

Partnership Sheffield Street Tree Working Strategy

*Promoting & enhancing a network of
street trees that Sheffield can be proud
of*

March 2020

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Foreword

We set out to develop an exemplary Partnership Street Tree Strategy for Sheffield that values street trees for the benefits they bring to people, the city and the wider environment.

And we believe this Working Strategy is just that. As a group we wanted to produce something positive and visionary - for the city to collectively view street trees as an asset, helping us to improve air quality, reduce flood risk, support wildlife and store carbon.

This strategy aims to learn from the past in order to deliver our vision for the future of Sheffield's street trees.

In developing this strategy we have recognised that a partnership approach to positively, actively and sustainably managing our street trees, both now and in the long-term, means we are more likely to achieve our ambitions. Sharing time, expertise and resources means we can deliver so much more.

And of course, our street trees are just a part of all the city's trees and woodlands and so we have tried to ensure that this strategy is a supplement to Sheffield City Council's Trees & Woodlands Strategy.

We have also collated and commissioned baseline data so that progress towards our ambitions can be measured and are transparent. For more details about some of the baseline data please also refer to our 'Sheffield Street Tree Inventory Report'.

This Strategy needs the support and involvement of many more people and organisations than those on our Development Group. And so we are launching this document as a Working Strategy. Over the coming year we will be seeking your views, comments and commitment to the proposals set out here. When the wider community has had the opportunity to say what they think, the future Partnership Delivery Group will review the comments at the end of the year and finalise the Strategy. The partners on the strategy development group have committed to their individual actions as set out under each of the six outcomes.

And so now it is over to you. Please tell us what you think and if you can help deliver any of the actions. We will shortly be sending out a questionnaire to interested groups and an online survey. So please do take part and find out how you can get involved.

On a personal note, I would like to thank the organisations and individuals involved in the development of this strategy for their commitment, passion, knowledge and expertise, without which my job would have been much harder.

Liz Ballard

Chair, Partnership Sheffield Street Tree Strategy Development Group

Introduction

Why street trees are important

Sheffield's trees and woodlands are one of the city's greatest natural assets and contribute to its reputation as one of the greenest cities in the UK. They provide benefits for the people of Sheffield, as well as making urban areas and local neighbourhoods attractive and healthy places to live and work. Trees are a valuable asset with strong and growing evidence that exposure to them increases physical and mental health benefits¹, as well as supporting the ecology and biodiversity of the city.

Street trees are a crucial part of the city's urban forest and provide numerous benefits including shade and shelter, introducing nature to otherwise barren areas, helping to clean the air and reduce the risk of flooding. Street trees form an important and much loved part of the city's tree stock that we want to improve, maintain and sustain for future generations to enjoy.

Opportunities & Challenges of managing street trees

Street trees live a tough life and they need to be able to cope with drought, compacted soils, road salt and traffic pollution. The choice of street tree species needs to be appropriate for them to thrive in their environment, close to houses, roads and people. Sheffield already benefits from a relatively high diversity of street tree species with 187 identified. This strategy addresses how we continue to increase street tree diversity to help increase the overall resilience of the street tree stock. In addition, we need to identify trees that can grow to reach an optimum canopy size to contribute the most benefits to the surrounding urban communities.

Street trees are managed somewhat differently from woodland trees. Their value needs to be balanced against the reality that they need to be managed for safety. For example, street trees that are diseased or dying need to be removed if they create a hazard for people, property and other street infrastructure.

In Sheffield, the Council acts as the local highway authority. Its duty to maintain the city's highways is delivered through the Streets Ahead citywide highways maintenance contract between the Council and Amey. The Council needs to make sure that the city's roads and pavements are safe and accessible for all members of the public, and that people and property are protected from the dangers of any hazards on the roads or pavements. Street tree management and maintenance form part of the routine programme of the highway maintenance work alongside gritting and snow clearance, street sweeping and litter collection, gully cleaning and grass cutting.

¹ Astell-Burt, T. & Feng, X. (2019) Association of urban green space with mental health and general health among adults in Australia. *JAMA Network Open*. 2019;2(7):e198209.

doi:10.1001/jamanetworkopen.2019.8209

Rouquette, J.R. and Holt, A.R. (2017). The benefits to people of trees outside woods (TOWs). Report for the Woodland Trust. Natural Capital Solutions.

O'Brien, L., Williams, K. & Stewart, A. (2010) Urban health and health inequalities and the role of urban forestry in Britain: A review. Forest Research.

Van den Berg, A.E., Koole S.L., and van der Wulp N.Y. 2003. Environmental preferences and restoration: (how) are they related? *Journal of Environmental Psychology* 23, 135-146.

Amey Streets Ahead has contractual responsibility for all trees located within the boundary of the Sheffield adopted highway network. This is a 'wall to wall', all-encompassing responsibility for trees on the highway, whether they are the formally designed planting schemes in the City Centre, the Victorian tree lined suburbs or on one of the many rural roads that lie within the Peak District National Park. Any tree within the highway is managed by and is the responsibility of Amey for the length of the Streets Ahead contract. In addition, Amey have responsibility for trees on Other Designated Land (ODL) but only from a safety perspective.

When the Streets Ahead contract commenced in August 2012, Amey began plotting and inspecting Sheffield's highway trees. This was the first systematic inspection of the highway tree estate since a survey in 2006-07 which had recorded 35,038 individual highway trees. It was known that this was not exhaustive; there were many trees in shelterbelts, cluster and woodlands which were not recorded and it seems that in time '36,000' trees became a shorthand for the highway tree stock as a whole.

The highway network itself is subject to continual change. Roads are added, removed or subject to change through design; trees have died, fallen, been removed and replaced, and additional planting has added trees in some areas.

Therefore, at the time of writing (December 2019) there are 35,259 individual street trees on the highway network for which Amey Streets Ahead has responsibility. This excludes any woodland, tree clusters or trees along the rural network, which whilst not plotted are all the responsibility of Amey until contract conclusion in 2037.

Why is there a need for a new Street Tree Strategy?

At the start of the Streets Ahead contract in 2012, a five year tree management strategy was produced setting out Amey's approach to delivering the street tree management element of the highway maintenance service. This document was published, reviewed each year and updated accordingly. The last five year tree management strategy published was for 2018-2023. No further updates of this document have been published while the new approach to street tree management has been in discussion and development with partners.

Over the last seven years there has been high profile public interest in Sheffield's street trees. A number of the city's residents formed local action groups to protest against the approach to felling and replacing street trees as part of the Streets Ahead contract.

In 2018, Amey, Sheffield City Council and Sheffield Tree Action Groups (STAG) came together through a series of mediated talks to explore and understand the different positions and find a way forward. This started to rebuild trust and confidence and provided a new starting point for the next phase of work. As a result of these talks, a Joint Position Statement was agreed and published in December 2018².

² <https://www.sheffield.gov.uk/content/dam/sheffield/docs/roads-and-pavements/managingtrees/Joint%20position%20statement%20SCC,%20Amey%20&%20STAG%20updated.pdf>

Work began in January 2019 on an approach to retain more street trees and stagger the replacement of others. This was made possible through the efforts of the street tree campaigners, the response by Amey to fund additional works outside the contract, and the Council temporarily suspending some specific elements of the contract without affecting the long term aims of Streets Ahead. Joint inspection work involving Amey, STAG representatives and the Council was carried out during the summer of 2019. A review of lessons learned³ from the early joint inspections was published in December 2019 and this shaped the inspections that restarted in January 2020.

The approach set out in this strategy is rooted in retaining street trees where possible by using a flexible combination of highway engineering solutions, enhanced monitoring and maintenance of street trees, appropriate species selection, and decisions on the removal and replacement of trees made on a case-by-case basis. This should enable street trees to be safely retained for longer while still delivering the long-term benefits from the investment in the city's highway network.

Partnership approach to developing the Sheffield Street Tree Working Strategy

This Sheffield Street Tree Strategy has been developed through true partnership, discussion and dialogue. It is based on a review of current street tree management practices and an independent assessment of Sheffield's street trees in terms of the benefits, or 'ecosystem services', that these trees provide to people living in urban areas. It supplements the Sheffield Trees and Woodlands Strategy 2018-2033 published in December 2018⁴.

A partnership group to develop the new street tree strategy was established in August 2019. The terms of reference for the group are attached as [Appendix 1](#). Membership of the group includes representatives from Amey, Sheffield City Council, STAG, The Woodland Trust, tree valuation experts, and a tree officer from a neighbouring local authority. The group is chaired independently by the Chief Executive of Sheffield and Rotherham Wildlife Trust.

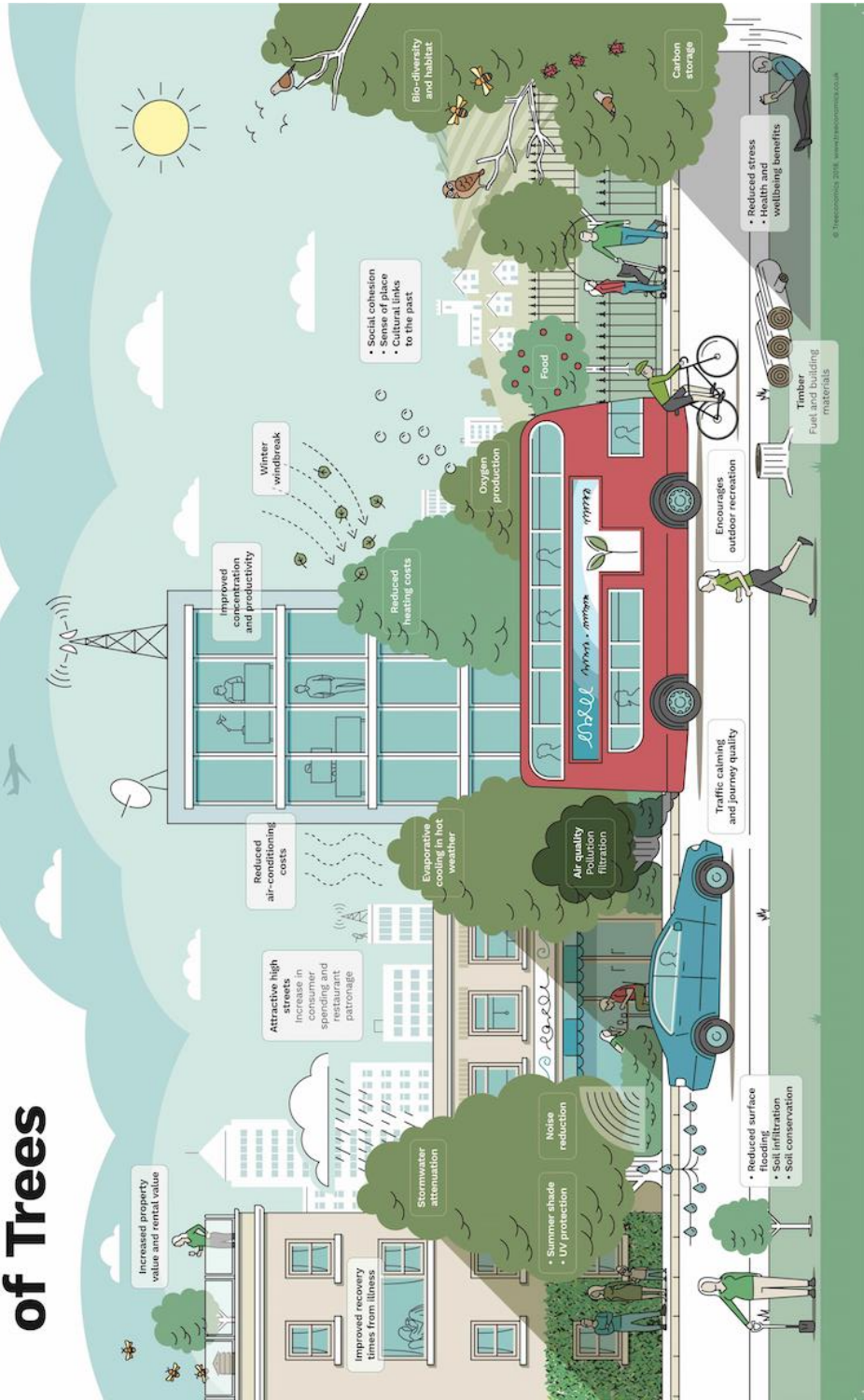
The group has developed the high level vision and outcomes for the management of Sheffield's street trees as well as considering the value of street trees, the decision process for street tree management and species selection, and community involvement.

