

The Impacts of Three Periods of Housing Development on the Urban Forest in Shrewsbury



Steve Shields

Tree & Woodland Amenity Protection Officer

Uni. Cert. For. & F.P. P. Dip. Arb. (RFS) MSc. Arb & U. For. MICFor. M.Arbor.A

Trees Are Good!



Trees Require Space & Resources

- ▶ Trees are living organisms that have complex needs
- ▶ They are susceptible to change and disturbance to their environment
- ▶ If we are to continue to benefit from urban trees then it is vital that we provide space and resources for them to establish and grow



The Changing Urban Environment

- ▶ The urban environment is one which is rapidly changing and expanding and this provides both threats and opportunity for our urban forest
- ▶ Growing Population – the UK population is predicted to grow by 15% over the next 25 years (ONS National Population Projections 2012)
- ▶ To meet the demands of a larger population will require an increase in housing, services and infrastructure

Background

- ▶ The Town & Country Planning Act 1990, places a general duty on the Local Planning Authority to make provision for the preservation and planting of trees when granting planning permission (section 197 TCPA 1990)
- ▶ Trees in Towns II identifies that built development is considered a significant threat to the extent and condition of the urban forest (Britt & Johnston 2008)
- ▶ The Tree Design Action Group guidance recommended that the planting and protection of urban trees is embedded into policies and other plans (Pauli M. ed. (2012))
- ▶ Research published by ciria notes that 'The majority of applications for development are determined by the Local Planning Authority, in accordance with the policies in the local development plan. Effective local policies are vital for tree protection' (Armour et al 2012)

How much do we know about our Urban Forests?



The Urban Forest in Shrewsbury

- ▶ What is the extent?
- ▶ Who owns it?
- ▶ What is it comprised?
- ▶ What are the costs?
- ▶ Is it changing?
- ▶ What condition is it in?
- ▶ Where is it?
- ▶ What are the benefits?
- ▶ What are the threats?
- ▶ Is it sustainable?

The Shrewsbury i-Tree Project



FINDING THE ANSWERS

Research Questions



- ▶ Does the current Urban Forest meet our needs and is it viable and sustainable?
- ▶ What are the long-term implications of any change in respect of the quality, quantity and viability of the urban forest resource?
- ▶ What factors impact on the urban forest resource and can they be controlled by local government policy, tree management practice or by strategic planning?

