Newly Planted Street Survey

Assessing the condition of Birmingham's newly planted trees

Why survey the newly planted street trees?

Birmingham Treepeople is the charity for the city's tree wardens and our aim is to protect, promote and plant trees in Birmingham.

We noticed that many of the newly planted trees were becoming damaged or dying and we wanted to get data on this to back up our impressions.

We used the Bloomington Urban Forestry Research Group's Planted Tree Re-inventory Protocol as a starting point.

We trained our first 6 volunteer inspectors in June 2020.

Volunteer tree surveyors

Since then we have trained 31 surveyors over 7 training sessions (3 online due to Covid restrictions and 4 on site) - a total of 11 hours of training

On-site training took place in Northfield, South Yardley, Handsworth, Sutton Coldfield.

Volunteer tree surveyors

Surveyors were provided with hi-vis vests, information leaflets for householders, business cards, 'please water me' labels, tape measures, height measures and inventory protocol quick reference guides. Each surveyor brought their own secateurs and rubbish bags.

Volunteers can survey about 6 trees an hour, so we have spent at least 125 hours preparing this data.

We have found working in pairs is better and using paper records as there can be mobile data issues.

The Bloomington Protocol has 41 variables to measure and is clear about how to do each one so that the survey can be repeated and longitudinal data collected.

After our first inspections in Handsworth Wood ward it was clear that we needed to add a variable about parking congestion as many trees were struggling in compacted ground due to cars parked on verges.
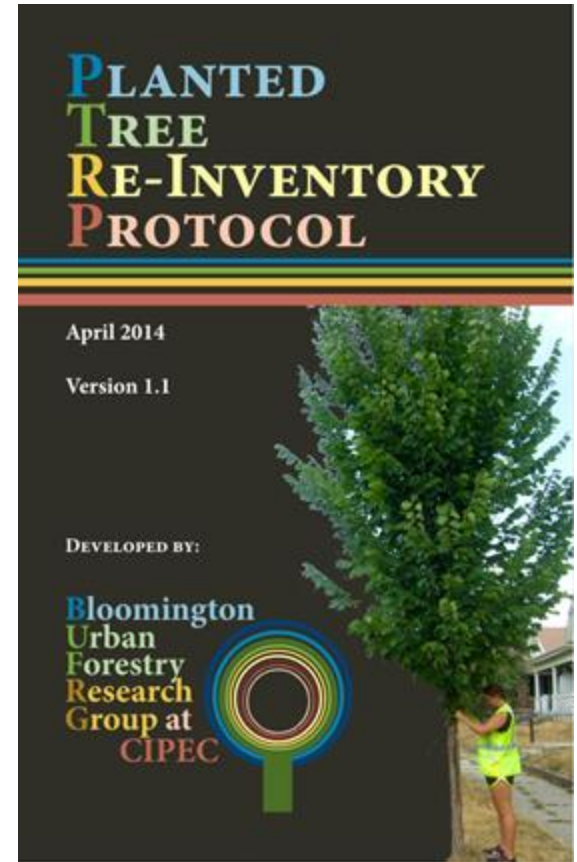
Variables - examples

V8 – Crown Dieback

- Mentally draw an outline around the outer - most branches or crown perimeter visible from that angle and estimate the percent of the canopy area (including dieback area) that is missing

- If you can, try looking at the tree with a clear patch of sky as background (e.g. Figure V8)

- If there are no leaves, look for fat terminal buds

Table V8. Explanation of *Crown Dieback* values. Observers should look at tree from more than one angle and imagine drawing a line around the outermost visible branches and determining the percent of missing canopy within.

Crown Dieback Rating	Visually estimated percent dieback
0	0% (no dieback)
1	1-20% dieback
2	21-40% dieback
3	41-60% dieback
4	61-80% dieback
5	81-99% dieback (very few living branches)
6	100% dieback (complete dieback, no living canopy)

Estimating *Crown Dieback* (V8)

The tree at the left has approximately 15% dieback in the canopy, and would be given a *Crown Dieback* rating of 1.

