approach. The judge ruled the direct replacement cost of the damaged trees at approximately £193,000 was neither reasonable nor fair to the parties, given that this constituted nearly half the total market value of the claimants’ property. This position might have been defensible, if the claimant had distinguished his basis of value from market value. The judge was not averse to the restoration of benefits to parity (which may have been the result of depreciating these direct replacement costs), adding that replacement with just saplings would not have been fair to the claimant either, nor reasonable on grounds of cost, and also taking into account that it was not the option the claimants sought and would not reinstate the property in terms of screening and wind protection for several years. Thus it was not the failure to reconcile the appraised tree value with property value that was unreasonable, but the failure to use depreciation and clarify the approach to value. Nor should “reasonable” be taken to mean modest or capped, but rather, supported by reasoned argument; i.e “properly justified true belief”(see Introduction above).

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**Table 1: Minimum requirements in respect of valuations and appraisals** (Scott Cullen pers. comm)

<table>
<thead>
<tr>
<th>Specification or Requirement</th>
<th>RICS Red Book</th>
<th>IVS Conduct §7.1</th>
<th>CTLA p. 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client</td>
<td>PS 2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The hiring party, may vary from the owner or beneficiary of</td>
<td>PS 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the subject trees or other plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purpose of the valuation or appraisal</td>
<td>PS 2.2.2 (a)</td>
<td>#3 §3.4.3</td>
<td>pp. 11-12</td>
</tr>
<tr>
<td>Why the assignment is undertaken</td>
<td>PS 3.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same as IVS, CTLA “see”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject of the valuation or appraisal</td>
<td>PS 2.2.2 (b)</td>
<td>#3 §3.4.1</td>
<td>p. 118</td>
</tr>
<tr>
<td>The trees or other plants being valued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subject “property” or “premises”</td>
<td>PS 2.2.2 (b)</td>
<td>#3 §3.4.2</td>
<td>p. 102</td>
</tr>
<tr>
<td>Where the trees or other plants are located</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rights and Interests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full ownership or otherwise, e.g. TPO or easement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Includes identification of the owner or rights holder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basis of value to be estimated</td>
<td>PS 2.2.2 (c)</td>
<td>#3 §3.4.4</td>
<td>pp. 19-20,118</td>
</tr>
<tr>
<td>Same as IVS, CTLA “type” of value</td>
<td>PS 4</td>
<td></td>
<td>p. 19</td>
</tr>
<tr>
<td>Stated “purpose” in US practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Often follows from stated use of the appraisal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dates of value, field inspection and report</td>
<td>PS 2.2.2 (e)</td>
<td>#3 §3.4.5</td>
<td>p. 19</td>
</tr>
<tr>
<td>Scope or extent of valuation and report</td>
<td>PS 2.2.1</td>
<td>#3 §3.4.6</td>
<td></td>
</tr>
<tr>
<td>Assumptions and limiting conditions</td>
<td>PS 2.3</td>
<td>#3 §3.4.7, §3.6</td>
<td>p. 118</td>
</tr>
</tbody>
</table>

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1 RICS Appraisal and Valuation Manual (Red Book), 1996, Practice Statement 2.2.2
2 International Valuation Standards, 2005, Standard 3 - Valuation Reporting, §3.4

**DRC and the law:**
legal precedents for tree valuation
Methodology: determining replacement costs

RICS advise that in assessing the cost of the replacement asset due account has to be taken of all the costs that would be incurred by a hypothetical buyer or user on the date of valuation.

In CTLA methods, these costs include the costs of delivery, transportation, installation, commissioning and any unrecoverable duties or taxes.

CTLA methods need reliable data on actual replacement costs in the local region in which the valuation is being undertaken. These costs include both plant and installation costs, which are provided in Tables 2 and 3, for the whole of the UK and Ireland. These costs are generally applicable and can inform valuations where specific costs cannot be estimated, though job-specific estimates are to be preferred.

The appraised tree can then be paired with equivalent plant and installation costs, either as like-for-like replacement stock through the straight Replacement Cost Method (see Fig. 6a: RCM worksheet p12) or for more mature trees, through unit cost extrapolation under the Trunk Formula Method (see Fig. 6b: TFM worksheet p13) as described in the guide (p 70).

In TFM the unit cost of the largest commonly available stock size is applied to that of the appraised tree (based on stem cross-sectional area at 1.5m above ground) and depreciated.

In RCM, although like-for-like replacement may be available, the costs should still be depreciated to reflect a truer estimation of value (DRC).
Survey conventions: anomalies of size

In pairing the appraised tree with its modern replacement equivalent, the former is conventionally measured by stem diameter at 1.5m above ground (BS5837: 2005 Trees in relation to construction) and the latter, as stem girth at 1.0m above ground (BS3936: Part 1: 1992 - Nursery Stock. Specification for Trees and Shrubs). The US nursery specifications used in the guide for replacement costs, measure caliper of stock at 0.5-1-ft above ground. Thus the need for this supplement is to confirm the usage of UKI survey and nursery mensuration standards in appraisal.

Although there is an anomaly in conventions here, the practical implications are not significant. Both in the nursery and in the field, there appeared to be very little difference between tree diameters, when sampled at 1-ft, 1m and 1.5m above ground in a 2000 study (Brokaw & Thompson). In all events, the degree of variation between measurements at both heights is unlikely to exceed the accepted degree of variation encompassed in nursery size grades; e.g. 20-25cm girth (cmg), 50-60cmg and 100-120cmg.

Appraisers should be mindful of a further potential anomaly between the appraised tree and its appropriate replacement, in the concept of Optimisation. This is a process of adjusting the replacement cost to reflect that an asset may be technically obsolete or over-engineered, or the asset may have a greater capacity than required. Hence optimisation minimises, rather than maximises, a resulting valuation where alternative lower cost replacement options are available. Optimisation may be applied at the outset in terms of hedge or screen replacement, where smaller diameter, but equivalent height stock may provide parity of function at a lesser cost. Such was the Judges reasoning in Bryant & Anor v Macklin & Anor [2005] (p.9 above). Alternatively, the process may be applied latterly under the broader depreciation process below (see overleaf).