The Partnership Sheffield Street Tree Strategy recommends a number of actions to achieve each of the high-level outcomes as well as a proposal for an ongoing Sheffield Street Tree Partnership to drive delivery of these actions and keep the strategy under review.

³ <https://www.sheffield.gov.uk/content/dam/sheffield/docs/roads-and-pavements/managingtrees/Review%20of%20Tree%20Investigations%20Lessons%20Learned%20and%20Actions.pdf>

⁴ <https://www.sheffield.gov.uk/content/dam/sheffield/docs/parks-sports-and-recreation/trees-woodlands/Sheffield%20Trees%20and%20Woodlands%20Strategy%202018-2033.pdf>

The Benefits of Trees



Sheffield Street Tree Strategy Vision

We want to see a network of street trees that Sheffield can be proud of: well-maintained and cared for; resistant to the threats of disease and climate change; and delivering many benefits for people and our environment. These benefits include:

- Supporting our wildlife
- Enhancing our city
- Cleaning the air that we breathe
- Improving our health and wellbeing
- Reduce our carbon emissions
- Helping combat the effects of climate change such as flash floods and rising temperatures.

In support of the Sheffield City Council Trees & Woodlands Strategy 2018-2033, we will promote and enhance Sheffield's street trees and their long-term benefits for the public, wildlife and the wider environment by:

1. Sustainably and carefully managing our street trees in accordance with best practice.
2. Ensuring our street trees are more resilient through the type and age of trees we plant and also how we manage the current street tree stock.
3. Increasing the value and benefits that flow from our street trees.
4. Contributing to a more equal distribution of urban forest across the city to promote health & wellbeing.
5. Increasing street tree canopy cover.
6. Involving the wider community in caring for and valuing street trees.

In the following sections each of the above six bullet points is developed further into an Outcome – the impact we want to see in the future. Each Outcome has measures so that we know what our starting point, or baseline, is as well as our longer term aim. There are action tables to help us move towards our Outcome.

In some Outcome sections, the action tables have both development actions and delivery actions. The development actions are areas that the Strategy Development Group were unable to fully complete in the timescale for producing the Working Strategy and still need to be taken forward in order to establish a baseline. Delivery actions are those that the group recommend in order to implement the strategy and achieve the Outcomes.

Outcomes, Measures, Actions & Resources

Outcome 1:

Our street trees are sustainably and carefully managed in accordance with best practice

We want to ensure that our street trees are looked after as valuable assets for the city. As part of this approach to management, we focused on the need for transparency in decision making and community consultation in the process. This allows local people the opportunity to understand and if necessary challenge a tree management decision through a clear and open process.

In relation to tree management, Amey currently work to industry standards and contract requirements as summarised in [Appendix 9](#). However, there is no independent assessment of compliance to this standard. There is also no requirement to undertake any stakeholder consultation. Both of these issues mean there is a lack of transparency about how our street trees are being managed that can lead to conflict and misunderstanding on all sides.

We agreed that independent accreditation would be a good step forward in ensuring transparency and quality of tree management. There are a number of schemes we are exploring including developing and accreditation scheme that is bespoke for Sheffield and the 'Trees Outside Forests'⁵ international independent certification scheme under development by the Programme for Endorsement of Forest Certification (PEFC)⁶.

How will we know our street trees are sustainably and carefully managed in accordance with best practice?

The management of Sheffield's Street Trees will meet best practice when independently assessed against internationally recognised criteria.

Baseline Figures

We do not currently have baseline to work from until the first independent assessment has taken place.

So what are we going to do?

Development Actions	Why is this going to help?	Who	By When	Resources
Work towards developing an independent accreditation of street trees	Offers a structured approach to assessing compliance with best practice verified by an independent third party.	PEFC STAG Amey SCC		Annual fee estimated <£500 (SCC)

⁵ <https://www.pefc.org/what-we-do/our-collective-impact/our-projects/exploring-certification-solutions-for-trees-outside-forests>

⁶ <http://ukwas.org.uk/>

Delivery Actions				
Promote and have oversight of the city's approach to street tree management Please refer to Appendix 5 for Guidance for the management of Sheffield's street trees	Provides transparency about what the Council and Amey will and won't do when managing trees.	SCC, Amey, STAGs, SRWT, WdT, other partners	May 2020	
Review, refine & publish decision making process for managing Sheffield's street trees Please refer to Appendix 5 for Guidance for the management of Sheffield's street trees	Provides transparency of the decision making process adopted by the Council and Amey for the management of street trees	SCC, Amey	May 2020	
Updated contract methods statements & management documents	To ensure Streets Ahead practice is in line with the working strategy	Amey	Latter part of 2020	

Outcome 2:

Our street trees are more resilient through the type and age of trees we plant and how we manage the current street tree stock

If we want our street trees to be more resilient to climate change, threats from pests and diseases etc then we need:

- Existing trees to be in the best possible condition.
- A good age profile of trees across all the street tree stock including leaving deadwood for its biodiversity value where safe to do so.
- Diversity of tree species, including species that can thrive in future climates.

We agreed that we must work towards the protection and retention of the existing tree stock we have alongside additional planting to improve the age profile and diversity.

How will we know our street trees are more resilient?

There will be an increasing trend over 5 year intervals in:

- Tree condition scores moving increasingly up the scale from poor to fair to good.
- Tree valuation scores (quality) moving increasingly from low to moderate to high quality.
- Improving tree age profile (yet to be defined)

Diversity of tree types moving towards a profile of 10% 20% 30%⁷ by:

- Reducing the reliance on Rosacea family down from 38% to below 30%
- Maintaining the current profile of <20% of any single genera
- Reducing the reliance on species choices from *Acer pseudoplatanus* (11%), *Tilia europaea* (9%) whilst managing the reduction in *Fraxinus excelsior* (7%) resulting from Ash dieback.
- Reduce the percentage of cultivars planted each year from the current level of above 70% to reflect the 10:20:30 rule

Baseline Figures

Please see further more detailed information and pie charts in [Appendix 3 Baseline Analysis of the Current Sheffield Street Tree Stock](#)

⁷ <https://pdfs.semanticscholar.org/26a2/4c5361ce6d6e618a9fa307c4a34a3169e309.pdf> A broader diversity of trees is needed in our urban landscapes to guard against the possibility of large-scale devastation by both native and introduced insect and disease pests. Urban foresters and municipal arborists should use the following guidelines for tree diversity within their areas of jurisdiction: (1) plant no more than 10% of any species, (2) no more than 20% of any genus, and (3) no more than 30% of any family. Strips or blocks of uniformity (species, cultivars, or clones of proven adaptability) should be scattered throughout the city to achieve spatial as well as biological diversity

Measure	Baseline (August 2019)
Tree condition	Good (15%), Fair (69%), Poor (7%), Senescent (0%) and n/a (8%)
Tree valuation (quality)	High CAT A (2%), Moderate CAT B (47%), Low CAT C (48%) Unable to remain CAT U (1%)
Age Classification	New (16%), Young (9%), Semi-mature (17%), Early mature (20%), Mature (38%) 62% of the tree stock are maturing trees but not yet mature
Diversity of tree type	Family: Rosacea (38%) Genera: Acer (15%), Prunus (17%), Tilia (12%) Species: <i>Acer pseudoplatanus</i> (11%), <i>Tilia europaea</i> (9%) <i>Fraxinus excelsior</i> (7%)
	Percentage cultivars planted in 2018 = 405 trees out of 559 = 72%

So what are we going to do?

Delivery Actions	Why is this going to help?	Who	By When	Resources
Annual review of all measures	So that we can monitor progress	Amey Partners	Yearly	Amey to undertake review
Cyclical tree inspection of at least once every 3-5 years – with inspection frequency increasing with worsening condition and risk to record: Age, condition, size, form, risk, presence of wildlife, special feature eg rarity, cultural value.	To monitor condition, diversity, age, quality etc and inform priorities for tree works	Amey	Ongoing	Amey to undertake inspections
Review the current age profile and consider approaches to increase resilience	To develop proposal for how to improve resilience and age diversity	Partners	2020-21	Partner time, some additional resource for analysis may be needed

Delivery Actions	Why is this going to help?	Who	By When	Resources
Through species selection process for replacements NB please refer to species selection process in Appendix 2 and indication of relative benefits provided by different tree species Appendix 7	To improve the tree species diversity over time	Amey	Ongoing	Tree Design Advisory Guide ⁸
Through species selection process for additional planting NB please refer to species selection process in Appendix 2 and indication of relative benefits provided by different tree species Appendix 7	To improve the tree species diversity over time	Amey	Ongoing	Amey time
Monitor and report the planting of cultivars on the network with the aim of minimising their use.	Cultivars lack the natural genetic diversity that can confer resistance to pathogens, e.g. small percentage of <i>Fraxinus</i> trees thought to be naturally resistant to Ash Dieback.	Amey	Ongoing	Amey time

⁸ Tree Species Selection for Green Infrastructure: A Guide for Specifiers <http://www.tdag.org.uk/species-selection-for-green-infrastructure.html>

Outcome 3:

Increase the value and benefits that flow from our street trees

As illustrated so well in the 'Benefits of Trees' image found on p7 (credit Treeconomics), our urban trees provide many benefits. As part of the strategy development, we considered all the benefits trees provide including:

- ◆ Improved air quality by removing pollutants from the air
- ◆ Storing and taking up carbon
- ◆ Reduced surface flooding
- ◆ Providing habitats for biodiversity e.g. a range of birds, insects, and other species
- ◆ Providing timber for fuel and building material
- ◆ Increased oxygen production
- ◆ Improved health and wellbeing and reduced stress
- ◆ More attractive streets and neighbourhoods
- ◆ Encouragement of outdoor recreation
- ◆ Noise reduction, summer shade and UV protection
- ◆ Food
- ◆ Increase property and rental values.