The tree at the right has approximately 50% dieback in the canopy, and would be given a *Crown Dieback* rating of 3. Note that the dead branch underneath the canopy and the branch off the main trunk are excluded from the total crown area.
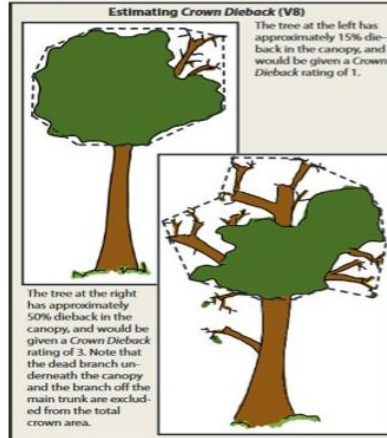
Figure V8. Example of *Crown Dieback*. A red maple (Acer rubrum) exhibiting crown dieback. This tree would receive a Crown Dieback rating of 3, corresponding to 40-60% dieback.

Images obtained from ForestryImages.org. Citation: Jason Sharman, Vitalitree, Bugwood.org.

V12 – Lower Trunk Damage   V13 – Other Damage

Table V12. Explanation of *Lower Trunk Damage* values.

Lower Trunk Damage value	Explanation
0	Absence; no evidence of damage is visible on lower 45 cm (18") of trunk.
1	Presence of damage on lower trunk.

Table V13. Explanation of *Other Damage* values.

Other Damage value	Explanation
0	Absence; no evidence of damage is visible on the tree excluding any Lower Trunk Damage (V12).
1	Presence of damage on the tree above any Lower Trunk Damage (V12), such as snapped branches or vandalism, car damage, etc.

V14 – Overall Tree Condition

Table V14. Explanation of *Overall Tree Condition* Ratings. Observers should look at the tree from more than one angle and examine trunk, branches and canopy. Tree must exhibit most of the characteristics indicated to be given that rating.

Rating	Explanation
Good	Full canopy, minimal to no mechanical damage to trunk, no branch dieback over 5 cm (2") in diameter, no suckering (root or water sprouts), form is characteristic of species.
Fair	Thinning canopy, new growth in medium to low amounts, tree may be stunted, significant mechanical damage to trunk (new or old), insect/disease is visibly affecting the tree, form not representative of species, premature fall coloring on foliage, needs training pruning.
Poor	Tree is declining, visible dead branches over 5 cm (2") in diameter in canopy, significant dieback of other branches in inner and outer canopy, severe mechanical damage to trunk usually including decay from damage, new foliage is small, stunted or minimum amount of new growth, needs priority pruning of dead wood.
Dead	Standing dead tree, no signs of life with new foliage, bark may be beginning to peel.
Sprouts	Only a stump of a tree is present, with one or more water sprouts of 45 cm (18") or greater in height growing from the remaining stump and root system.
Stump	Only a stump remains, no water sprouts greater than 45 cm (18") high present.
Absent	No tree present, not even a stump remains visible in the location where the tree should have been; this category should also be used for trees that have obviously been replaced (are the incorrect species, much smaller than they should be given the planting date, etc.) and there is no evidence of the original tree.

Good

V14 – Overall Tree Condition

Fair

Poor

V24 – Planting Area Types

Tree Lawn

Median = Central Reservation

Shoulder

V24 – Planting Area Types

Tree Grate

Tree Pit

Bumpout

2022 V3

V24 – Planting Area Types

Median = Roundabout

Side Yard

Open Yard

2022 V3

V42 – Road Congestion

0 - Parking not permitted

1 - Free parking

2 - Easy parking

V42 – Road Congestion

3 - Limited parking available

4 - Clear shortage of parking

5 - Major shortage of parking

Findings

As at October 2022 we have surveyed and entered 754 trees on TreePlotter™.

There are 536 trees which have been surveyed but yet to be input onto TreePlotter™

We have found it easy to use and it provides lots of useful data and downloads for further analysis.