Optimisation is the process by which a least cost replacement option is determined for the remaining service potential of an asset

IVS GN8

Figure 5:
There may be anomalies between the measurements of trees in the field and those in the nursery: conifer nursery stock is often measured by height rather than stem diameter. Subject to optimisation, smaller replacement trees than the appraised tree may be adequate to achieve parity of function.
Replacement Cost Method Worksheet
Guide for Plant Appraisal, 9th Edition (modified by Cullen from p. 65)

Appraised Value = (Installed Plant Cost x Species% x Condition% x Location%) + Removal & Cleanup Cost (if needed)

Case/Location ___________________________ Appraiser ___________________________ Date ______

A) Field Observations
1. Species ___________________________ in/cm
2. Condition Rating ___________________________ in/cm
3. Trunk Circumference or Diameter ___________________________ in/cm
   or Box size ___________________________ in/cm
   or Evergreen or Clump or Palm Height ___________________________ in/cm, ft/m
   or Shrub or Vine Height/Spread/Volume ___________________________ in/cm, ft/m
4. Location% = (Site _____% + Contribution _____% x Location _____%)/3 = ________%
   (Or use form of calculation at 4a if directed by UKI-RPAC Guidance)
4a. Location% = (Site _____% x Contribution _____% x Placement_____%) = ________%
5. Removal & Cleanup Cost (enter zero if not needed)

B) RPAC or Appraiser Developed-Modified Information
6. Species rating: _____________ %
7. Replacement Plant Size
8. Replacement Plant Cost (mean or median of 3 sources) = ________________
   Wholesale, Re-Wholesale or Retail?
   Source 1: ________________ Source 2: ________________ Source 3: ________________
9. Installation Cost (actual amount OR markup #8 by ____x) = ______________________
10. Other Regional Information

C) Calculations by Appraiser Using A and/or B
11. Installed Plant Cost = ________________
   (#8 Replacement Plant Cost ____________ + #9 Installation Cost ____________)
12. Depreciated (adjusted) Plant Cost = ________________
   (Installed Plant Cost #11 _____ x Species #6_____% x Condition #2_____% x Location #4 ____%)
13. Appraised Value = ________________
   (Depreciated Plant Cost #12 _____ + Removal & Cleanup Cost #5 _____) or Appraised Value = #12
14. Additional Damages (= #5 only if not included in #13) = ______________________
15. Round #13 as appropriate for the currency.
16. Appraised value = say,
Trunk Formula Method Worksheet
Guide for Plant Appraisal, 9th Edition (modified by Cullen from p.74)

Appraised Value = (Basic Tree Cost x Species% x Condition% x Location%)

Case/Location_______________________ Appraiser_____________ Date_________

A) Field Observations
1. Species: ________________________________
2. Condition rating ______% 
3. Trunk Circumference________in/cm or Diameter________in/cm
4. Location% = [Site____% + Contribution____% + Placement_____% ] / 3 = _____% 
   (Or use form of calculation at 4a if directed by UKI-RPAC Guidance)
4a. Location% = [Site____% x Contribution____% x Placement____%] = _____% 

B) RPAC or Appraiser Developed-Modified Information
5. Species rating ______% 
6. Replacement Tree Size: (diameter) ________in/cm 
   (trunk area) ________in²/cm² =TA
7. Replacement Tree Cost: Wholesale or Retail RPAC Cost ________ OR 
   Mean or Median of Source 1 ______ Source 2 ______ Source 3 ________
   __________
8. Installation Cost (actual amount OR markup #7 by _______x) __________
9. Installed Tree Cost (#7 Replacement Tree Cost ______ + #8 Installation Cost______ ) = __________
10. Unit Tree Cost (#7 Wholesale or Retail Replacement Tree Cost _____ / #6 TA____ ) OR 
    (#9 Installed Tree Cost ______ / #6 TA____ ) __________

C) Calculations by Appraiser Using A and/or B
11. Appraised Trunk Area = TA OR Adjusted Trunk Area = ATAA in² or cm² 
    Tables 4.4-4.7: 
    If #3 circumference > 94in or 241cm, #3 c² ______ x 0.080, 
    or if diameter > 30in or 75cm #3 d² ______ x 0.785 __________
12. Appraised Tree Trunk Increase = TAINGR = 
    (#11 TAA or ATAA ______in²/cm² less # 6 TA____ in²/cm² ) = __________
13. Basic Tree Cost = 
    (#12 TAINGR____ x #10 Unit Tree Cost ____ + #9 Installed Tree Cost ___) __________
14. Appraised Value = 
    #13 Basic Tree Cost ____ x #5 Species____% x #2 Condition____% x #4 Location____% 
    = __________
15. Round #14 as appropriate for the currency.
16. Appraised value = say, __________
17. Additional Damages (e.g. Removal & Cleanup Cost) __________
Table 2 compares plant costs for a basket of common broad-leaved genera at a range of size bands from a number of nursery suppliers across the region in April 2007. These costs are wholesale costs for containerised stock, ex-VAT, at the nursery. VAT should be added to the final gross valuation, but is better kept separate throughout the valuation for accounting purposes, to reflect the registration status of the client. Where VAT is not recoverable, it is included in the appraisal total.

The median plant cost for each size band is presented in the right hand column of the table; e.g. £400 for 30-35cmg stock. The median is preferred to the mean, since it reflects an actual, rather than calculated replacement cost. Where possible, the appraiser should approach local nurseries directly and obtain 3 quotations to formulate specific plant costs for a valuation, especially for large conifers where pricing can be very variable. Specific installation costs should also be sought, where possible. Alternatively, the installation cost metrics in Table 3 (overleaf) can be applied generically to specifically obtained plant costs.

In determining these costs, containerised stock, where available, is preferred by UKI-RPAC to rootballed stock, since a valuation client should be entitled to the most adaptable replacement stock with the greatest chance of survival.

Rootballed stock may be more appropriate for valuations involving larger stock and/or high numbers of replacement trees, where containerized supply is more limited e.g. in local authority inventories. Rootballed stock can be on average 20% cheaper than containerised stock.

Bare root stock is not considered appropriate for sizes above 14-16cmg and therefore, does not play a part in estimates of largest commonly available replacement stock, since semi-mature trees are now readily available in the UKI and Ireland.
Installation costs: unit installed tree

Table 3 above combines the median plant costs from Table 2 with installation costs of delivery, planting, maintenance, warranty and irrigation to arrive at the total Installed Cost.

Following its remit, UKI-RPAC choose installed costs (from the guide’s options of installed, wholesale, retail or plant cost) as the basis of replacement cost. In RCM, installed costs are used directly to determine the replacement cost of the appraised tree. In TFM, the replacement cost is extrapolated instead from unit costs based upon these installed plant costs.