We decided to focus on the key benefits below as we felt they were particularly relevant to street trees⁹ because:

- It is well documented that street trees have a particularly important role to play in improving the visual attractiveness of a street
- Street trees have a specific and positive impact on air quality because they are so near to a major source of air pollution ie traffic fumes¹⁰
- Storm water alleviation (slowing down rain water) is critical in helping to keep the city moving in time of high rainfall and flood.

The one exception to this approach is the measure for carbon take up and storage. This is a benefit of trees, not just street trees. However, due to the climate emergency it was agreed that we should look at every opportunity to help reduce our carbon emissions.

⁹ <https://www.forestresearch.gov.uk/tools-and-resources/urban-tree-manual/>

¹⁰ Role of trees & other green infrastructure in urban air quality, Inst. of Environmental Science magazine, 2019: <https://www.the-ies.org/analysis/role-trees-other-green>
<https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/using-green-infrastructure-protect-people-air-pollution>

How will we know we are increasing the value and benefits that flow from our street trees?

There will be an increasing trend averaged over five years across the following indicators:

- a) Capital Asset Valuation of Amenity Trees (CAVAT) – please refer to the Sheffield Street Tree Strategy Development Group Report ‘i-tree eco stratified inventory report’ by Treeconomics for an explanation of CAVAT.
- b) Tonnes per year of air pollution removal (ozone, carbon monoxide, nitrogen dioxide, sulphur dioxide and particulates by street trees and financial value of this service).
- c) Tonnes per year of carbon stored and sequestered by street trees and financial value of this service.
- d) Cubic metres per year of storm water alleviation by street trees and financial value of this service.

Baseline Figures

To estimate the benefits and values that flow from Sheffield’s current stock of street trees in 2019, the Group commissioned Treeconomics to undertake an i-Tree Eco Inventory Report. This report was based on the street tree management database used by Amey.

The Sheffield street tree inventory contains 35,274 records. For each tree the data collected includes tree species, diameter at breast height (dbh), tree height, tree condition and tree location.

Of this data set, Treeconomics removed 166 records due to insufficient data for species or diameter at breast height (dbh). Therefore the analysis drew on data from 35,108 trees.

The table below presents the headline figures from the Treeconomics report, with some additional analysis (see ‘*Methodology’ below the table) by Natural Capital Solutions. The benefits of street trees are expressed as a monetary value. For more details on the data, assumptions and the process used, please refer to the Sheffield Street Tree Strategy Development Group Report ‘[i-Tree Eco stratified Inventory Report](#)’ by Treeconomics.

Ecosystem Service	Level of service provided each year (Annual physical flows)	Value of service provided each year (Annual monetary flows)	Present financial value*
Capital Asset Valuation of Amenity Trees (CAVAT)			£340,746,149
Tonnes per year of air pollution removal (ozone, carbon monoxide, nitrogen dioxide, sulphur dioxide and particulates by street trees) and financial value of this service	3.0 tonnes	£39,198	£1,175,641

Ecosystem Service	Level of service provided each year (Annual physical flows)	Value of service provided each year (Annual monetary flows)	Present financial value*
Tonnes per year of carbon sequestered (taken up) by street trees and financial value of this service	302 tonnes	£74,246	£6,049,720
Cubic metres per year of storm water alleviation by street trees and financial value of this service	10,415m	£18,039	£541,032
Total		£131,483	£7,766,393
	Natural capital stock (2019)	Total value (£2019 prices)	
Tonnes of carbon currently stored by street trees and financial value of this service	12,313 tonnes	£3,025,104	

***Methodology**

The CAVAT amenity value is calculated over 80 years, so we have estimated the present value for air pollution regulation, carbon sequestration, and storm water alleviation in 2019 prices over 80 years. This ensures that there is some comparability between these values, although it is not clear from the literature if the CAVAT value is equivalent to a present value.

The present value was calculated for the total monetary flow value across all pollutants due to time constraints. The HM Treasury Green Book (2019) discount rate of 3.5% was used, and the price was assumed constant over the 80-year period. This gives an indication of the present value. Ideally this would have been done for each pollutant individually and using the Defra air quality damage cost guidance (2019) 2% damage cost uplift per year. As a result the actual present value over 80 years is likely to be much higher.

The present value of the ability of the street trees to sequester carbon into the future was calculated by using the Government's non-traded central carbon price estimates (DBEIS 2019) (that had been used to calculate the monetary flow in 2019) for each following year for the next 80 years, and using the discount rate suggested in HM Treasury Green Book (2019) discount rate of 3.5%.

The storm water alleviation present value was also calculated over 80 years using the HM Treasury Green Book (2019) discount rate of 3.5%, and assuming a constant price.

So what are we going to do?

Delivery Actions	Why is this going to help?	Who	By When	Resources
I-Tree Eco recalculated in spring every year and reported as a 5 year moving average	So that we can monitor progress.	Amey	Yearly	Est £1,500 /year
Training of Streets Ahead staff to use species selection toolkit Please refer to Appendix 2	To ensure the toolkit is used and applied consistently	Amey	Yearly	Amey time
Undertake equivalent planting in advance of felling mature trees	So that we can continue to increase benefits even as large trees are replaced.	Amey	Ongoing	Time to find locations Cost of planting
Under plant trees with hedges in appropriate locations	To increase the amount of benefits within any given space.	Amey	Ongoing	Amey time to find locations Cost of planting
Improve the data for the 166 street tree records lacking dbh and species information and so not included in the Treeconomics analysis	Collecting more data will improve the accuracy and our understanding of the amenity value of our street trees.	Amey	2020	Amey time
Increasing the tree condition dataset for street trees from 17% by training and co-ordinating volunteers and Amey staff to undertake surveys	The baseline measure for CAVAT is an estimate. Collecting more data will improve the accuracy and our understanding of the amenity value of our street trees.	Amey Partners	Yearly	Volunteer time (tree wardens - see outcome 6 and Appendix 6) Survey co-ordination

Outcome 4:

Contribute to a more equal distribution of urban forest across the city to promote health and wellbeing

There is growing evidence to support the health and wellbeing benefits of being in close proximity to trees including reducing stress and improving the physical, mental and spiritual wellbeing of individuals and communities. Trees also have an important role to play in improving air quality. The city's street trees remove 3 tonnes of air-borne pollutants each year including fine particles¹¹ (particulate matter less than 2.5 microns also known as PM_{2.5}) which can affect a person's lungs and heart. Leaf area is an important measure for the contribution trees make to improving air quality as the larger the canopy, the greater the amount of air pollution that can be captured in the canopy of the tree.

Across Sheffield, there are disparities in the leaf area of street trees measured in each ward. Stannington has the largest leaf area at over 912,000m² followed by Firth Park with over 479,000m² and Fulwood with nearly 436,000m². East Ecclesfield, Walkley, Birley, Park & Arbourthorne and Broomhill & Sharrow Vale have the smallest leaf areas. Unsurprisingly, the total air-borne pollution removal is lower in these wards than other parts of the city with larger leaf areas.

To understand where existing or new street trees could have the most impact in terms of promoting health and wellbeing, we need to better understand the relationship between the presence of trees, in particular trees with larger leaf areas, and health outcomes of people living in different parts of the city. This could help us to pinpoint areas where it would be beneficial to maintain leaf area or to introduce new planting. The choice of species is also important as this affects the level of air-borne pollutants a tree can hold in its canopy.

How will we know we are contributing to a more equal distribution of urban forest across the city to promote health and wellbeing ?

A greater number of new trees will have been planted in areas of lower canopy cover across the city that also have poorer air quality and Indices of Multiple Deprivation (IMD) ranking (baseline 2019).

Baseline Figures

Natural Capital Solutions reviewed canopy cover against indices of multiple deprivation and air quality data across the city ([see Appendix 8](#)) and the following are the top five wards with the lowest IMD respective to low street tree canopy cover (% canopy cover is the percentage of the total network covered in that ward) and higher air pollution (PM_{2.5}):

1. Manor Castle – deprivation rank 4/28, canopy cover 4%, average PM_{2.5} 7.17 ug m⁻³
2. Darnall - deprivation rank 6/28, 3% canopy cover, average PM_{2.5} 7.99 ug m⁻³ (the highest level of pollution across all 28 wards)
3. Woodhouse - deprivation rank 1028, 4% canopy cover, average PM_{2.5} 7.62 ug m⁻³

¹¹ [i-Tree Eco Stratified Inventory Report](#), Treeconomics, November 2019

4. Richmond - deprivation rank 11/28, 4% canopy cover, average PM_{2.5} 7.35 ug m⁻³

5. Walkley - deprivation rank 13/28, 2% canopy cover, average PM_{2.5} 7.22 ug m⁻³.

Overall the trend is not necessarily that more deprived wards have the lowest canopy cover. The most deprived ward (Firth Park) has the highest canopy cover of all wards in Sheffield (19%).

Taken together it seems that the most affluent wards do have a consistently high canopy cover (see below). However, the most deprived, the above and below average wards for deprivation all have similar mean canopy covers. The areas with average deprivation having a lower canopy cover than the most deprived wards of Sheffield.

- **Most deprived wards:** mean = 6%, canopy area - 277,030m².
- **Wards with above average deprivation:** mean = 7%, canopy area - 226,396m².
- **Wards with average deprivation:** mean = 5%, canopy area 188,302 m².
- **Wards with below average deprivation:** mean = 8%, canopy area 383,893 m².
- **Affluent wards** (Ecclesall, Dore and Totley, Crookes, Fulwood): mean of 12%, canopy area - 462,333m².

Further analysis is needed.

So what are we going to do?

Delivery Actions	Why is the going to help?	Who	By When	Resources
Analyse the contribution of street trees AND other trees & woodlands across the city to further refine the main opportunities for trees to contribute to promoting health and wellbeing	To better understand the relationship between canopy cover in the city and air quality and the potential for targeted planting.	Partnership	2020-21	Partners' time, some additional resource may be needed
Target additional planting in areas of low canopy cover and higher IMD ranking, including through community funded planting - see Appendix 8	So that we can target planting where it can provide the most benefits	Amey, Partnership	Yearly	Time to find locations Cost of planting and establishment
Target additional planting in areas of high air pollution – see Appendix 8	So that we can target planting where it can provide the most benefits	Amey, Delivery Partnership	Yearly	Development action completed Cost of planting

Outcome 5:

Increase street tree canopy cover

The total tree cover in Sheffield is 18.4%, and 21.6% in the urban area¹². Street trees form a small but important part of the whole tree canopy that covers the city. Canopy cover is an indication of whether the whole biomass of our street trees is increasing over time. More tree biomass generally equates to more benefits and value flowing from our street trees. In particular, this should benefit biodiversity, providing more habitats for bats, birds, insects and other wildlife.

We recognise that there might be variations in canopy cover from one year to the next depending on particular management issues that might arise. Therefore we intend to measure canopy cover averaged over a 5-year period. Our aim is to see an increasing trend in average canopy cover over a rolling 5-year period.

How will we know we are increasing street tree canopy cover?

There will be an increasing trend in average canopy cover over a 5-yearly rolling period using the i-Tree canopy calculations.

Baseline Figures

The current street tree canopy cover as a percentage of the total road network* is 7% (1,537,954 m²)

**The total network is the area of grass, paths and roads combined.*

So what are we going to do?