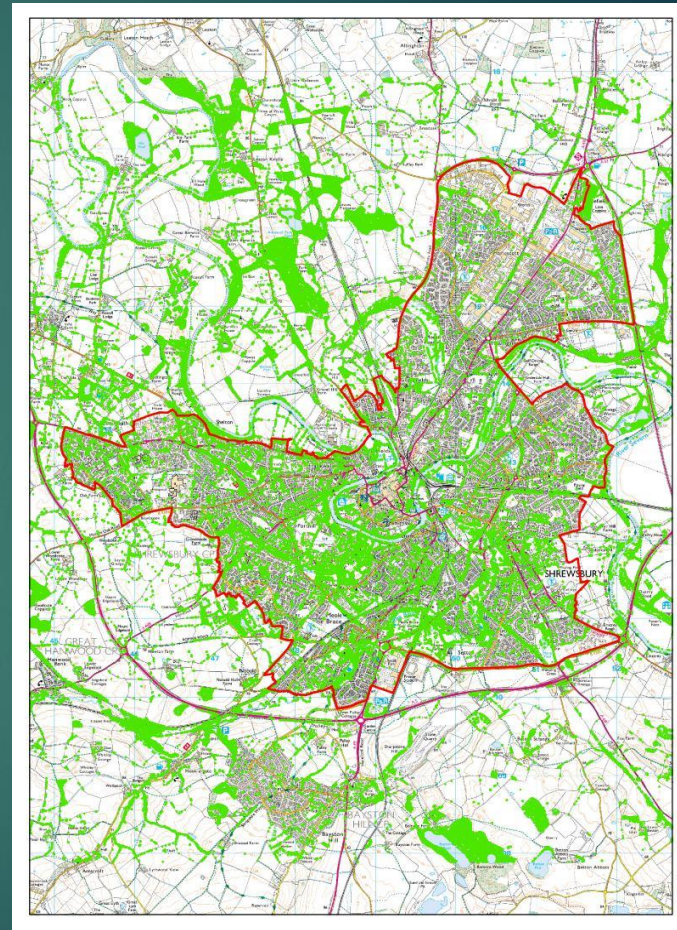
Project Objectives



- ▶ Identify study areas
- ▶ Gather data about the Shrewsbury's urban forest
- ▶ Verify data
- ▶ Digitise data
- ▶ Extrapolate and analyse data
- ▶ Evaluate results from data analysis
- ▶ Develop conclusions

Research Methodology

- ▶ Physical study area defined as the current urban area of Shrewsbury and the proposed urban extensions 2248.5 ha
- ▶ Sample survey undertaken in accordance with itree sample inventory protocol to provide a standard deviation of +/- 10%.
- ▶ Species, height, canopy size, ownership, age class and life expectancy recorded for all trees and large shrubs in sample plots
- ▶ Data on land use and ground cover recorded for all sample plots

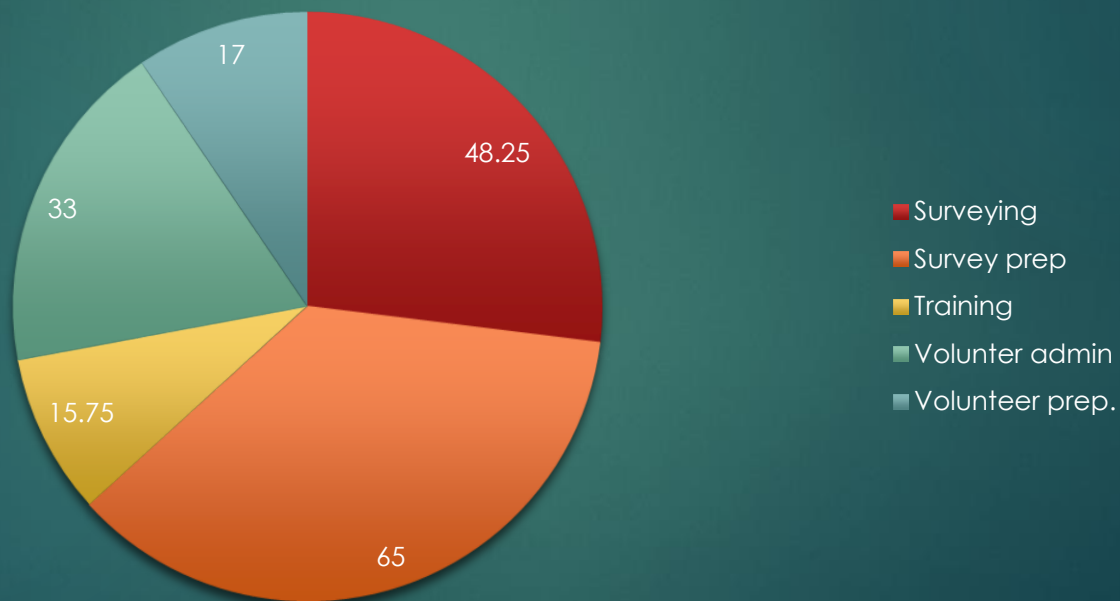


VOLUNTEERS AND THE SHREWSBURY i-TREE PROJECT

	No plots completed	Comments:
Volunteers	99	Site of varying complexity but all were mostly accessible / visible from a public open space.
Coordinator / Tree Officers	84	Difficult plots, or plots requiring permission for access single/multiple back gardens, school grounds and the like.
	47	Sites done by desk assessment, open grassland, carparks / hard standing and industrial units etc.