Installed costs for each stock size are divided by trunk cross sectional area at 1.5m above ground to give Unit Tree Costs in £/cm². Trunk radius is calculated from the midrange of each size band as an approximation which may incidentally, accommodate variation between diameters measured at 1.5m above ground in the field and at 1.0m above ground in the nursery.

From these unit costs a further median unit installed cost is derived for comparative purposes to help select the appropriate Replacement Tree Size to inform the TFM. One of the size bands in Table 3 is selected as the basis for extrapolating replacement costs for mature trees of sizes unavailable from nurseries under TFM. That size can be selected on the basis of largest commonly available stock and/or the cost band closest to the overall median. The 30-35cm girth (cmg) stock (at £12.55/cm²) conforms to both these criteria. Numerous semi-mature tree nurseries supply stock to this size.

Coincidentally, US CTLA appraisers use 4-inch caliper (30-35cmg) stock for their TFM replacement stock size. A specific stock-size cost is preferred to the overall median cost in the guide for realism; i.e. with the unit replacement costs anchored in actual nursery stock costs.

Thus, the 30-35 cmg stock size with a £12.55/cm² unit installed cost is selected by UKI RPAC as the Replacement Tree Size for TFM calculations (p. 74 of the guide). It is used to find generic replacement cost and then depreciated to find value.

---

**Table 3: Median UKI Wholesale Unit Area Costs For Installed Semi-Mature Trees (Ex VAT)**

<table>
<thead>
<tr>
<th>Size Girth cm</th>
<th>Replacement Tree Cost £</th>
<th>Delivery Cost £</th>
<th>Planting Cost £</th>
<th>Warranty Cost £</th>
<th>Irrigation Cost £</th>
<th>Installation Cost £</th>
<th>Installed Tree Cost £</th>
<th>Trunk Radius Cm</th>
<th>Trunk Area Cm²</th>
<th>Unit Tree Cost £/cm²</th>
<th>Average Cost £/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-25</td>
<td>218</td>
<td>70</td>
<td>109</td>
<td>139</td>
<td>150</td>
<td>468</td>
<td>686</td>
<td>3.6</td>
<td>40.3</td>
<td>17.05</td>
<td></td>
</tr>
<tr>
<td>25-30</td>
<td>290</td>
<td>70</td>
<td>143</td>
<td>177</td>
<td>150</td>
<td>542</td>
<td>832</td>
<td>4.4</td>
<td>60.2</td>
<td>13.82</td>
<td></td>
</tr>
<tr>
<td>30-35</td>
<td>400</td>
<td>70</td>
<td><strong>200</strong></td>
<td><strong>235</strong></td>
<td><strong>150</strong></td>
<td><strong>655</strong></td>
<td><strong>1,055</strong></td>
<td>5.2</td>
<td>84.1</td>
<td><strong>12.55</strong></td>
<td></td>
</tr>
<tr>
<td>35-40</td>
<td>435</td>
<td>115</td>
<td>217.5</td>
<td>269</td>
<td>150</td>
<td>731</td>
<td>1,186</td>
<td>6.0</td>
<td>112.0</td>
<td>10.60</td>
<td></td>
</tr>
<tr>
<td>40-45</td>
<td>580</td>
<td>115</td>
<td>290</td>
<td>345</td>
<td>150</td>
<td>900</td>
<td>1,480</td>
<td>6.8</td>
<td>143.7</td>
<td>10.29</td>
<td></td>
</tr>
<tr>
<td>45-50</td>
<td>800</td>
<td>115</td>
<td>400</td>
<td>460</td>
<td>150</td>
<td>1,125</td>
<td>1,925</td>
<td>7.6</td>
<td>179.5</td>
<td>10.72</td>
<td></td>
</tr>
<tr>
<td>50-60</td>
<td>1450</td>
<td>500</td>
<td>725</td>
<td>936</td>
<td>150</td>
<td>2,311</td>
<td>3,761</td>
<td>8.8</td>
<td>240.7</td>
<td>15.62</td>
<td></td>
</tr>
<tr>
<td>60-70</td>
<td>2002</td>
<td>500</td>
<td>1001</td>
<td>1226</td>
<td>150</td>
<td>2,877</td>
<td>4,879</td>
<td>10.3</td>
<td>336.2</td>
<td>14.51</td>
<td></td>
</tr>
</tbody>
</table>

Delivery assumes 100 mile round trip at 0.70p/mile up to 25-30 cmg, £1.15/m from 30-35 cmg and £500 for stock above 50-60 cmg.

Planting includes machine hire, support systems & sundries and is set at 50% of supply cost.

Irrigation is by hand & assumes 20 visits in year one & 10 in year 2 at £5 per visit (by non-specialist owner/gardener/DSO).

Warranty includes 2-6 annual maintenance visits & is set at 20% & 15% of plant, delivery & planting cost for yr 1 & 2, respectively.

Trunk Radius is calculated from the midpoint of the nursery stock bands.
Supporting evidence for unit costs: Myerscough maple

Under TFM, unit costs are projected up to the size of the appraised tree to arrive at replacement cost. If these costs were to coincide with larger tree examples the correlation would add validity to these unit costs. Figure 4 above demonstrates such a conservative correlation with the Myerscough maple and a Super Tree (>10m height).

Arboricultural Journal Vol. 29 (1) pp 19-41, 2005 details the successful transplanting of the celebrated Myerscough maple: a mature 490mm stem diameter tree, transplanted at a total cost of approximately £20,000. The principal cost was that of crane hire at £13,000. Other costs involved expert assistance from Specimen Trees and Peter Scott and support hardware.

The cost of maintenance was £2,500 which included a rootball ventilation system and a rootball and crown irrigation system. This involved a 1,000 litre tank, hoses, 5 x Toro irrigation heads in the crown and a customised leaky pipe over the rootball, together with two pumps and timers.

The tree was also treated with soil injected biostimulant fertilizer and mycor together with Boost UK, which Bartlett undertook for free - the cost would have been about £600. There was no cost for most of the labour, which was provided by the Myerscough Arboricultural Students and Technical Staff. If the latter were to be factored in, the costs would have amounted to another £5,000 to £6000 (Dealga O’Callaghan pers. comm).