Delivery Actions	Why is this going to help?	Who	By When	Resources
Calculate canopy cover annually in spring/early summer	We can extrapolate that street tree biomass is increasing over a period of years.	Amey	May/June 2021 next calculation	Amey time
See outcome 3 & 5 actions				

¹² Sheffield Trees and Woodlands Strategy 2018-2033, p9, Sheffield City Council, December 2018

Outcome 6:

The wider community is involved in caring for and valuing street trees

By involving more people, we hope to increase the resources (funds and time) available to care for our street trees. There is also an opportunity to improve our shared understanding of the benefits and challenges that come from managing street trees.

Better communication could help to ensure we work together across the city to improve our street trees and not repeat the mistakes of our past.

How will we know the wider community is involved in caring for and valuing street trees?

There will be more people actively and positively engaged with the Council, Amey and other partners to help look after and care for our street trees.

Baseline Figures

The following is not a complete list of current community engagement in tree planting and management but provides an indication of levels of activity:

- Sheffield City Council community tree scheme – Council Officers supporting tree planting projects at schools and with community projects across the city.
- STAG's involvement in tree inspections and making Amey aware of any maintenance or contract related issues, potentially exploring nurseries for local provenance.
- Sheffield & Rotherham Wildlife Trust have regular community volunteer days and conservation volunteers who helps look after trees and woodlands on their Nature Reserves and partner sites.
- Individuals and friends of groups occasionally undertake tree planting.

So what are we going to do?

Delivery Actions	Why is the going to help?	Who	By When	Resources
Establish a Sheffield Street Tree Partnership to take forward this Strategy. Please refer to the draft Terms of Reference in Appendix 4	<ol style="list-style-type: none">1. To deliver the Sheffield Street Tree Strategy2. To work in partnership to contribute and secure skills, resources and funds to deliver the strategy3. To develop and evolve the strategy over time in response to the needs of the people of Sheffield, the climate and ecological emergency	SCC, Amey, SRWT, WdT, others	May 2020	Partners' time
Promote the new process that allows	To provide additional tree planting	SCC, Amey, STAG,	March 2021 onwards	Partners time, social

Delivery Actions	Why is the going to help?	Who	By When	Resources
residents and community groups to fund additional street tree planting		SRWT, WdT, other partners		media, web pages
Develop a Tree Warden scheme (or similar) for Sheffield Please refer to Appendix 6 proposal for a Sheffield Tree Warden scheme	To provide a structured approach, as part of a national scheme, to engage local people in looking after street trees. To develop opportunities for community groups and schools to engaging in tree planting and care.	SRWT, Amey, STAG	May 2020	Support from Amey to help with co-ordination

Going Forwards

The Sheffield Street Tree Strategy Development Group set out to:

Develop an exemplary Partnership Sheffield City Street Tree Strategy that values street trees for the benefits they bring to people, the city and the wider environment.

The production of this Working Strategy, and its adoption by all partners involved in its development, is the result of the work undertaken by the group over the last 9 months. It completes this initial task.

Critically, the Working Strategy now needs the support and involvement of many more people and organisations than those on the Strategy Development Group. It also needs to be led by those partner organisations who can deliver the actions and take the Strategy forward in the longer term.

Therefore, two key next steps for this work are as follows:

1. From April 2020, establish a Sheffield Street Tree Strategy Partnership that will deliver and further develop this strategy.

The proposed Membership and Terms of reference of this new Partnership are set out in [Appendix 4](#).

2. From now until Spring 2021, the new Partnership will be seeking views, comments and commitment on the proposals set out here in order to refine and finalise this Working Strategy.

Comments on the Working Strategy will be sought through:

- Online survey
- Survey sent to interested groups
- Sheffield Tree Celebration Event and Discussion Panel (November 2020)

Comments and feedback will be collated and used by the new Sheffield Street Tree Strategy Partnership to inform, amend and finalise this Working Strategy.

Appendices

Appendix 1: Sheffield Street Tree Strategy Development Group Terms of Reference

Developing a Partnership Sheffield City Street Tree Strategy Steering Group Terms of Reference



Sheffield &
Rotherham

Through the life of the project, the Steering Group will:

- Work to the agreed scope as set out in the ***Developing Sheffield's Street Tree Strategy Project Set Up Sheet***
- Steer and guide the programme of development to ensure outputs and priorities are delivered on time as planned in the project set up
- Attend a majority of the Steering Group meetings, and deliver any agreed tasks or actions in a timely manner as requested.
- Support and assist partners in carrying out their agreed tasks
- Offer time, skills, knowledge, networks and expertise to enable the efficient and effective development and delivery of the partnership's work
- Submit any relevant information, data or evidence in a timely manner to help support the process
- Champion the Street Tree Strategy as it develops, at a local, sub-regional and regional level to ensure that maximum benefit is achieved for the people and environment of Sheffield
- Work together to resolve conflicts that may arise and to manage risks and realise opportunities
- Disclose any conflict of interest and maintain high professional standards and integrity at all times
- Raise any concerns and complaints about the process with the Chair in the first instant so as to provide an opportunity to reconcile issues within the Steering Group prior to any public statements
- Accept that when a consensus cannot be reached the Chair will make a decision that they believe to be in the best interest of the project aims
- Seek opportunities for additional funds and resources to the Strategy as it develops.

We recognise and support the role of the Chair, Liz Ballard, Sheffield and Rotherham Wildlife Trust, who will:

- Oversee the development and delivery of the Strategy
- Lead and co-ordinate the Steering Group, preparing the agenda and subjects to be worked on as set out in the scope
- Impartially and objectively direct the meetings, workshops etc, ensuring that all views are heard

- Foster consensus based decision-making amongst the Steering Group wherever possible
- Promote a professional and respectful culture
- Ensure that Group members have the appropriate expertise to contribute effectively to the Group
- Summarise and confirm key decisions and actions, clarifying with individuals any allocated key tasks and the agreed timelines for completion.
- Ensure that resources are used efficiently to further the development of the Strategy
- Ensure that any Strategy publicity is approved collectively by the Steering Group prior to release and signed off by the Chair.

Ways of Working

- Attendance, should wherever possible, be in person. It is accepted that occasionally group members may be unable to attend in person and conference call facilities will be provided where practicable.
- If the person who normally represents an organisation cannot attend, they should send their alternative in their place.
- People will be free to respectfully express their personal and organisational views during group meetings and workshops.
- Meetings may not be captured through detailed minutes but through Decision & Action Notes, Workshop papers etc. that will be circulated shortly after the meeting.
- Sharing of Steering Group papers, discussions held and the work of the group beyond the immediate individuals involved must first be agreed with the Chair.
- Group members identified by the Chair to have breached these terms of reference and ways of working will have their involvement reviewed. The Chair will be the decision-maker about continued membership of the group.

Each Steering Group Partner confirms their commitment to these Terms of Reference:

Organisation	Name	Signed
Sheffield and Rotherham Wildlife Trust (SRWT)	Liz Ballard (Chair)	
Amey	Darren Butt Brian Stock	
Sheffield City Council (SCC)	Mick Crofts Karen Ramsay	

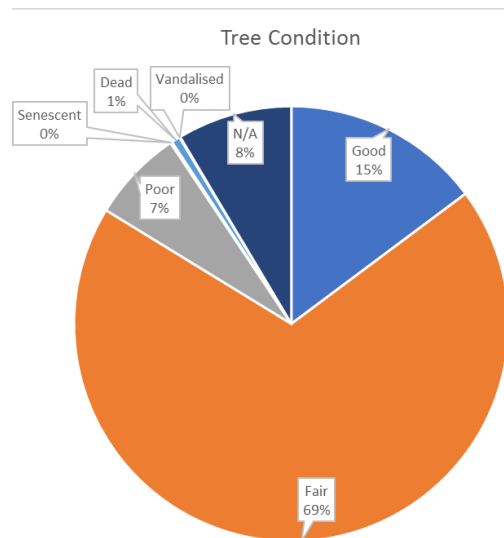
Organisation	Name	Signed
STAG	Paul Selby Deepa Shetty Christine King	
Woodland Trust	Joe Coles	
Independent Advisers	Dr Alison Holt Glen Gerner	

Appendix 2 Draft Guidance for selecting street tree species in Sheffield

- 1) Should the replacement be placed elsewhere in the city, to meet our objective of equalising canopy cover across the city? Refer back to canopy cover targets etc.
- 2) If still planting in same location, are there any constraints preventing the use of the old tree pit? For example:
 - a. Proximity to buildings, gardens, garden trees, other street trees, signs, street lights or junction sight lines
 - b. Site conditions unfavourable (exposed, windy, dry, wet, waterlogged, shaded, compacted, busy footfall)
 - c. Subsidence having led to previous tree being felled
- 3) Are there specific considerations on species selection? For example:
 - a. Tree disease risk in that location/area
 - b. Consideration relating to National Parks, Conservation Areas, Important Landscapes, Memorial Trees, Veteran Trees, Woodland
 - c. Strong community preference
 - d. Specific species selected by SCC or others
- 4) Can species diversity be increased, whilst meeting constraints of Step 3? If so, reduce species options list
- 5) Rank remaining species on the list according to their ability to deliver one or all of the following:
 - a) Air quality improvements (especially in high air pollution streets)
 - b) Carbon take up (sequestration)
 - c) Storm water attenuation (if localised flooding is a problem)Please refer to table in [Appendix 7](#) Indication of Relative Benefits Provide by Different Tree Species
- 6) Do site conditions or location constraints cross a specific threshold to mean that only species on specific sub-lists can be used? (eg Fastigate sub-list or Small Species sub-list). (Note: We will define those specific thresholds for site conditions and location constraints through further refinement on the decision-making framework).
- 7) Of the remaining trees on the list (or sub-list), pick the largest canopy, longest lived, and preferably native tree species, that can be sourced locally or in the UK wherever possible.

Appendix 3: Baseline Analysis of the Current Sheffield Street Tree Stock

Tree condition scores and tree valuation scores (see below)



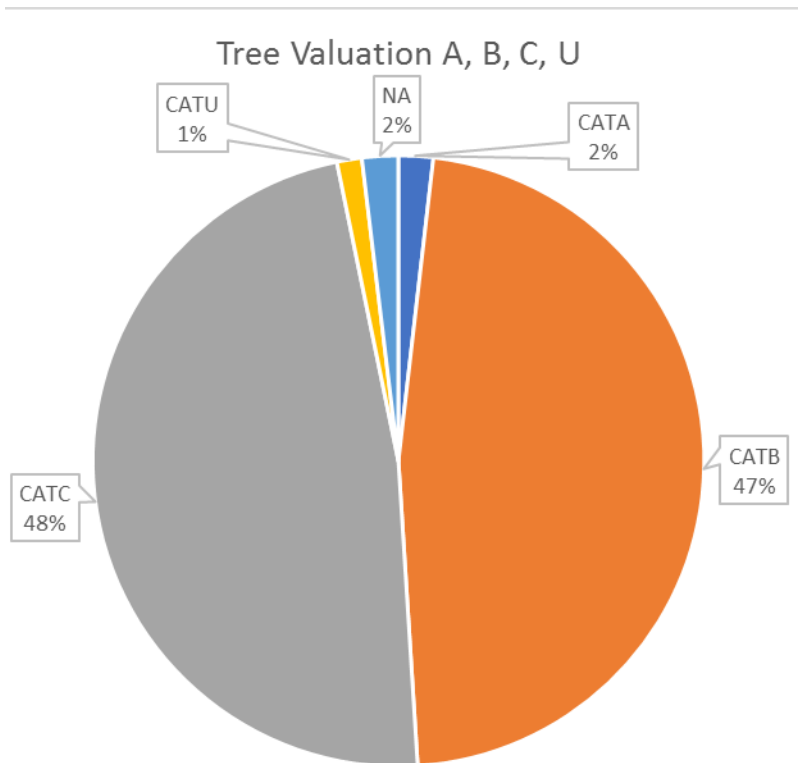
Current position, August 2019.