VOLUNTEERS AND THE SHREWSBURY i-TREE PROJECT

Break-down of co-ordinator time on survey elements by hours



Research Methodology



- ▶ Main physical study area stratified to provide discrete areas:
- ▶ Commercial & Industrial
- ▶ Institutional
- ▶ Open space
- ▶ Residential pre 1950 (279 ha)
- ▶ Residential 1951 – 1984 (840.5 ha)
- ▶ Residential 1985 – present (320 ha)

Research Methodology



- ▶ Data verified by in field checks and desktop assessment
- ▶ All data loaded into excel spreadsheets for analysis
- ▶ Data extrapolated for study areas
- ▶ Results calculated

Results

Urban Forest Metrics Summary									
Study Area (Land Area Ha)	Canopy Cover	Trees per Ha (Total)	Average Tree Canopy Diameter	Average Stem Diameter @ 1.5m	# Species Ha	Ownership	Age Class *	LE **	Size Class
Overall Shrewsbury Town (2248.5)	14%	77.6 (172,320)	4.2m	21.9cm	65	Public 41% Private 59%	1 17% 2 48% 3 35%	1 16% 2 43% 3 41%	L 40% M 30% S 30%
Residential Areas up to 1950 (279)	17.8%	85.5 (23,865)	4.6m	22.3cm	37	Public 12% Private 88%	1 20% 2 53% 3 27%	1 18% 2 42% 3 40%	L 44% M 35% S 21%
Residential Areas 1951 – 1985 (840.5)	12.7%	89.4 (75,458)	5.0m	21.1cm	50	Public 35% Private 65%	1 21% 2 48% 3 31%	1 22% 2 40% 3 38%	L 38% M 20% S 42%
Residential Areas 1985 – present day (320)	10%	67.2 (21,547)	3.8m	19.8cm	31	Public 38% Private 62%	1 27% 2 55% 3 18%	1 18% 2 42% 3 40%	L 32% M 28% S 40%

Table 1: Urban Forest Metrics Summary

* Age class is based on 3 classes, 1, young and semi mature trees, 2, trees in early maturity, 3, trees that are mature to late maturity

** Life Expectancy is based on 3 classes, 1, trees expected to survive less than 10 years, 2, trees expected to survive between 10 & 40 years, 3, trees expected to survive beyond 40 years. This is based on the assessor's opinion of the tree's condition, longevity of the species, location of the tree and any relevant environmental factors.

Pollution Removal & Storage

Shrewsbury Urban Forest Benefits			
Structural Value	£511,878,884		
Pollution Removal	Kg/PA	+/- SE	£/PA ²
CO	397	27	24.17
O3	21,527	1,478	2,159.09
NO2	2,159	145	62,153.20
SO2	1,360	90	2,542.80
PM2.5	1,043	72	
PM10	7,212	498	547,009.3
Total	336,982		613,888.56
Carbon Storage	Tonnes		£ ³
	110,519.2	7,614	3,067,095
Carbon Sequestration	Tonnes		£/PA³
	4,383.3	301	121,632

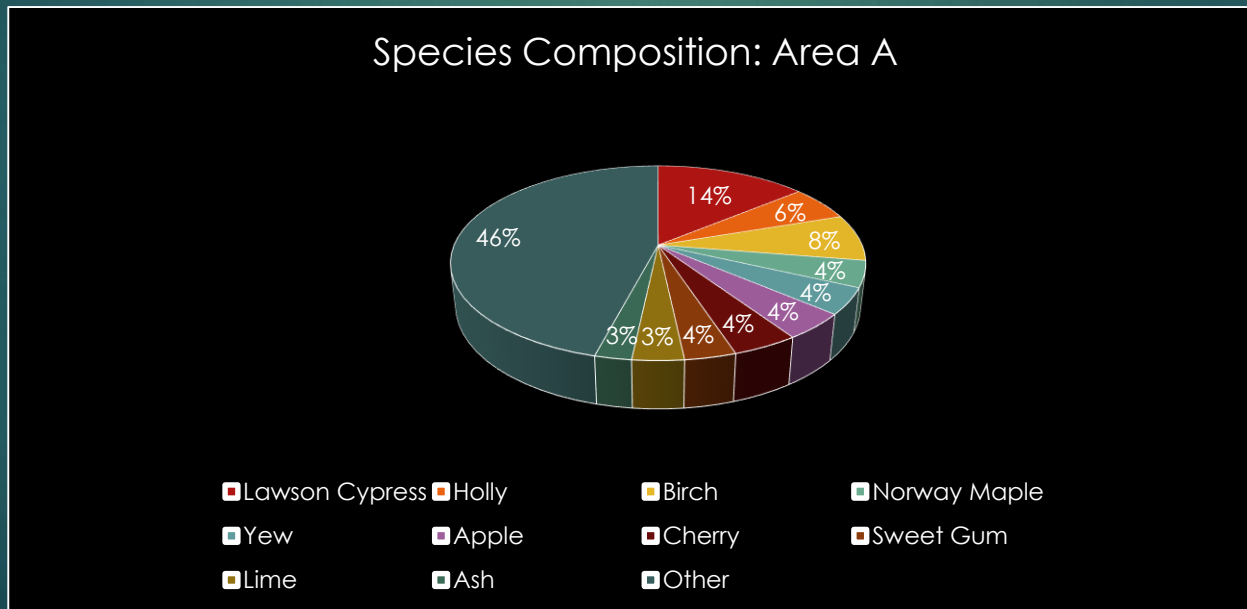
1. Based on CAVAT assessment. 2 Based on UK Social Damage Cost. 3. Based on UK Costs PA = Per Annum SE = Statistical Standard Error