Large 100-120cmg Super Trees are available from the continent and through specialist UKI importers/suppliers. Indicative, installed costs from UKI suppliers, Bellwood Trees, Civic Trees and Tendercare for a 100-120cmg oak tree were £15,000 + VAT.
### CTLA Depreciation Factors

**RICS Forms of Obsolescence**

‘Having established the replacement cost of a modern equivalent asset, it is then necessary to adjust or deprecate this to reflect differences between this modern equivalent and the actual asset being valued.’ (RICS 2006).

For an original definition of the depreciation factors the reader is referred to Chapter 4 of the guide. The core process is outlined in the Figs. 6a & 6b worksheets (p.12-13) and paired with RICS processes in Fig3 (p. 7). In Table 4 above, specific interpretation of the depreciation factors is modified to UKI preferences and their subdivision and scoring to regional references.

The main departure from the guide here is the multiplication, rather than averaging of Location sub-factors to allow for a zero sum for unsuitable trees. Thus Table 4 sets out the method of depreciating the replacement cost, through a network of score ranges that describe the various factors (and their relationship) to be considered in the valuation. From within the score ranges (e.g. 80-100%) a final selection of scores is made through the judgment of the appraiser. Percentage scores are attributed to all the bands from high, medium to low etc. These are set neutrally by generally dividing 100% by the number of categories.

Interpretation of the factors and their scoring can be refined by individual judgment in the field. The plan should help focus, rather than replace judgment and is not binding. There is no one-size-fits-all appraisal. The point is to deduct for all relevant forms of obsolescence and optimisation (RICS) in a rational and consistent way.

### Table 4: Depreciation Plan for Replacement Cost and Trunk Formula Methods

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>Environmental Adaptability</th>
<th>Growth Characteristics</th>
<th>Pest &amp; Disease Susceptibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Rating</td>
<td>Size</td>
<td>Longevity Years</td>
</tr>
<tr>
<td>Suburban</td>
<td>Inner city Residential Areas</td>
<td>Zoo Resort Picnic area nature reserve Country park Golf course Corporate Cemetery Campus Arboretum</td>
<td></td>
</tr>
<tr>
<td>50-70%</td>
<td>70-100%</td>
<td>80-100%</td>
<td>0-25</td>
</tr>
</tbody>
</table>

**Location**

- Frequency: <10% 75-100% 25-50% 0-25%
- Cover: >10% 50-75% 50-75% 75-100%
- Dominance: Shared 50-75% Co-dominant 25-50% Suppressed 25-50%
- Rating: Excellent 75-100% Good 75-100% Good 75-100% Excellent 75-100%
- Placement: Excellent: Trees able to achieve full species potential and comprehensively fulfill designed or evolved role, whether aesthetic, functional or ecological. Good: Trees attracting a higher collective rating than they would individually, but which are not essential components of formal arboricultural feature. Compromised: Trees unable to achieve full species potential and fulfill long term functional role, on account of site suitability and related maintenance requirements. Unattractive: Trees that are totally unsuitable for their functional setting: that obscure a view, interfered significantly with infrastructure, act oppressive or oppressive or obstructive.

### Sources

Species factor (CTLA) economic obsolescence (RICS)

The species factor relates to RICS Economic Obsolescence or ‘comparative running costs.’ It determines these ‘costs’ in relation to the species’ genetic potential. Rather than rating each commonly available species empirically, this supplement suggests some of the specific tree attributes, such as size, longevity, maintenance requirements and pest & disease susceptibility, which relate to this form of obsolescence. Thus, the species factor is subdivided in Table 4 into 3 sub-factors: Environmental Adaptability, Growth Characteristics and Pest & Disease Susceptibility. They are derived from Table 1 of the guide: Factors to consider in rating plant species & cultivars.

Environmental adaptability

This sub-factor is referenced to Hibberd (1989) Urban Forestry Practice. This reference provides a comprehensive table (see Table 5 above) of commonly planted UKI amenity tree species, listing their suitability to a range of macro-sites from very suitable to intolerant. Native species would tend to rate well here, but not to the exclusion of other adaptable exotic species in challenging environments e.g. sycamore in upland sites. The appropriateness of exotic species in nature reserves would be considered under Location below.

Growth characteristics

This sub-factor is divided here into Size, Longevity and Maintenance. Size and soil adaptation are identified by Harris et al (1999) as a major factor reproduced in Table 4.2 in the guide: Characteristics of woody plants and suggested relative importance of their influence on landscape function, site adaptation, and plant care. Life expectancy and pruning requirements are identified in Harris’ Table 4.2 as significant growth characteristics, and are modified here as longevity and maintenance.
Species factor (contd.)
growth characteristics and
pest & disease susceptibility

The Table 4, Growth Characteristics are assessed
in terms of the genetic potential of the species or
cultivar, rather than specimen performance. High
maintenance requirements (e.g. *Tilia cordata*
‘Greenspire’) and pests & disease susceptibility (e.g.
_Aesculus_ species) will affect that genetic potential.

**Size** in Table 4, refers to crown size and relates to
the spatial quantity of benefits that a species may
potentially provide over its life time. Helliwell
(2003) Visual Amenity Valuation of Trees and
Woodlands, is cited as a reference for guaging
crown sizes.

**Longevity** relates to the temporal quantity of
benefits that a species may potentially provide over
its life time. Longevity of the species is distinct
from the actual remaining asset life of the ap-
praised tree, that is considered separately in the
depreciation process under Condition. Mitchell
& Wilkinson (1991): Trees of Britain and N.
Europe, is cited as the reference for the life expec-
tancy of common UKI tree species.

**Maintenance** in Table 3 is intended to imply a
broader range of potential expenditure on tree
species than the guide’s Table 4.2 reference to
pruning Nonetheless, Gilman (2002) an illustrated
guide to pruning is cited here, for its comprehen-
sive list of species’ pruning requirements.

**Pest and disease susceptibility**

This sub-factor is ranged in Table 3 from those
species only prone to cosmetic disorders to those
prone to fatal diseases. Since susceptibilities may
overlap, each stratum is prefixed with a “+” sign
and the appraiser should select the most signifi-
cant. This choice need not mean the worst case
scenario and some selectivity will be required, in
the case of trees that are very susceptible to cos-
metic disorders and mildly susceptible to other
conditions. The choice of reference here is
Strouts & Winter (1994) Diagnosis of ill-Health in
trees. Table IV within this reference lists: Pro-
blems of ill health characteristic of some common
amenity trees.