Categories used are: Good, Fair, Poor, Senescent, Dead, Vandalised.

These categories draw on the standard survey technique in the British Standard 5837 *Trees in relation to design, demolition and construction*.

This perhaps best describes the current condition profile or 'baseline'.

The majority of the highway trees are fair or 'OK', neither outstandingly good or especially poor specimens.



Current position, August 2019

Valuation categorised in line with British Standard 5837:2012 – *Trees in relation to design, demolition and construction*.

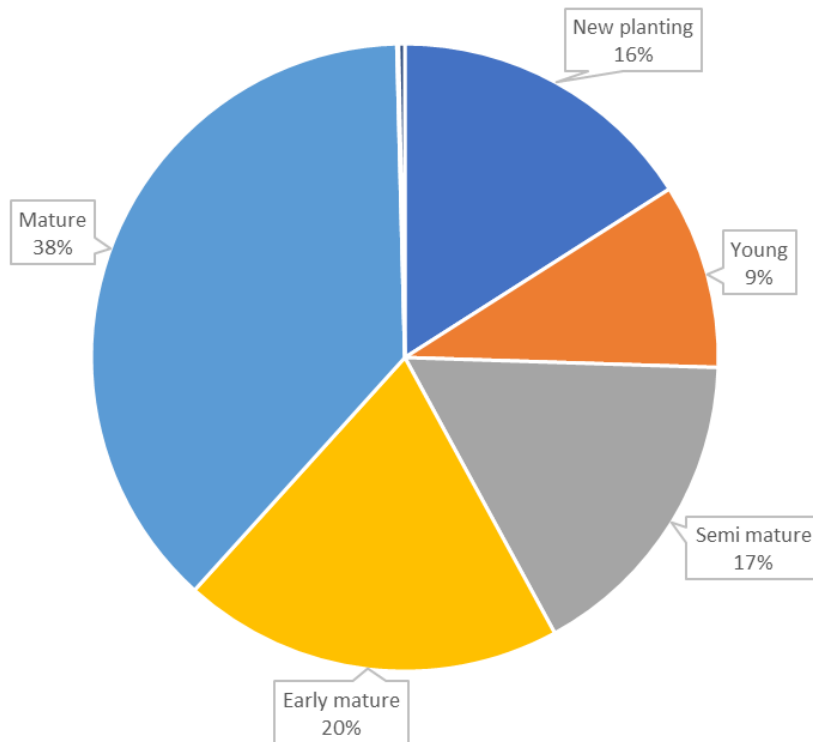
Category A: High quality trees, at least 40 yrs remaining – 705 trees

Category B: Moderate quality trees, at least 20 yrs remaining - 16555

Category C: Low quality trees, at least 10 yrs remaining - 16908

Category U: Unable to realistically remain for more than 10 yrs - 352

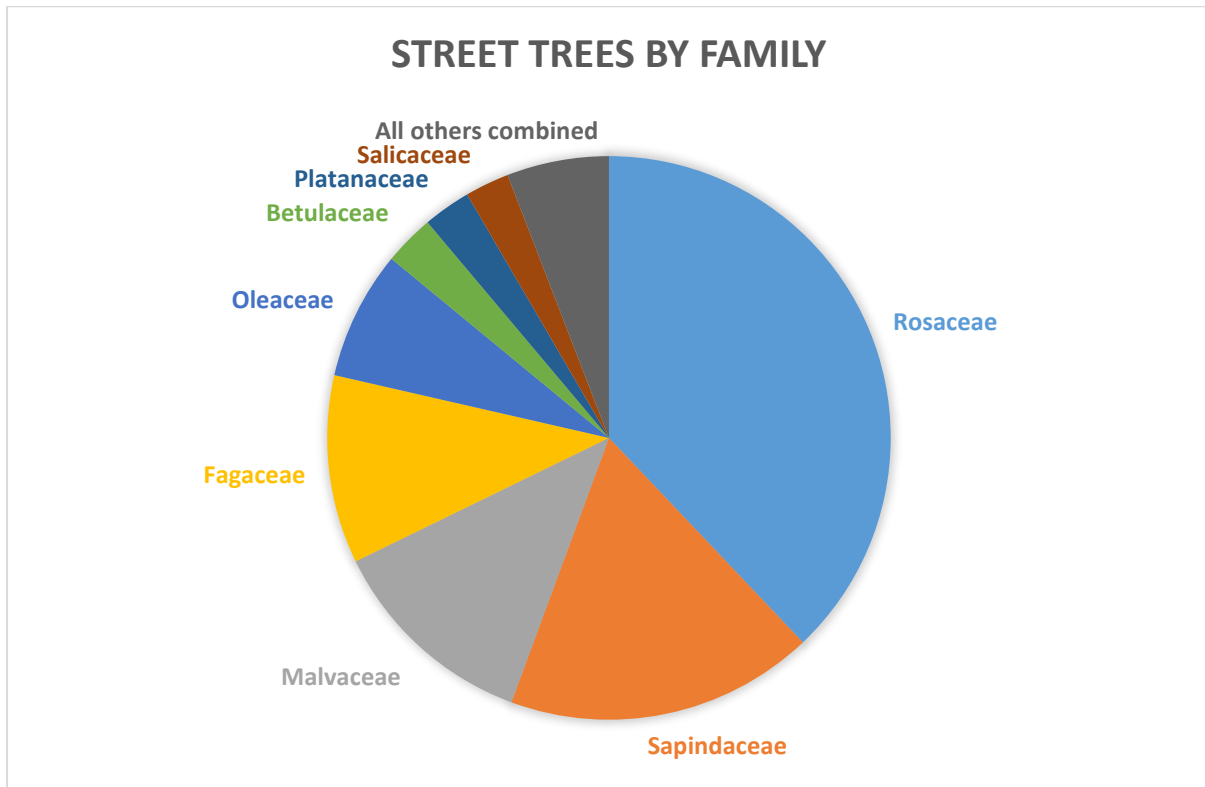
Age classification



Current position, August 2019

Approximately two thirds of the tree stock are currently maturing trees (62%), i.e. not yet mature

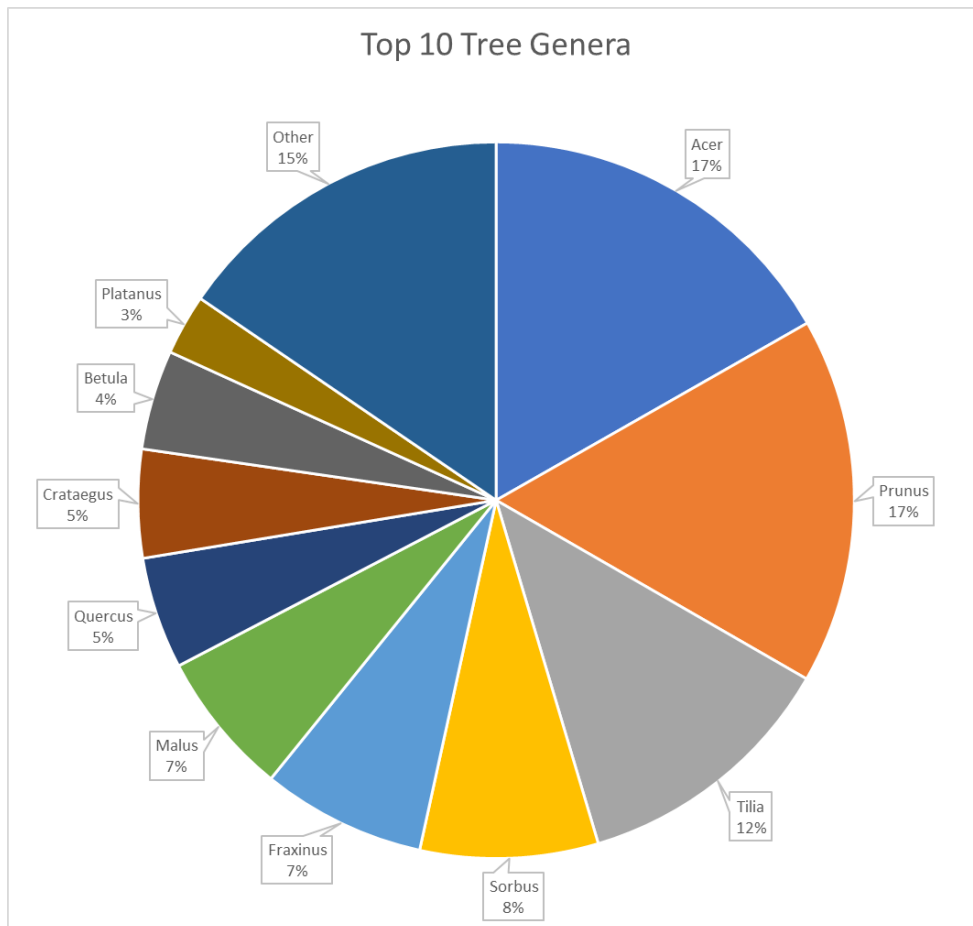
Current Species Diversity Position as of August 2019



If we refer to the 10% 20% 30% guide¹³ when we select trees to plant (or the even higher ambition of 15-10-5) then:

Family – over 30%: Rosaceae are 38% (from i-tree data which is why it differs slightly)
Four families (Rosaceae, Sapindaceae, Malvaceae and Fagaceae make up 79% of all street trees

¹³ <https://pdfs.semanticscholar.org/26a2/4c5361ce6d6e618a9fa307c4a34a3169e309.pdf> A broader diversity of trees is needed in our urban landscapes to guard against the possibility of large-scale devastation by both native and introduced insect and disease pests. Urban foresters and municipal arborists should use the following guidelines for tree diversity within their areas of jurisdiction: (1) plant no more than 10% of any species, (2) no more than 20% of any genus, and (3) no more than 30% of any family. Strips or blocks of uniformity (species, cultivars, or clones of proven adaptability) should be scattered throughout the city to achieve spatial as well as biological diversity



Genus – all below 20%: Prunus (17%), Acer (17%), Tilia (12%)

Top 10 Genera make up **85%** of all trees.

Top 5 Genera make up **61%** of all trees.