CO
O3
NO2
SO2
PM2.5
PM10

Carbon
Ozone
Nitrous Dioxide
Sulphur Dioxide
Particulate Matter less than 2.5 microns
Particulate Matter greater than 2.5 but less than

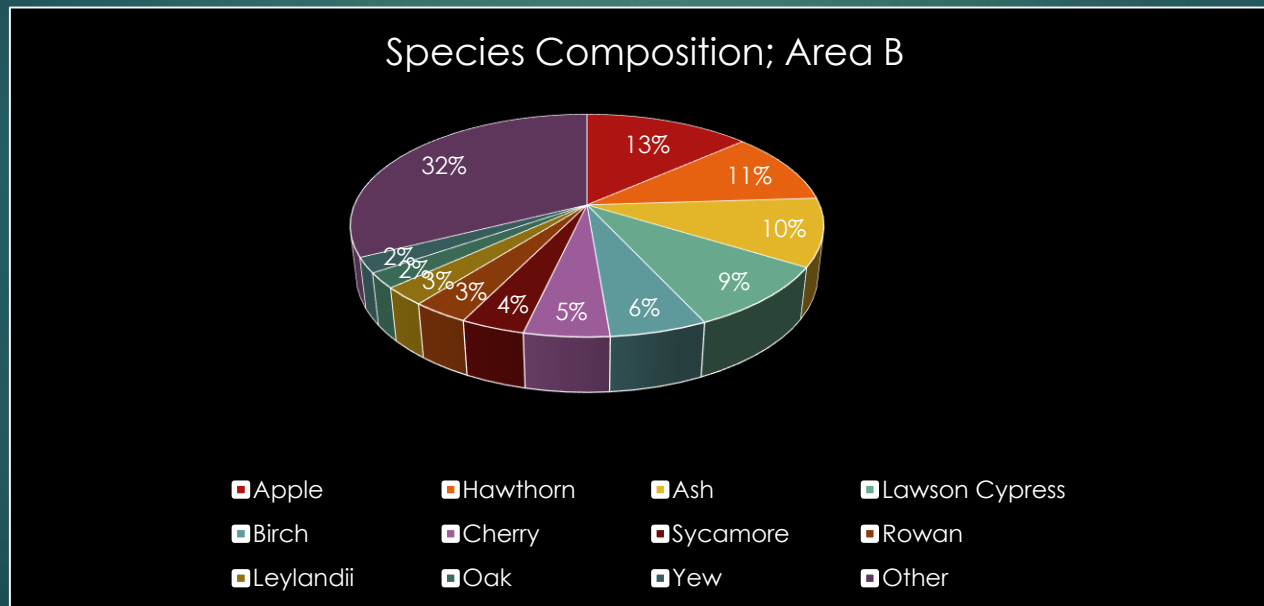
Composition & Species Diversity

- ▶ Area A - Thirty-seven different species of tree were recorded in the sample. The most frequent occurring species was Lawson cypress (14.5%) followed by birch (8%), holly (6%), yew, apple, cherry, leylandii & Norway maple (4.5%). The top five ranking species make up 37.5% of the total urban forest in this area.