**Figure 8:**
High maintenance
requirements; e.g
for *Tilia cordata*
Greenspire (right)
with its acute
branch angles and
pest & disease
susceptibility; e.g.
_Aesculus_ species
(left) and bleeding
canker will affect
that genetic poten-
tial.
Condition factor (CTLA)  
physical deterioration (RICS)

The guide lists a series of tree conditions that may be taken into consideration to arrive at a Condition rating, equivalent to RICS Physical Deterioration. Alternatively, where defects are curable, the cost of repair can be deducted as a cash item. In the light of regional developments such as Safe Useful Life Expectancy (SULE) (Barrell 1995), which promote a less defect-led approach to tree condition assessment, this supplement departs slightly from the guide’s aggregate approach, taking a more global one to condition, in terms of remaining life expectancy (where repairs are not practical). This choice also reflects a RICS preference for assessing physical deterioration in terms of Asset Life: the depreciation that will affect an asset when compared with its modern equivalent will depend on its anticipated remaining life. An asset that is expected to have a remaining life of twenty years will be worth a higher percentage of a new replacement than one with an expected life of five years. SULE is cited as the reference for segregating remaining life expectancy scores. SULE assesses wider locational factors than basic life expectancy (or asset life), but its time lines now also inform the definition of Tree Quality Categories in BS5837: 2005 Trees in relation to construction. Thus, UKI appraisers are familiar with its application. On account of its familiarity, the range of time lines used in BS5837 are employed here, but with the qualifications described overleaf.
The Table 3 Condition rating based on remaining asset life adopts the same timelines as Safe Useful Life Expectancy (SULE) or ‘Service Life’ in appraisal terms (see RICS quotation opposite), but is not identical to it. The Condition rating is simply and assessment of the remaining life-span of the asset, independent of its location. SULE considers the relevance of a tree’s location to its condition.

In Table 3 above, the global process of depreciation (Species x Condition x Location) also considers the relevance of a tree’s location, but the two factors are considered under separate headings. The functional obsolescence of a tree’s service life (the “U” in SULE) is best considered under Location below and should therefore, not be duplicated here, under Condition. This distinction is in keeping with both RICS guidance and now, Quantified Tree Risk Assessment methods, where the Probability of Failure of a tree defect and the Target Range of its location are considered as separate (though related) factors. The guide’s partition of Condition and Location makes the same conceptual distinctions between inter-related factors.

Thus, whilst mechanical damage or root decay and associated crown dieback may have a direct impact on Condition, the managerial implications of deadwood are affected principally, by Location: where the tree may or may not be removed preemptively. Asset life need not necessarily stop with biological life, depending on the valuation exercise. If standing deadwood provides an ecological function that is to be valued, then the asset life becomes the period over which the deadwood remains standing. An asset or in this instance, a tree does not have to be biologically alive to have an economic life or use. Generally though, biological life will be implied by this factor.

‘The life of the asset, and the pattern of depreciation over that life, determined by the valuer as part of a DRC valuation is not necessarily based on the same criteria as the estimate of the ‘useful life’ or ‘future useful economic life’ or, in the public sector ‘service delivery life-span’, and attendant depreciation that has to be determined by the entity for depreciation accounting. These two tasks are not to be confused.’

(RICS 2006)
Location factor (CTLA)
functional obsolescence (RICS)

This factor relates to Functional Obsolescence in the RICS Red Book - a measure of an asset's Comparative Efficiency and Functionality. Location is divided into 3 sub-factors in the guide: Site Rating, Contribution and Placement.

Site Rating

Site Rating is considered in the guide in terms of real estate value and its associated effect on tree value. The effect of trees as a percentage influencing property prices is well established by published US references such as Laverne & Geideman (2003) [http://www.utilityarborist.org/historical_articles.htm]. Supporting research is also emerging in the UK: the amenity value of woodlands was assessed by Willis & Garrad (1993) [http://www.charteredforesters.org/intro.html]. Does money grow on trees? (CABE Space, 2005) [http://www.cabe.org.uk/search.aspx?type=0] showed how well planned and managed parks, gardens and squares can have a positive impact on the value of nearby properties and can attract inward investment and people to an area. If trees can affect property value by a nominal percentage, then the associated value of trees can be affected by the specific value of the property on which they stand. In the absence of any UKI reference, the guide 7th Ed is cited here for its Table 8: Determining location values.

Figure 11: Trees and property can confer mutually supporting value to each other.
The distinction between Contribution and Placement in the guide is understandably somewhat fluid, since the two sub-factors are highly complementary. Combined, they encompass a tree’s efficient fulfillment of any given, functional role. The two terms are unraveled slightly differently here to in the guide, into quantitative (Contribution) and qualitative (Placement) roles. Thus, Contribution relates more to Comparative Efficiency than Comparative Functionality in the RICS Red Book. A quantitative role for Contribution suits the guide’s description of ‘plant size, shape, branch structure, foliage density, and distribution.’

Arguably, these attributes are partly qualitative, but Flannigan (2006) showed that UKI public perceptions of tree form were largely quantitative, not qualitative. The Planning Inspectorate (Burley P, 2007 pers. comm) also places more emphasis on wider landscape values than arboricultural perfection.

NB the objective is not to define elusive plant qualities (which are replicated by replacing the tree) but to make deductions for all relevant forms of obsolescence and optimisation. In conventional forestry, form characteristics are subject to stand density and canopy position. Such concepts of population dynamics were first applied to urban forestry by Coder (1995) and are illustrated in Fig 12; only a given amount of leaf area can be maintained on a site, providing a similar contribution of benefits.
Contribution (contd.)

frequency and dominance

Stand density and canopy position are applied within Table 3 as frequency and dominance, giving them a more arboricultural nomenclature, relevant to BS5837: 2005 and Helliwell (2003). Research supports the influence of frequency and dominance on value: Payne (1973) showed that a 7% premium on domestic property value was dependent on there being < 30 trees on a “lot” and Laverne & Geideman (2003) concluded that density of screening affected rental rates.