Tree condition

- 2.5% of trees dead at time of inspection
- 7.4% poor
- 18.2% fair
- 69.5% good

dead
2.5%
poor
7.4%

fair
18.2%

good
69.5%
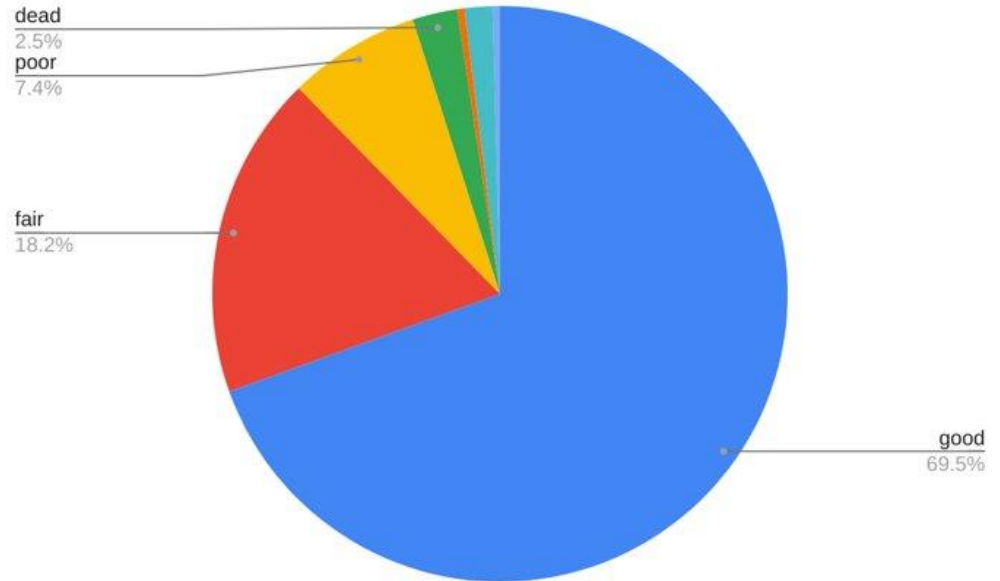
Numbers of trees surveyed by genus

Acer	35
Betula	45
Carpinus	12
Cedrus	3
Celtis	15
Corylus	39
Crataegus	32
Fagus	10
Ginkgo	21
Gleditsia	27
Liquidambar	65
Liriodendron	39
Magnolia	2

Malus	53
Metasequoia	2
Ostrya	10
Pinus	2
Platanus	15
Prunus	101
Pyrus	60
Quercus	15
Sorbus	38
Tilia	98
Ulmus	1
Zelkova	14
Grand Total	754

Tree Condition - Genus – top ranked by % good

Genus	Absent	Dead	Fair	Good	Poor	Sprouts	Stump
Liquidambar		3%	8%	85%	5%		
Carpinus			8%	83%	8%		
Prunus	2%	4%	10%	78%	4%	1%	1%
Gleditsia			15%	78%	4%		4%
Acer			23%	74%	3%		
Betula	2%		18%	73%	7%		
Tilia	3%	2%	19%	71%	3%		1%
Fagus	10%	10%		70%	10%		

Findings - Dead trees

dead trees	No. dead	% dead	% pop	diff
Celtis australis	1	5.26%	1.99%	3.27%
Tilia cordata	2	10.53%	10.08%	0.45%
Zelkova	1	5.26%	1.86%	3.40%
Liriodendron	2	10.53%	5.17%	5.36%
Prunus	4	21.05%	10.08%	10.97%
Pyrus	1	5.26%	7.96%	-2.70%
Sorbus intermedia	1	5.26%	1.99%	3.27%
Liquidambar	2	10.53%	8.62%	1.91%
Fagus	1	5.26%	1.33%	3.93%
Sorbus aucuparia	3	15.79%	0.53%	15.26%
Quercus	1	5.26%	1.86%	3.40%
	19			