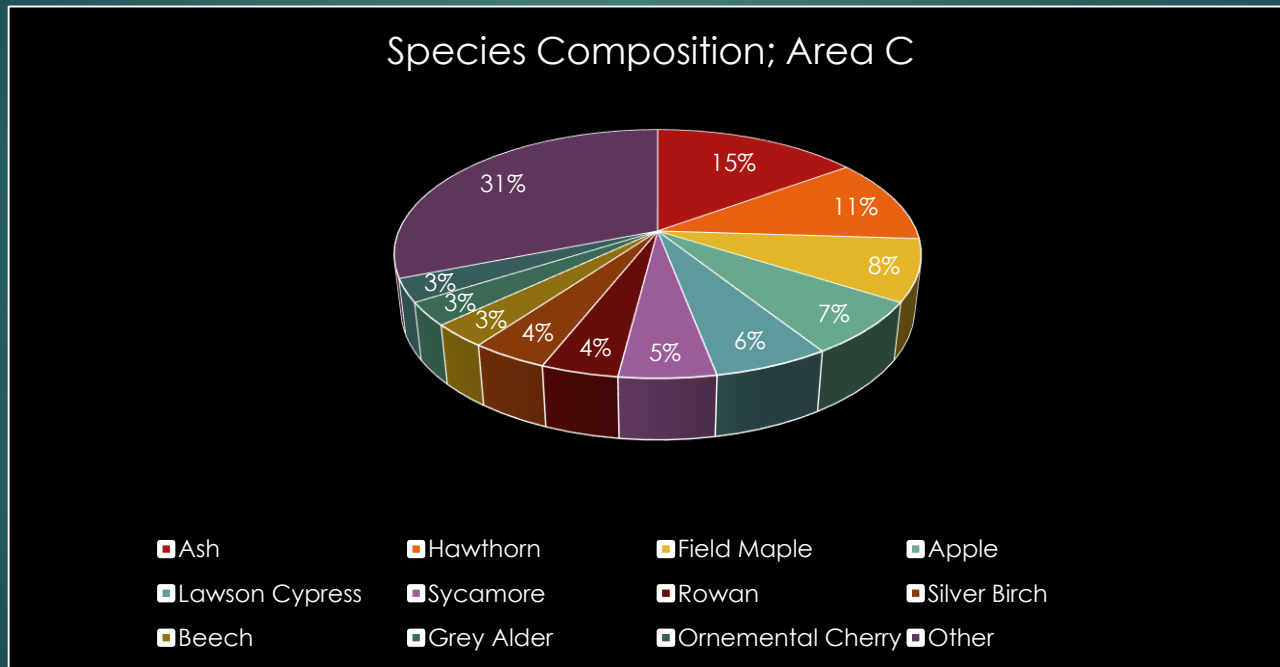
Composition & Species Diversity

- ▶ Area B - fifty different species recorded in the sample. The most frequent occurring species was apple (13.5%) followed by hawthorn (10.5%), ash (9.8%), Lawson cypress (9.3%) birch (5.6%). The top five ranking species make up 48.7% of the total urban forest in this area.