In the guide, frequency is considered under Placement, but a tree may be well-placed and still contribute little from within dense woodland: it functions well, but delivers its benefits less efficiently than a free-grown tree. Formal collective features are considered under Placement below. Dominance is also considered under Contribution, and is more directly related to frequency in terms of efficiency of benefits delivery than to functional placement. A dominant tree will normally deliver more benefits than a subdominant one unless it is poorly placed. Thus, dominance or canopy placement is distinct from site placement and related to frequency: a dominant tree in a woodland will have its benefits modified but for a poorly placed tree dominance will be a negative value. As these 2 factors are inter-related, they are multiplied in Table 3. Helliwell (2003) is cited as a reference for distinguishing frequencies of trees and Hart (1991) for distinguishing canopy classes.
Placement qualifies contribution, by assessing the suitability of a tree to perform a given functional role within its setting. Contribution can obviously be negative or less than optimal (obscuring a view, shading an amenity, interfering with infrastructure). Similarly, individual placement within a formal feature, such as an avenue, may qualify an otherwise collective contribution. A well-placed tree is more likely to achieve its full species potential/fulfil its functional role and develop healthily. Similarly, a veteran tree is more likely to live out its senescence in a remote placement and is likely to have a longer service life or SULE. Poorly-placed trees are more likely to be removed than to achieve dominance but will have a greater negative impact if they do. Thus Placement relates more to Comparative Functionality than Efficiency in the RICS Red Book and takes on board the process of Optimisation. UKI arboriculturalists may be familiar with this factor of appraisal through BS5837: 2005 Table 1: Cascade chart for tree quality assessment. Although the appraisal in hand may consider much wider functional roles than suitability for retention through land development, the table is cited here as the principal reference, because of both its familiarity and its initial engagement with these factors of location. Placement may also have a distinctly subjective flavour in terms of “value to whom?” An evergreen shelterbelt may be perfectly placed for a cattle farmer but undesirably so for local residents of a beauty spot. Placement may be affected by wider statutory rights, such as the Town and Country Planning, Anti-social Behaviour or Electricity Acts, which may alternately prevent or require the pruning of a landowner’s trees. Gruffydd B (1994) is cited as a useful reference for spacing in assessing a tree’s ability to achieve full species potential in a given position.
REFERENCES


Gilman, E.F., (2002). An illustrated guide to pruning, ISA Illinois USA


North Somerset District Council requested an amenity valuation of 5 semi-mature street trees (3 alders and 2 sycamores) growing in pavement outside the council offices. The trees were implicated in surface disruption damage to the pavement and the highway engineers wanted them felled.

The Tree Officer, John Flannigan, requested the CTLA valuation to compare the costs of pavement repair with the value of the trees being retained. Identically sized nursery stock were not available for either species, so a Trunk Formula Method appraisal was used.

Identically sized nursery stock were not available for either species, so a Trunk Formula Method appraisal was used.

The median plant cost for 30-35cm girth stock, applied to sycamore = £400 +VAT.

Plant costs were available from 3 UK semi-mature tree nurseries for 30-35cm girth Italian alder stock shown in Table 1. Therein, the median plant cost for 30-35cm girth alder = £250 +VAT.

Plant costs for semi-mature sycamores were unavailable, and the UKI-RPAC’s median plant costs were used instead.
Table 2a: Trunk Formula Calculation for Italian Alder (*Alnus cordata*)

**Trunk Formula Method Worksheet**

Guide for Plant Appraisal, 9th Edition (modified from p.74)

Appraised Value = (Basic Tree Cost x Species% x Condition% x Location%)

<table>
<thead>
<tr>
<th>Case/Location</th>
<th>Appraiser</th>
<th>Date</th>
</tr>
</thead>
</table>

**A) Field Observations**

1. Species: *Alnus cordata*  
2. Condition rating = 75%
3. Trunk Circumference 38 in/cm or Diameter 38 in/cm
4. Location% = [Site __% + Contribution___% + Placement___%] / 3  
   (Or use form of calculation at 4a if directed by UKI-RPAC Guidance)
4a. Location% = [Site 90% x Contribution 90% x Placement 75%]  
   = 61%

**B) RPAC or Appraiser Developed-Modified Information**

5. Species rating = 82%
6. Replacement Tree Size: 
   (diameter) 10.4 in/cm or (trunk area) 72.3 in²/cm² = $TAR$
7. Replacement Tree Cost: Wholesale or Retail RPAC Cost £250 OR 
   Mean or Median of Source 1 ______ Source 2 ______ Source 3 ______  
   = £250
8. Installation Cost (actual amount OR markup #7 by ______ x)  
   = £501
9. Installed Tree Cost 
   (#7 Replacement Tree Cost ______ + #8 Installation Cost_______)  
   = £751
10. Unit Tree Cost 
    (#7 Wholesale or Retail Replacement Tree Cost ______ / #6 $TAR_____ OR 
    (#9 Installed Tree Cost ______ / #6 $TAR_____)  
    = £10.38

**C) Calculations by Appraiser Using A and/or B**

11. Appraised Trunk Area = $TA_A$  OR  Adjusted Trunk Area = $ATA_A$ in² or cm² 
    Tables 4.4-4.7
    If #3 circumference > 94in or 241cm, #3 $c^2$ ____ x 0.080, 
    or if diameter > 30in or 75cm #3 $d^2$ ____ x 0.785  
    = 1133.54
12. Appraised Tree Trunk Increase = $TA_{INC}$  
    (#11 $TA_A$ or $ATA_A$ in²/cm² less # 6 $TAR$ in²/cm²)  
    = 1061.2
13. Basic Tree Cost  
    (#12 $TA_{INC}$ X #10 Unit Tree Cost + #9 Installed Tree Cost)  
    = £11763.05
14. Appraised Value  
    #13 Basic Tree Cost 11763.05 x #5 Species 82% x #2 Condition 75% x #4 Location 61%  
    = £4412.91
15. Round #14 as appropriate for the currency.
16. Appraised value = say, 
17. Additional Damages (e.g. Removal & Cleanup Cost)
Table 2b: INSTALLED TREE COST CALCULATOR

<table>
<thead>
<tr>
<th>Size Girth cm</th>
<th>Replacement Tree Cost £</th>
<th>Delivery Cost £</th>
<th>Planting Cost £</th>
<th>Warranty Cost £</th>
<th>Irrigation Cost £</th>
<th>Installation Cost £</th>
<th>Installed Cost £</th>
<th>Trunk Radius Cm</th>
<th>Trunk Area Cm ²</th>
<th>Unit Cost £/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35</td>
<td>250</td>
<td>70</td>
<td>125</td>
<td>156</td>
<td>150</td>
<td>501</td>
<td>751</td>
<td>5.2</td>
<td>72.3</td>
<td>10.38</td>
</tr>
</tbody>
</table>

Table 2b establishes the unit costs per cm² trunk area of full tree installation for alder to include delivery, planting, irrigation and warranty costs, as used in the Table 2a TFM worksheet above. The pursuant Tables 2b-2d are by way of a more graphical and step-by-step explanation of those calculations in the above worksheet. Table 2d in particular, presents the depreciation process in a plan view that relates more visually to Table 3 Depreciation Plan within this supplement (p17).