Findings – Dead trees

- The original tree survey findings in the US found that trees were more likely to die if planted in areas of high unemployment.
- "Explaining planted-tree survival and growth in urban neighborhoods: A social–ecological approach to studying recently-planted trees in Indianapolis" Jessica M.Vogt et al Landscape and Urban Planning Volume 136, April 2015, Pages 130-143

Findings – Dead trees in Birmingham

This is a small sample size but so far our work doesn't back up the USA work – Sutton Vesey, Bournville and Northfield are some of the least deprived wards in the city, but small sample size.

dead trees by ward	all trees	dead trees	% dead in ward
Bournville	30	2	6.67%
Brandwood	24	1	4.17%
Handsworth Wood	223	5	2.24%
Harborne	6		0.00%
Ladywood	1		0.00%
Nechells	78	1	1.28%
Northfield	57	2	3.51%
Selly Oak	57	2	3.51%
South Yardley	6		0.00%
Soho	28		0.00%
Springfield	6		0.00%
Sutton Vesey	101	4	3.96%
Weoley	137	2	1.46%
	754	19	2.52%

Findings – lower trunk damage

- 23.5% trees with lower trunk damage

- Possible reasons – strimmers/ground maintenance, vehicles, species of tree

Is the damage due to cars parking on the verges/pavements, etc?			
lower trunk damage	177 trees out of 754		23.47%
no parking allowed	19	major shortage	16
easy parking	57	clear shortage	5
free flowing parking	28	limited parking	48
	104		69
173	60.12%		39.88%
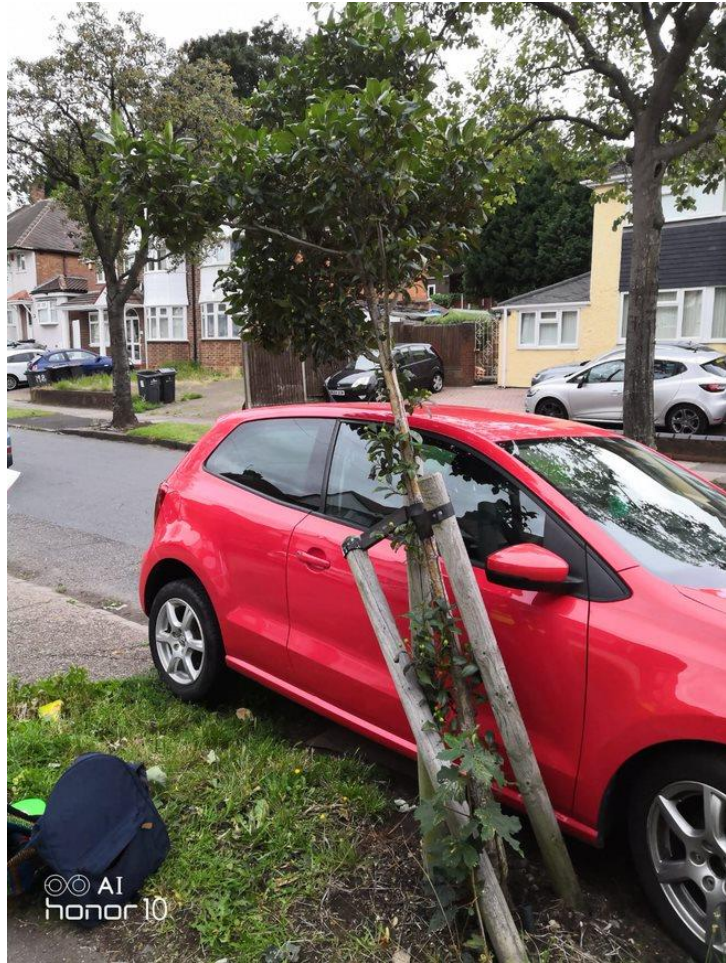
Findings – lower trunk damage

- 61% of the trees had soil at their base so no strimming?
- Only 43% of the trees with soil at their base were in areas where cars may be expected to park on the pavements

ground cover at base		
grass	56	31.82%
gravel	1	0.57%
mulch	10	5.68%
soil	107	60.80%
soil/gravel/weeds	1	0.57%
weeds	1	0.57%
	176	

trees with soil at base -		
easy parking	59	56.73%
limited parking	45	43.27%
	104	