222 individual species or cultivars

59 different Genera

Species – one over 10%: *Acer pseudoplatanus* (11%), *Tilia europaea* (9%), *Fraxinus excelsior* (7%)

Therefore, we need to aim to:

- Reduce the reliance on the family *Rosaceae*
- Maintain approach to genera
- Reducing the reliance on species choices from *Acer pseudoplatanus* (11%), *Tilia europaea* (9%) whilst managing the reduction in *Fraxinus excelsior* (7%) resulting from Ash Dieback

Appendix 4 Sheffield Street Tree Partnership Terms of Reference

Purpose

- 1. To deliver the Sheffield Street Tree Strategy**
- 2. To work in partnership to contribute and secure skills, resources and funds to deliver the strategy**
- 3. To develop and evolve the strategy over time in response to the needs of the people of Sheffield, the climate and ecological emergency**
- 4. To encourage and direct donations with reference to this strategy – including funds for new tree planting and to support the retention of existing trees.**

Membership and Representation

Any group or organisation that can positively contribute to the Street Tree Strategy can become a member of the partnership.

Groups and organisations may nominate one person to act as their key representative and to regularly attend meetings.

Group decisions will be achieved, wherever possible, by consensus. This will include decisions around membership and progression of the strategy. Where consensus cannot be achieved the Chair will consider a vote or hold the final decision making responsibility.

Founding members: Sheffield City Council, Amey, STAG and other local community groups, Sheffield & Rotherham Wildlife Trust, Woodland Trust

Expert Advisers: Leeds City Council, Tree Officers Group

If the group membership becomes too unwieldy then these Terms of reference will be revised to support a Committee structure.

Leadership

The Partnership will elect a Chair each year who will set the agenda, direct and guide the work of the group. They will also represent the Partnership in a formal capacity when appropriate

The Chair may respond to external queries on behalf of the partnership, and in doing so will make every attempt to consult with the wider group, if time allows.

Meetings

The Partnership will meet at least four times and there will be a wider stakeholder and general public event once a year.

Secretariat support will be provided by SCC.

Communications

Any press statements will be agreed in advance by the whole partnership.

Securing Resources

The Partnership will not be an independent body constituted in its own right at this time.

The Partnership will actively seek funds and resources to support delivery of the strategy. Funds will be held in a restricted account by the most appropriate organisation in relation to the grant funder eg SCC, SRWT, local residents group etc.

Any funds held on behalf of the partnership will be fully accounted for and must be distributed in accordance with the priorities of the Strategy as agreed by the Partnership and relevant funders.

Donations for Additional Street Tree Planting

To allow individual residents, community groups, and other interested stakeholders to pay for additional street trees to be planted, donations will be accepted by the partnership and held in a restricted account by SCC or SRWT (gift aid benefit if a charity)?

Through this strategy opportunities for additional planting will be identified and recommended to the Council by the Street Tree Partnership. Donations will be sought to support the delivery of these new planting schemes. New tree planting will include both tree planting adjacent to or near the highway ie in the pavement. Donations will be used to pay for a tree, the cost of a tree pit and any related engineering works if required and ongoing establishment for a minimum of 3 years. A tree will not be planted unless all of these costs can be covered up front.

The costs will be calculated at cost by Amey and agreed with the Partnership before any works commence.

A system (web based) would be set up to manage the process of donations. This will set out the terms and conditions and any restrictions on the donation. For example:

- Donors can indicate their preferred location for planting a new tree but this cannot always be guaranteed as the Partnership will identify priorities that reference this strategy
- Donors will not own the tree or have any rights over the tree. Sheffield City Council will remain the owner.
- Whilst Sheffield Council will care for the tree and maintain it for as long as it is safe to do so, some trees will sadly have to be felled, for a variety of different reasons, every year. Those paying for the tree will not be entitled to compensation, even if the tree is felled/removed very quickly after planting.
- Sheffield Council will however always publish clear and transparent reasons for felling a donated tree.

Transparency

Minutes and actions logs will be taken at all meetings. All papers, presentations, financial information and minutes will be available online to the public.

Appendix 5 Guidance for the Management of Sheffield's Street Trees

Overview

- The management of Sheffield's street trees is in the interests of the long-term improvement of the quality of the city's street tree stock balanced with the Council's statutory duty to maintain the integrity and safety of the city's highways¹⁴. This duty is delivered through the Streets Ahead citywide highways maintenance contract between the Council and Amey.
- There are **six parts to the decision making process** (*fig. 1*):
 1. **Initial assessment of street tree (Amey)**
 2. **Initial recommendation (Amey)**
 3. **Public engagement on initial recommendation (Amey)**
 4. **Recommendation to the Council (Amey)**
 5. **Decision by the Council as the local highway authority (Council)**
 6. **Publish decision**
- The decision making process is published.

Principles

- Removal and replacement of a street tree is considered on a case-by-case basis
- Any street tree removed will be replaced on a 1:1 basis with a suitable species for the location in as close to the original site as possible unless there are good reasons to do otherwise
- Work towards green infrastructure, including street trees, being integrated into the design of highways and other development schemes in the city

Initial assessment of street tree

- For the initial assessment of a street tree (part 1 of the decision making process), the **street tree condition-impact matrix** (*fig. 2*) is used by Amey to help assess:
 - The likely impact or extent of damage to people or property by a street tree
 - Whether the likely impact or extent of damage can be remediated or mitigated, either through arboricultural or engineering means
 - The likelihood of repetitive repairs within a five year period
 - The safe useful life expectancy (SULE) of the tree
 - Other options for retaining the tree and carrying out a risk assessment of these
 - Relative costs of repair compared to all the benefits that flow from the tree
- This condition-impact matrix generates a score between 1-30 for the tree being assessed:
 - **15+ means that the tree is retained**

¹⁴ Under the Highways Act 1980

- **6-14 means that the tree is subject to enhanced inspection and/or cost benefit analysis** to determine if the likely impact or extent of damage can be remediated or mitigated through either arboricultural or engineering means
- **<6 means that the tree is removed and replaced.**
- A **decision flowchart** (*fig. 3*) summarises this approach.
- If a tree is found to be immediately dangerous, it will be replaced as soon as possible to protect the public and property.

Exceptions to tree removal

Generally, the Council has a legal duty of care to make sure that all identified tree-related risks to people and property are reduced or eliminated so that everyone can safely enjoy the benefits and ecosystem services provided by a healthy tree canopy.

Street trees are removed and replaced on a 1:1 basis under the following circumstances:

1. Where trees are dead, dying or have structural defects that render them dangerous.
2. Where a diseased tree in managed decline has progressed to the stage where it is now dead, dying or dangerous as per the above.
3. Where a tree is causing an unacceptable risk to road or pavement users that cannot be reasonably mitigated, as classified by the Tree Condition Impact Matrix.
4. Where there is a contractual requirement to do so because a tree is causing damage to third party structures.

If a tree is found to be immediately dangerous, it will be replaced as soon as possible to protect the public, property and other street infrastructure.

Trees are not removed and pruning works are not carried out for any of the following reasons:

- Construction or widening of driveways
- Casting of shade
- Fall of leaves, honeydew, blossom, seeds or berries
- Nesting birds
- Where a tree is touching a telephone wire
- Poor television reception.