Composition & Species Diversity

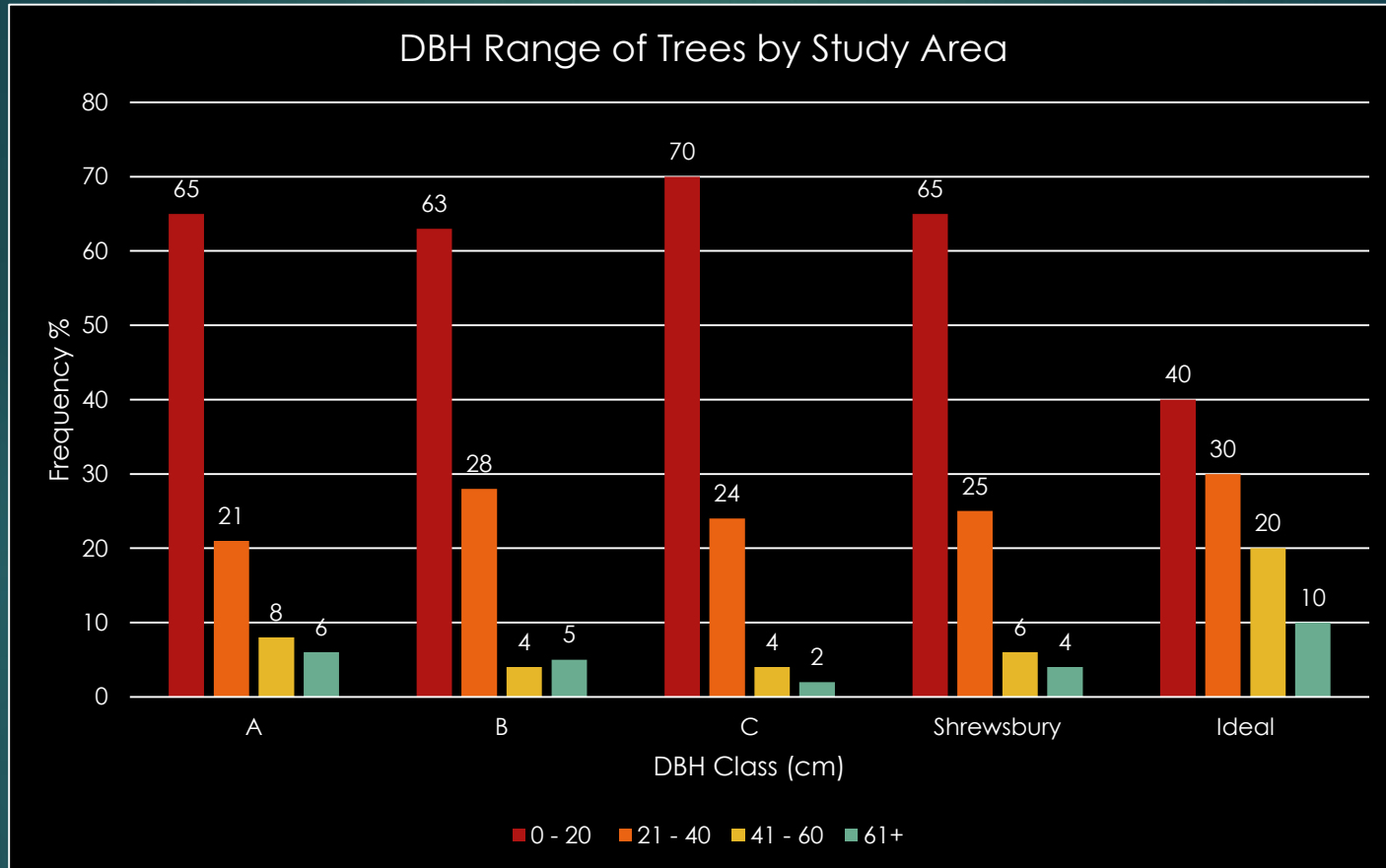
- ▶ Area C - thirty-one different species recorded in the sample. The most frequent occurring species was ash (15%) followed by hawthorn (11%), field maple (8%), apple (7%) Lawson cypress (6%). The top five ranking species make up 47% of the total urban forest in this area.