Findings – lower trunk damage

- These are the species that are overrepresented with lower trunk damage

	No. trunk damage	%damage	%pop	diff
Prunus	12	12.24%	2.25%	9.99%
Malus	10	10.20%	7.03%	3.17%
Corylus colurna	11	11.22%	4.91%	6.31%
Crataegus laevigata	5	5.10%	1.99%	3.11%

Findings – root problems

- Trees were reported to Kier that were loose

loose or exposed roots		% problems	%pop	diff
Pyrus chanticleer	2	9.52%	7.96%	1.56%
Crataegus lavalleei	4	19.05%	2.25%	16.80%
Prunus	1	4.76%	10.08%	-5.32%
Platanus acerifolia	2	9.52%	1.86%	7.66%
Tillia cordata	3	14.29%	10.08%	4.21%
Acer campestre	1	4.76%	4.24%	0.52%
Liquidambar	5	23.81%	8.62%	15.19%
Malus	2	9.52%	7.03%	2.49%
Gingko	1	4.76%	2.79%	1.97%
	21			

Loose trees

- The soil volumes for wobbly trees varied from 0.26m^3 to 1000m^3 depending on the planting location. Crataegus and Liquidambar were wobbly even in large soil volumes. (assumed depth of 0.4m)

- Looking at all trees, there were 204 planted in less than 1m^3 of soil, and more of these were fair than the overall population.

dead
1.5%

poor
6.9%

fair
25.0%

good
66.7%
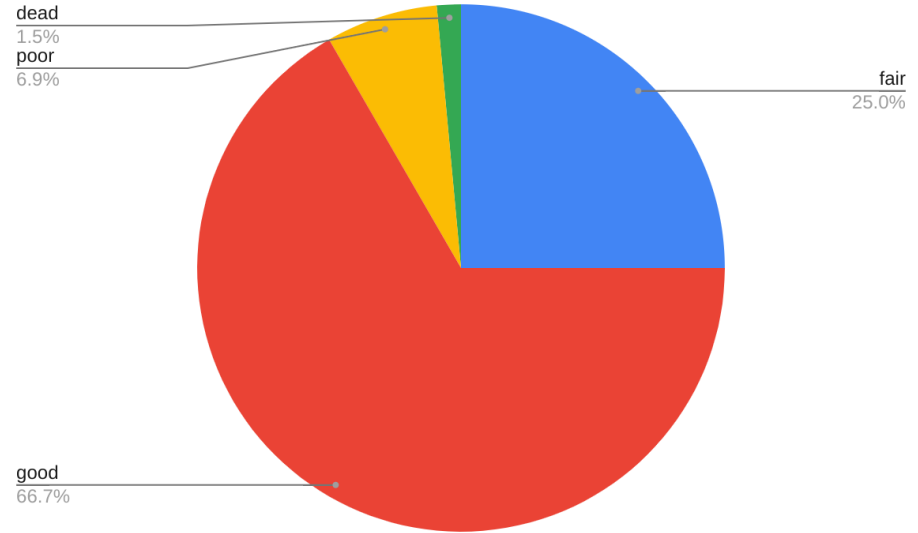
Findings – root problems

- Failed grafts on Tilia tormentosa 'Brabant'