Fig. 1 – Decision making process

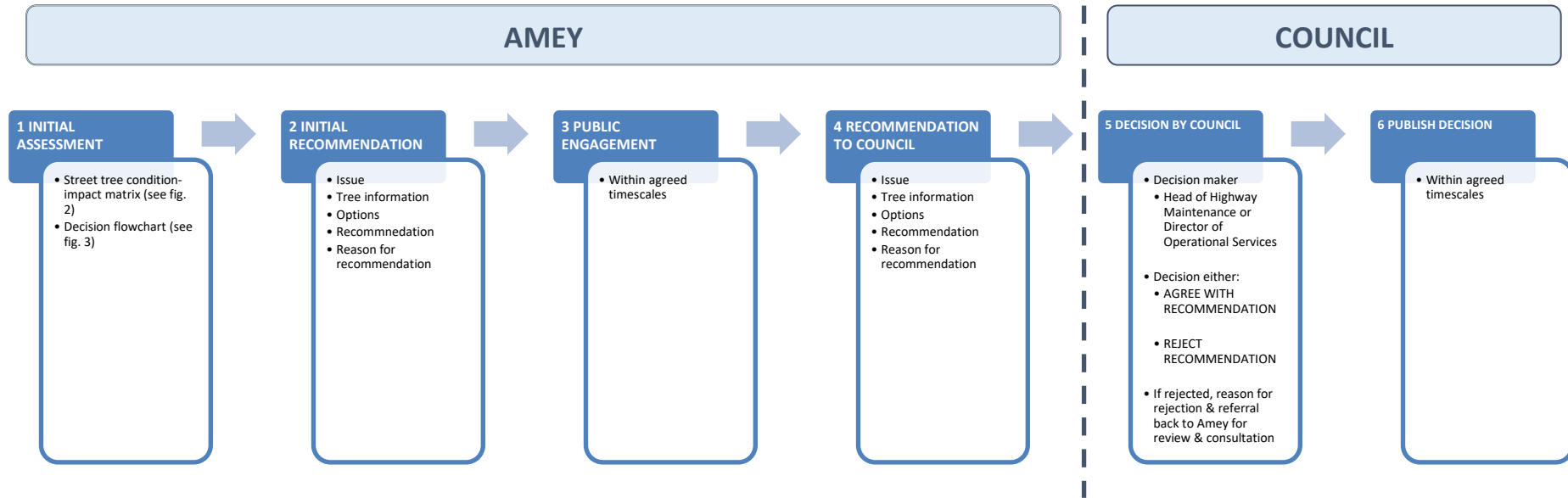


Fig. 2 – Street tree condition-impact matrix

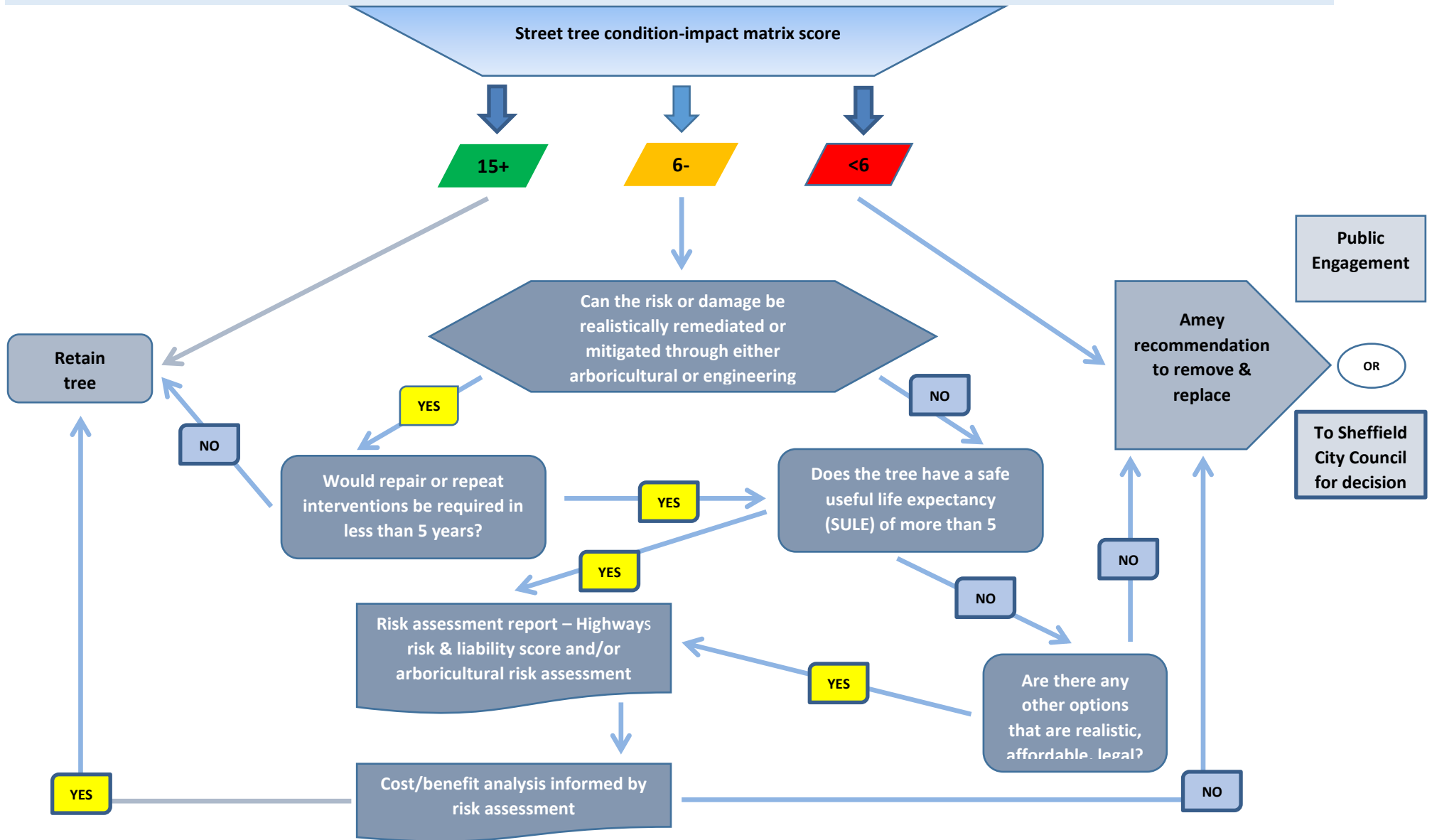
Impact of Tree	Impact or extent of damage	Cost to remediate	Impact Score	Condition of Tree					Tree Quality		
				High, Category A		Moderate, Cat B		Low, Cat C		Nil, Cat U	Tree Condition
				Good	Fair	Poor	Dead				
				40 years +	20-40 yrs	10-20 yrs	5-10 yrs	<5 years		Remaining Life Expectancy	
				5	4	3	2	1		Condition Score	
				None	Nil	6	6 x 5 = 30 Retain	6 x 4 = 24 Retain		6 x 3 = 18 Retain	6 x 2 = 12 Retain, enhanced inspection frequency/ detailed investigation
Minor	Low	5	5 x 5 = 25 Retain	5 x 4 = 20 Retain	5 x 3 = 15 Retain	5 x 2 = 10 Retain, enhanced inspection frequency/ detailed investigation	5 x 1 = 5 Recommendation to Remove and Replace				
		Moderate	Moderate	4	4 x 5 = 20 Retain	4 x 4 = 16 Retain	4 x 3 = 12 Cost/Benefit Analysis and Risk Assessed Solution	4 x 2 = 8 Cost/Benefit Analysis and Risk Assessed Solution	4 x 1 = 4 Recommendation to Remove and Replace		
3	3 x 5 = 15 Retain			3 x 4 = 12 Cost/Benefit Analysis and Risk Assessed Solution	3 x 3 = 9 Cost/Benefit Analysis and Risk Assessed Solution	3 x 2 = 6 Cost/Benefit Analysis and Risk Assessed Solution	3 x 1 = 3 Recommendation to Remove and Replace				
High	High	2	2 x 5 = 10 Cost/Benefit Analysis and Risk Assessed Solution	2 x 4 = 8 Cost/Benefit Analysis and Risk Assessed Solution	2 x 3 = 6 Cost/Benefit Analysis and Risk Assessed Solution	2 x 2 = 4 Recommendation to Remove and Replace	2 x 1 = 2 Recommendation to Remove and Replace				
Unacceptable	Unacceptable	1	1 x 5 = 5 Recommendation to Remove and Replace	1 x 4 = 4 Recommendation to Remove and Replace	1 x 3 = 3 Recommendation to Remove and Replace	1 x 2 = 2 Recommendation to Remove and Replace	1 x 1 = 1 Recommendation to Remove and Replace				

Indicative scores given for tree condition or value vs the impact of the tree on infrastructure.

Values and boundaries
 Outcome score... > 15 retain tree 14 - 6 tree subject to enhanced inspection and/or cost benefit analysis < 6 Remove and Replace
 For scores 14 - 6 follow decision tree

GUIDANCE ONLY, TO AID A DECISION

Fig. 3 – Decision flowchart



Appendix 6 Tree Warden Scheme

Background

The Tree Warden Scheme¹⁵¹⁶ is a national initiative co-ordinated by The Tree Council. There are many Tree Warden Networks with Tree Warden Co-ordinators right across the UK helping local tree enthusiasts to get involved and care for the trees in their area.

Tree Warden Volunteers are usually people who love trees and are willing to offer some of their time to help care for their local trees and woods, work with the local community, and/or be the eyes, ears and voice for the trees down their street.

Tree Warden Schemes are usually co-ordinated by the local council or a local community organisation. Tree Warden activities and projects are often autonomous, and tailor-made to benefit the local area and community.

Every year, The Tree Council invites Tree Wardens to Regional Forums where they can come together to network, share ideas and be inspired by presentations, workshops and the outdoor site visits and mini-training sessions.

Sheffield Tree Warden Proposal

A Tree Warden Scheme would be part of the Sheffield Street Tree Strategy Partnership. Investment would be needed to co-ordinate the scheme on behalf of the partnership and the direct involvement of Streets Ahead representatives would be critical for the scheme to work.

Streets Ahead and SRWT could help co-ordinate the Tree Wardens by:

- Co-ordinating and leading the volunteer network
- Allocating 'patches' of a manageable size to volunteers
- Providing opportunities for volunteers to meet up, share experiences and training, promote their activities etc
- To ensure that all volunteers are fully knowledgeable and equipped to be able to spot signs of disease, danger or damage to trees.

Wardens would need specific training, support and direction to ensure their activities are valued and of value in taking forward the Sheffield Street Tree Strategy.

Activities a tree warden might undertake in Sheffield could include:

- Championing their local tree and woods
- Planting and caring for trees, setting up tree nurseries
- Monitoring trees in a 'patch'
- Liaising between neighbours, the community, Streets Ahead and the partnership
- Eyes and ears on the ground to report in any tree issues or concerns such as any signs of disease, danger, or damage to the tree eg identifying ash dieback

¹⁵ <https://www.treecouncil.org.uk/Take-Part/Tree-Wardens>

¹⁶ <https://www.treecouncil.org.uk/Portals/0/TC%20Tree%20Warden%20Leaflet%202017.pdf>

- Undertaking and supporting other volunteers to carry out surveys of all types to improve our understanding of our street trees
- Getting together with other like-minded people for training and sharing ideas
- Coordinating any watering of young saplings in their first three years during long dry spells or the weeding of tree pits for new plantings, and/or placement of weed retardant mats
- Supporting the partnership on tree related projects and public events as they arise

Appendix 7 Indication of Relative Benefits Provide by Different Tree Species

Extract from: Odhran S.O'Sullivan, Alison R.Holt, Philip H.Warren, Karl L.Evans (April 2017) Optimising UK urban road verge contributions to biodiversity and ecosystem services with cost effective management, *Journal of Environmental Management* vol 191, p162-171

<https://www.sciencedirect.com/science/article/pii/S0301479716310556>

Species name	Native Distribution	Air quality		Drought tolerance	Winter Hardiness	Biodiversity value	Growth rates	Wood density	
		PM	VOCs						
<i>Acer campestre</i> **	Field maple	Europe, N. Africa and W. Asia	++	+	+++	+++	++	+	+++
<i>Acer platanoides</i>	Norway maple	Europe and W. Asia (not UK)	+	+	++	+++		+++	++
<i>Acer pseudoplatanus</i>	Sycamore	Europe and W. Asia (not UK)	+	+++	+	+++	+++	+	+++
<i>Aesculus hippocastanum</i>	Horse chestnut	Europe (not UK)	++		+	++	+	+	++
<i>Alnus cordata</i> #	Italian alder	Europe (not UK)		++	++	++		+++	+
<i>Alnus glutinosa</i>	Alder	Europe, N. Africa and W. Asia		+	+	++	++	++	+
<i>Alnus incana</i>	Grey alder	Northern temperate (not UK)		++	+++	+++			+
<i>Betula ermanii</i> *	Erman's birch	E. Asia							++
<i>Betula pendula</i> **	Silver birch	Europe and W. Asia	+++	+	++	+++	+++	+++	++
<i>Carpinus betulus</i> **	Common hornbeam	Europe and W. Asia	++		++	+++	+	+	+++
<i>Castanea sativa</i>	Sweet Chestnut	Europe & Asia Minor (not UK)			++	++	+		++
<i>Catalpa bignonioides</i> **	Indian Bean Tree	N. America			+	+			+
<i>Cedrus atlantica</i> **	Atlas Cedar	N. Africa			+++	+			+
<i>Chamaecyparis lawsoniana</i>	Lawson cypress	N. America		+					+
<i>Corylus colurna</i> *	Hazel	Europe and W. Asia		++	++	++	++	++	++
<i>Crataegus laevigata</i> *	Midland Hawthorn	Europe			+	+++	+++	+++	+++
<i>Crataegus monogyna</i> **	Common hawthorn	Europe, N. Africa and W. Asia		+	++	+++	+++	+	+++
<i>Cupressocyparis leylandii</i>	Leyland cypress	N. America		++	++	++		+++	
<i>Fagus sylvatica</i> **	Beech	Europe	+		+	++	+++	+	+++
<i>Fraxinus excelsior</i>	Ash	Europe and W. Asia	+	+	++	++	++	++	+++
<i>Ginkgo biloba</i> *	Ginko	E. Asia			+++	++			+++
<i>Gleditsia triacanthos</i> *	Honey locust	Central and N. America			+++	++			+++
<i>Gymnocladus dioica</i> **	Kentucky coffeetree	N. America			++	++			++
<i>Ilex aquifolium</i>	Holly	Europe, N. Africa and W. Asia		++			++	+	+++
<i>Juglans nigra</i>	Walnut	N. America	++				+		++
<i>Larix decidua</i>	Larch	Europe (not UK)		+			++		++
<i>Liquidambar styraciflua</i> *	Sweet gum	Central and N. America			++	+			++
<i>Liriodendron tulipifera</i> **	Tulip tree	N. America			+	++			+
<i>Malus</i> *	Apple	Northern temperate		++	+	++	+++	+	+++
<i>Parrotia persica</i> **	Persian ironwood	Central Asia							++
<i>Picea abies</i>	Norway spruce	Europe (not UK)					++		+
<i>Pinus nigra</i>	Black pine	Europe, N. Africa (not UK)		+	+++	+++		+++	
<i>Pinus sylvestris</i> **	Scots pine	Europe and W. Asia	+++		+++	+++	++	+++	+
<i>Platanus x hispanica</i> *	London plane	Hybrid - N. America/E. Asia			+++	++	+	++	+++
<i>Populus tremula</i>	Aspen	Europe and Asia	++	+++	++	+++	+	+++	+
<i>Prunus cerasifera</i>	Plum	Europe & Asia Minor (not UK)			+++	++	+++		++
<i>Prunus x hillier</i> *	Cherry hybrid	Hybrid - E. Asia/E. Asia	+	++					++
<i>Prunus laurocerasus</i>	Laurel	N. America		+	+	+++			++
<i>Prunus</i> spp.	Cherry tree spp.	Northern temperate					+++	+++	++
<i>Pterocarya fraxinifolia</i> **	Caucasian walnut	W. Asia			+	+			+
<i>Pyrus calleryana</i> *	Gallery pear	E. Asia	++		+++	++		+++	+++
<i>Quercus cerris</i> **	Turkey Oak	Europe & Asia Minor (not UK)			+++	++	+		+++
<i>Quercus ilex</i>	Holm Oak	Mediterranean Basin					+		+++
<i>Quercus petraea</i>	Sessile oak	Europe and W. Asia		+++	++	++	+++		+++
<i>Quercus robur</i> **	English Oak	Europe and W. Asia	++	+++	+	+++	+++	++	+++
<i>Quercus rubra</i>	Red oak	N. America		+++	++	++			++
<i>Robinia pseudoacacia</i> var. <i>frisia</i>	False acacia	N. America	+		+	+++	+		+++
<i>Salix alba</i>	White willow	Europe and Asia		+++	+	+++	+++	++	+
<i>Salix caprea</i>	Goat willow	Europe and Asia		+++	++	+++	+++	++	+
<i>Salix fragilis</i>	Crack willow	Europe and W. Asia	+++	+++			+++	++	+