The costs employed here are based on standard industry norms documented by UKI-RPAC in its supplementary guidance:

- Delivery assumes 100 mile round trip at £0.70p/mile up to 25-30cmg, £1.15/m from 30-35cmg and £5.00/m for stock above 50-60cmg.
- Planting includes machine hire, support systems and sundries and is set at 50% of supply cost.
- Irrigation is by hand and assumes 20 visits in year one and 10 in year 2 at £5 per visit (by non-specialist owner/gardener/DSO).
- Warranty includes 2-6 annual maintenance visits and is set at 20% and 15% of plant, delivery and planting cost for year 1 and 2 respectively.
- Trunk radius is calculated from the minimum value of each band to accommodate any girth variation between appraised tree and nursery stock.

Thus the total installed cost is £751 + VAT which equates to a unit cost of £10.38/cm².

Table 2c: APPRAISED TREE (AT) TRUNK AREA INCREASE (TAI) & BASIC TREE COST CALCULATOR

<table>
<thead>
<tr>
<th>AT Diameter (cm)</th>
<th>AT Radius (cm)</th>
<th>AT Trunk Area (cm²)</th>
<th>Installed Tree Area (cm²)</th>
<th>AT TAI (cm²)</th>
<th>Unit Tree Cost (£/cm²)</th>
<th>AT TAI Cost (£)</th>
<th>Installed Tree Cost (£)</th>
<th>Basic tree cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>19</td>
<td>1133.54</td>
<td>72.3</td>
<td>1061.2</td>
<td>10.38</td>
<td>11012.30</td>
<td>751</td>
<td>11763.05</td>
</tr>
</tbody>
</table>

Table 2c calculates the total installed costs of the appraised alder tree, known as the Basic Tree Cost. It is “basic” because it has yet to be depreciated. Rather than simply multiplying the area of the appraised tree by the unit installed costs, it adds the actual cost of an installed 30-35cm-girth replacement (Installed Tree) to the computed costs of installing the difference in trunk area between the installed tree (30-35cmg) and the appraised tree (38 cm stem diameter). The intention is to maintain as much of the “real” inputs as possible throughout the calculation.

Thus the Basic Tree Cost for the alder is £11763.05 + VAT.
### Table 2d: Italian alder (Alnus cordata) depreciation

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>DRC CALCULATOR</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental/Soil Adaptability</td>
<td>Environmental/Soil Adaptability</td>
<td>Very Suitable</td>
</tr>
<tr>
<td>Growth Characteristics</td>
<td>Size</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Longevity</td>
<td>Short</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>Low</td>
</tr>
<tr>
<td>Pest &amp; Disease Susceptibility</td>
<td>Pest &amp; Disease Susceptibility</td>
<td>Prone to cosmetic disorders</td>
</tr>
<tr>
<td><strong>CONDITION</strong></td>
<td>Remaining Life Expectancy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remaining Life Expectancy</td>
<td>75</td>
</tr>
<tr>
<td><strong>LOCATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Rating</td>
<td>Site Rating</td>
<td>90</td>
</tr>
<tr>
<td>Contribution</td>
<td>Frequency</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Dominance</td>
<td>90</td>
</tr>
<tr>
<td>Placement</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Basic Tree Cost</td>
<td></td>
<td>£11,763.05</td>
</tr>
<tr>
<td>Total Depreciation</td>
<td></td>
<td>62.48%</td>
</tr>
<tr>
<td>Depreciated Replacement Cost</td>
<td></td>
<td>£4,412.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>£4,412.91</td>
</tr>
</tbody>
</table>

Site notes:

- The species is well suited to the sandy soils, but less to a maritime environment. The site is sheltered from sea breezes.
- It is of modest final size (100m²)
- It is short lived (50-70yrs)
- It has very little maintenance requirements.
- It is not prone to the same Phytophthora disorders as common alder.
- The trees have reached early maturity
- They are in good condition with a current life expectancy of 20-40 yrs.
- They are planted at a prominent municipal site.
- Their contribution is singular with no other trees in the area.
- The crowns are dominant/free grown.
- The trees are suitable placed to fulfil their functional role, with only minor canopy encroachment of the adjacent building.

Table 2d above provides scores for the alders on the depreciation factors outlined in Table 4 in the main text of this supplement. At the bottom of the table, it applies these percentage scores to the installed cost to calculate the DRC value of the trees.

Thus, the total Depreciated Replacement Cost of the alder tree is £4,412.91 + VAT.
**Table 3a: Trunk Formula Calculation for Sycamore (Acer pseudoplatanus)**

**Trunk Formula Method Worksheet**  
Guide for Plant Appraisal, 9th Edition (modified from p.74)

**Appraised Value = (Basic Tree Cost x Species% x Condition% x Location%)**

<table>
<thead>
<tr>
<th>Case/Location</th>
<th>Appraiser</th>
<th>Date</th>
</tr>
</thead>
</table>

**A) Field Observations**

1. **Species:** *Acer pseudoplatanus*
   
2. **Condition rating:** 90%  
   
3. **Trunk Circumference:** in/cm or Diameter: 35 in/cm  
   
4. **Location% = [Site___% + Contribution___% + Placement___%] / 3**  
   
   (Or use form of calculation at 4a if directed by UKI-RPAC Guidance)