Findings – stakes and vandalism

- 79 were noted as having stakes still on at 5 years and needing removal - 10%
- 14 trees were commented on as being vandalised – either snapped off or ring barked
- Tree surveyors often cut the ties to release the trunk but left the stakes which act as a barrier against cars
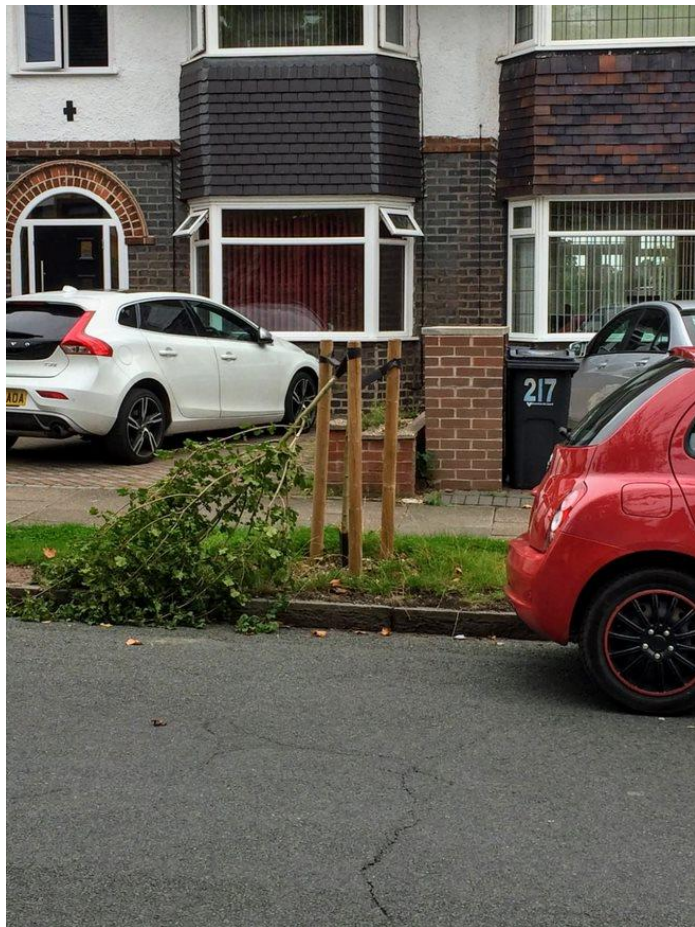
Vandalism

- The tree outside of the house was ring barked which may have been done by the residents as they had just extended the width of their drive and the tree was now in the way.

Climate emergency

- 91.6% of trees surveyed had unrestricted crown exposure
- 58.6% had water pipes or water bags
- 87.7% were not mulched
- Smallest tree pit found 0.1m^3 (assuming 0.4m depth)

V9 – Crown Exposure

Level of Crown Exposure	Explanation
0	Tree receives no light on any sides, because it is shaded by other trees/vegetation, buildings or other infrastructure.
1	Tree receives light from the top or only one side.
2	Tree receives light from two sides but not the top, or from the top and one side.
3	Tree receives light from three sides but not the top, or from the top and two sides.
4	Tree receives light from the top and three sides.
5	Tree receives light from all four sides and the top.

2022 V3
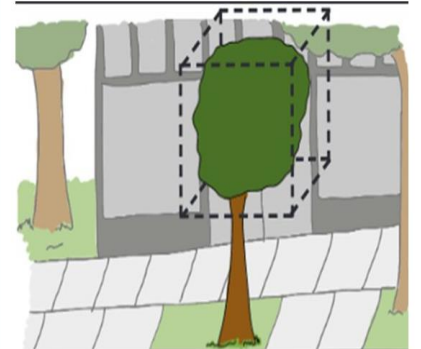
Findings

- Species of tree is important
- We have collected data on so many different variables that this short presentation only scratches the surface of what we could investigate
- We will continue to add to TreePlotter^{TM} to increase our sample size
- We'd welcome suggestions for other variables that we could measure or other pieces of analysis that we could do
- Ideally we'd like an University student to look at the data properly as part of their dissertation or research project

Spin offs

It was evident that neighbours were interested in their street trees and wanted to find out more.

We produced an A4 leaflet about the street trees on which the surveyor could add the tree common name and species and then pop through the neighbour's door.

We also worked with Kier to produce 'Please water me' tree tags which surveyors add to very newly planted street trees if they don't already have one.

The street tree survey is a good way to introduce volunteers to all aspects of tree care eg formative pruning, damage, disease and species identification.

It has helped Birmingham Tree People plan suitable training topics for the Tree Warden monthly training.