Appendix 8 Air Pollution data (particulate matter)

Table comparing Canopy cover, IMD score, IMD rank, deprivation description and PM_{2.5} air pollution level by Sheffield ward.

Top wards for low canopy cover, high PM pollution and low IMD and are in **bold**

Sheffield Ward	Index of Multiple Deprivation (IMD)	IMD Ward Rank (1=most deprived)	IMD description	Canopy Cover (% of ward road network)	Canopy Area (m ²)	Average PM _{2.5} * (ug m ⁻³) level by ward
Firth Park	52.28	1	Most Deprived	19%	114,621	6.92
Southey	51.06	2	Most Deprived	4%	29,270	6.48
Burngreave	50.69	3	Most Deprived	4%	39,992	7.01
Manor Castle	47.71	4	Most Deprived	4%	34,129	7.17
Arbourthorne	42.33	5	Most Deprived	4%	19911	7.11
Darnall	41.79	6	Most Deprived	3%	39,107	7.99
Shiregreen and Brightside	41.54	7	Above Average	12%	78,902	7.04
Gleadless Valley	36.49	8	Above Average	6%	35,659	7.09
Beauchief and Greenhill	32.51	9	Above Average	9%	64,217	6.26
Woodhouse	29.91	10	Above Average	4%	23,160	7.62
Richmond	29.27	11	Above Average	4%	24,457	7.35
Birley	24.75	12	Average	2%	15,117	6.95
Walkley	23.50	13	Average	2%	13,913	7.22
Nether Edge	23.01	14	Average	14%	74,877	6.9
Central	22.61	15	Average	5%	59,418	7.05
Mosborough	21.74	16	Average	3%	18,263	6.94
East Ecclesfield	19.85	17	Average	1%	6,713	7.01
Hillsborough	19.71	18	Below Average	6%	32,332	5.88
West Ecclesfield	19.07	19	Below Average	7%	41,352	6.32
Beighton	18.87	20	Below Average	4%	22,261	6.94
Stocksbridge and Upper Don	18.52	21	Below Average	7%	65,870	5.11
Stannington	15.08	22	Below Average	18%	222,078	5.15
Broomhill	14.33	23	Least Deprived	5%	19,615	6.68
Graves Park	13.29	24	Least Deprived	10%	63,951	6.82
Dore and Totley	7.81	25	Least Deprived	12%	97,978	5.2
Crookes	7.23	26	Least Deprived	14%	58,873	6.2
Fulwood	5.08	27	Least Deprived	15%	103,404	5.16
Ecclesall	4.56	28	Least Deprived	17%	118,512	6.22

*PM_{2.5} is fine particulate matter < 2.5 µm diameter.

Appendix 9 British Standards and Guidance pertaining to Tree Works and The Streets Ahead Contract

The Streets Ahead Contract, Part G – The Services 31.

Obligation To Provide The Service And Performance Standards

31.1 Standard of Service

The Service Provider shall provide the Service continuously throughout the Term:

31.1.1 in accordance with Good Industry Practice;

31.1.2 in order to comply fully with Schedule 2 (Output Specification);

31.1.3 in accordance with Highway Standards;

31.1.4 in accordance with Schedule 3 (Method Statements);

Highway Tree Replacement Policy

Contains advice on: *selection, aesthetics, ease of maintenance, tolerance to difficult conditions, due regard to disease prevalence, planting considerations.*

Highway Tree Design Guide

Contains advice on: *selection, root barriers, drainage, dealing with clay soils, anti-vandalism measures, trees in paving area – pit size*

British Standards

BS3998:2010: Tree work – Recommendations

This is for work on trees, and covers:

Planning of works, biosecurity, site management, scheduling and risk control.

Root environment: mulching, aeration, treatments,

Damage/decay: wounds and other injuries, and the management of decay.

Pruning; deadwood, formative, crown thinning/lifting, pollarding, infrastructure.

BS8545:2014: Trees: from nursery to independence in the landscape – Recommendations

This covers the management of young trees including: *selection, biosecurity, planting, assessment, ongoing maintenance*

BS5837:2010: Trees in relation to design, demolition and construction – Recommendations

The main relevant points are: *the zone in which machine digging is prohibited, protecting roots, the size that can be pruned, protecting roots from chemical damage from concrete, avoiding strimmer damage.*

Department for Transport: Practical Guide to Street Works

This is a simple guide covering NJUG Vol 4 which covers: *the zone in which machine digging is prohibited, avoiding damage to roots, size limit on root pruning (25mm diameter), using clean, sharp equipment.*

The Trees and Design Action Group (TDAG) Trees in a Hard Landscape

Practical challenges and solutions to integrating trees in 21st century streets, civic spaces and surface car parks, detailing process, design and technical options.

Glossary and Acronyms

Term	Definition
Amenity tree	Allowed to occupy a site and to serve its surroundings in a useful manner which culminates in the aid, protection, and comfort of humans ¹⁷
Avoided runoff	Amount of water held in the tree canopy and re-evaporated after a rainfall event
BS or British Standard	A series of professional standards covering a variety of works eg on trees. Please refer Appendix 9 for more details.
Canopy cover	Area of leaves, branches and stems of trees covering the ground when viewed from above; commonly expressed as a percentage of total ground area, e.g. at 50% canopy cover, half of the total ground area is covered by the vertical projection of tree crowns
Carbon sequestration	Annual removal of carbon dioxide from the air by plants
Carbon storage	Amount of carbon bound up in the above-ground and below-ground parts of woody vegetation
Capital Asset Valuation of Amenity Trees (CAVAT)	A valuation method developed in the UK to express a tree's relative contribution to public amenity and its prominence in the urban landscape
Council of Tree and Landscape Appraisers (CTLA)	A method for assigning a monetary value to the amenity value of trees
Cultivar	A tree or plant variety that has been produced in cultivation by selective breeding. They usually have no or low genetic diversity, with individuals of any particular cultivar usually being clones of one another.
Ecosystem services	Benefits provided by ecosystems that contribute to making human life both possible and worth living, e.g. products such as food and water, regulation of floods, soil erosion and disease outbreaks, and non-material benefits such as recreational and spiritual benefits in natural areas
Epicormic	Of a shoot or branch, growing from a previously dormant bud on the trunk or a limb of a tree

¹⁷ University of Georgia, Daniel B Warnell School of Forest Resources

Term	Definition
Epicormic growth	Epicormic growth is a plant response to damage or stress; the growth of new shoots from epicormic buds that lie dormant beneath the bark
i-Tree Eco	A suite of open source, peer-reviewed and continuously improved software tools to help assess and manage urban tree populations and the benefits they can provide
Indices of multiple deprivation (IMD)	The official measure of relative deprivation for small areas in England, and the most widely used of the Indices of Deprivation. Deprivation is measured in a broad way to encompass a wide range of aspects of an individual's living conditions; these are Income, Employment, Education, Skills and Training, Health and Disability, Crime, Barriers to Housing and Services, and Living Environment.
Landscape: National Park	Areas of relatively undeveloped and scenic landscape that are designated under the National Parks and Access to the Countryside Act 1949
Landscape: Conservation Area	Conservation areas exist to manage and protect the special architectural and historic interest of a place - in other words, the features that make it unique
Landscape: Important Landscape	Important landscapes are landscapes or features that aren't in national parks, or conservation areas, or memorials, or veteran, or woodland, but still deserve special consideration; for example, some historic avenues.
Landscape: Memorial Trees	Memorial trees celebrate or commemorate people or events. Typically in Sheffield, they commemorate those people of the area that fought in the two World Wars
Landscape: Veteran Trees	Ancient trees are veteran trees, but not all veteran trees are old enough to be ancient. Veteran trees are survivors that have developed some of the features found on ancient trees. However, veteran trees are usually only in their second or mature stage of life.
Landscape: Woodland	Woodland is used in British woodland management to mean tree-covered areas which arose naturally and which are then managed, while forest is usually used in the British Isles to describe plantations, usually more extensive, or hunting Forests, which are a land use with a legal definition and may not be wooded at all

Term	Definition
Moving Average	A moving average is commonly used with time series data to smooth out short-term fluctuations and highlight longer-term trends or cycles.
PEFC	Programme for the Endorsement of Forest Certification
Replacement cost	Value based on the physical resource itself, e.g. the cost of having to replace a tree with a similar tree, using the CTLA methodology guidance from the Royal Institution of Chartered Surveyors
Safe useful life expectancy (SULE)	Life expectancy of a tree modified first by its age, health, condition, safety and location then by economics, effects on better trees and sustained amenity
SCC	Sheffield City Council
Shelterbelt	A barrier of trees and shrubs that provides protection (as for crops) from wind and storm and lessens erosion
SRWT	Sheffield & Rotherham Wildlife Trust
STAG	Sheffield Tree Action Groups
Street tree	A tree located next to or within a public road; a tree on land forming or adjacent to a highway which affects, in some way, those using that highway
TOF	Trees Outside Forests
Tree warden	Volunteers who love trees and are willing to offer some of their time to help care for their local trees and woods, work with the local community, and/or be the eyes, ears and voice for the trees down their street.
UKWAS	United Kingdom Woodland Assurance Scheme
Urban forest	Trees, woodlands, shrubs, hedges, open grass, green space and wetland in and around urban areas
WdT	The Woodland Trust