   4a. **Location% = [Site 90% x Contribution 100% x Placement 50%] = 45%**

**B) RPAC or Appraiser Developed-Modified Information**

5. **Species rating:** 94%  
   
6. **Replacement Tree Size:**  
   
   (diameter) 10.4 in/cm  
   
   (trunk area) 72.3 in²/cm² = TA_R

7. **Replacement Tree Cost:** Wholesale or Retail RPAC Cost £400 OR  
   
   Mean or Median of Source 1_____ Source 2_____ Source 3_____ = £400  
   
8. **Installation Cost (actual amount OR markup #7 by ______ x):**  
   
   = £655

9. **Installed Tree Cost**  
   
   (#7 Replacement Tree Cost _____ / #6 TA_R____) OR  
   
   (#9 Installed Tree Cost _____ / #6 TA_R____) = £14.58

10. **Unit Tree Cost**  
    
    (#7 Wholesale or Retail Replacement Tree Cost _____ / #6 TA_R____) OR  
    
    (#9 Installed Tree Cost _____ / #6 TA_R____) = £14016.52

11. **Appraised Trunk Area = TA_A OR Adjusted Trunk Area = ATAA  
    
    Tables 4.4-4.7  
    
    If #3 circumference > 94 in or 241 cm, #3 c²____ x 0.080,  
    
    or if diameter > 30 in or 75 cm #3 d²____ x 0.785  
    
    961.63

12. **Appraised Tree Trunk Increase = TAINCR =**  
    
    (#11 TAA or ATAA____ in²/cm² less #6 TA_R____ in²/cm²) = 889.3

13. **Basic Tree Cost =**  
    
    (#12 TAINCR X #10 Unit Tree Cost + #9 Installed Tree Cost)  
    
    £14016.52

14. **Appraised Value =**  
    
    #13 Basic Tree Cost 14016.52 x #5 Species 94% x #2 Condition 90% x #4 Location 45%  
    
    = £3336.09

15. **Round #14 as appropriate for the currency.**  
    
16. **Appraised value = say,**

17. **Additional Damages (e.g. Removal & Cleanup Cost)**
Table 3b: INSTALLED TREE COST CALCULATOR

<table>
<thead>
<tr>
<th>Size Girth cm</th>
<th>Replacement Tree Cost £</th>
<th>Delivery Cost £</th>
<th>Planting Cost £</th>
<th>Warranty Cost £</th>
<th>Irrigation Cost £</th>
<th>Installation Cost £</th>
<th>Installed Cost £</th>
<th>Trunk Radius Cm</th>
<th>Trunk Area Cm²</th>
<th>Unit Cost £/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35</td>
<td>400</td>
<td>70</td>
<td>200</td>
<td>235</td>
<td>150</td>
<td>655</td>
<td>1,055</td>
<td>4.8</td>
<td>72.3</td>
<td>14.58</td>
</tr>
</tbody>
</table>

Table 3b again uses standard UKI-RPAC unit costs for the sycamore to illustrate a total installed cost of £1055 + VAT which equates to a unit cost of £14.58/cm² + VAT.

Delivery assumes 100 mile round trip at 0.70p/mile up to 25-30cmg, £1.15/m from 30-35cmg and £5.00/m for stock above 50-60cmg. Planting includes machine hire, support systems and sundries and is set at 50% of supply cost. Irrigation is by hand and assumes 20 visits in year one and 10 in year 2 at £5 per visit (by non-specialist owner/gardener/DSO). Warranty includes 2-6 annual maintenance visits and is set at 20% and 15% of plant, delivery and planting cost for year 1 and 2 respectively. Trunk radius is calculated from the minimum value of each band to accommodate any girth variation between appraised tree and nursery stock.

Table 3c: APPRAISED TREE (AT) TRUNK AREA INCREASE (TAI) & BASIC TREE COST CALCULATOR

<table>
<thead>
<tr>
<th>AT Diameter (cm)</th>
<th>AT Radius (cm)</th>
<th>AT Trunk Area (cm²)</th>
<th>Installed Tree Area (cm²)</th>
<th>AT TAI (cm²)</th>
<th>Unit Tree Cost (£/cm²)</th>
<th>AT TAI Cost (£)</th>
<th>Installed Tree Cost (£)</th>
<th>Basic tree cost (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>17.5</td>
<td>961.625</td>
<td>72.3</td>
<td>889.3</td>
<td>14.58</td>
<td>12962.02</td>
<td>1055</td>
<td>14016.52</td>
</tr>
</tbody>
</table>

Table 3c calculates the same Basic Tree Costs for the appraised sycamore tree. Thus the Basic Tree Cost for the sycamore is £14,016.52 + VAT.
Table 3d: Sycamore (*Acer pseudoplatanus*) depreciation

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>SPECIES</th>
<th>Growth Characteristics</th>
<th>Pest &amp; Disease Susceptibility</th>
<th>CONDITION</th>
<th>LOCATION</th>
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<td>Prone to cosmetic disorders</td>
<td>Remaining Life Expectancy</td>
<td>Site Rating</td>
</tr>
<tr>
<td>Species</td>
<td>Size</td>
<td>Medium</td>
<td></td>
<td>Remaining Life Expectancy</td>
<td>Site Rating</td>
</tr>
<tr>
<td></td>
<td>Longevity</td>
<td>Short</td>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td>Low</td>
<td></td>
<td>Dominance</td>
<td>Percentage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Placement</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>Basic Tree Cost</td>
<td>£14,016.52</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total Depreciation</td>
<td>61.93%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Depreciated Replacement Cost</td>
<td>£5,336.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>£5,336.09</td>
</tr>
</tbody>
</table>

Site notes:
- The species is very suited to the sandy soils
- It is of large final size (>100m²)
- It is long-live (>100 yrs)
- It has some formative pruning requirements with its decurrent habit
- It is prone to occasional/sporadic wilting diseases.
- The trees have reached early maturity
- They are in good condition with a current life expectancy >40 years.
- They are planted at a prominent municipal site.
- Their contribution is singular, with no other trees in the area.
- The crowns are dominant/free grown.
- The trees are not well placed to fulfil their functional role, with future canopy encroachment of the adjacent building.

Table 3d above provides scores for the sycamore tree.

Thus the total Depreciated Replacement Cost of the sycamore is £5,336.09 + VAT
Editors

Dr Jon Heuch
John Flannigan
Scott Cullen

Contributors

The replacement costs (both supply and installation), informing Tables 2 & 3, were determined with the assistance of some of the leading nurseries and landscape contractors

- Barcham Trees,
- Bellwood Trees
- Civic Trees,
- Hilliers Nurseries,
- Majestic Trees,
- Nature First,
- Practicality Brown
- Tendercare Nurseries

CAS continues to sponsor CTLA training seminars at
http://www.consultingarboristsociety.co.uk

UKI-RPAC welcomes professional input from the field and can be contacted at:
http://lists.tree-care.info/wws