Physical Structure



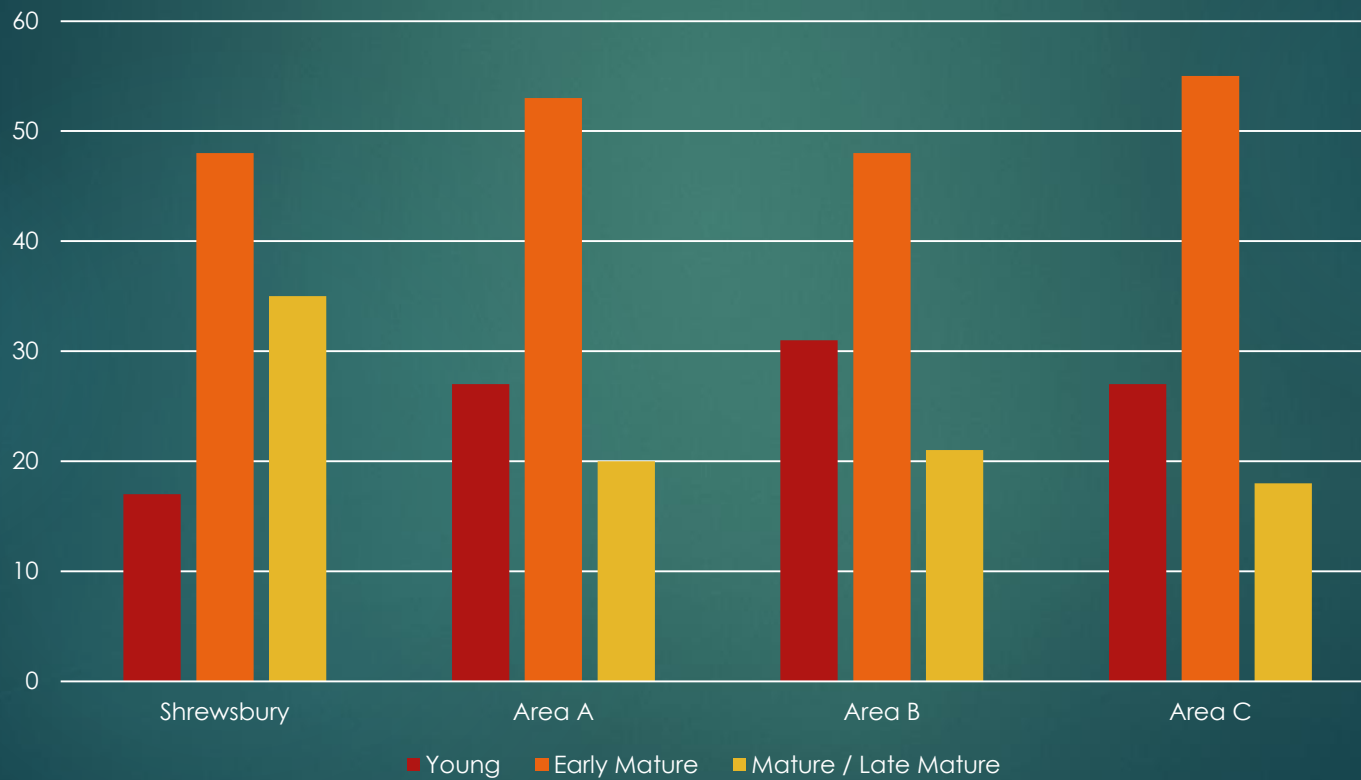
Physical Structure



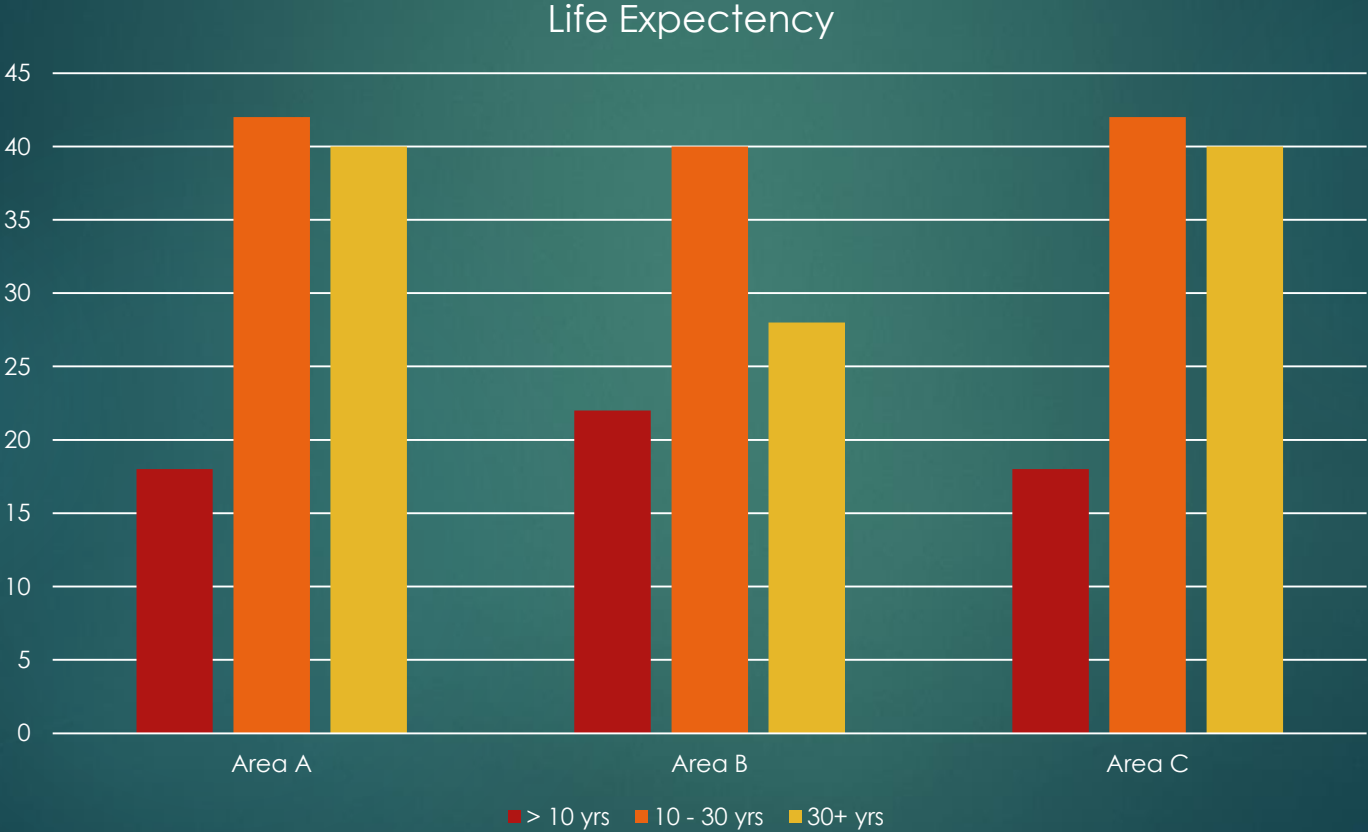
Age Structure



Distribution by Age Class



Life Expectancy



The Next Steps



References

- ▶ Armour T., Job M., & Canavan R. *'The benefits of large species trees in urban landscapes: a costing, design and management guide'* CIRIA 2012
- ▶ Britt. C. & Johnston. M. ed. (2008). *Trees in Towns II*. HMSO
- ▶ British Standards Institution (2012) *'BS 5837 (2012) Trees in relation to design, demolition and construction – Recommendation'* BSI Standards Limited 2012
- ▶ Commission for Architecture and the Built Environment (2005) *'Does money grow on trees'* CABE 2005
- ▶ Forestry Commission. (2010) *The Case for Trees in Development and The Urban Environment*. DEFRA
- ▶ Office of National Statistics *'National Population Projections 2012'*
- ▶ Pauli M. ed. (2012) *Trees in the Townscape A Guide for Decision Makers issue 2* Trees & Design Action Group
- ▶ Town & Country Planning Act 1990
- ▶ Imagery © 201 5 Bluesky, Infoterra LTD & COWI DigitalGlobe, Getmapping PLC, Infoterra LTD. & Bluesky.
- ▶ Map Data © 201 5 Google

Acknowledgements

▶ **Data Collection Volunteers and Supervisors**

▶ Dougald Purce

▶ Aidan Long

▶ Di Long

▶ Alison Collins

▶ Andy Gordon

▶ Anna McCann

▶ Avril Boyce

▶ Caroline Savage

▶ Carla Halford

▶ Clare Kelly

▶ Denis Kelly

▶ Christine Holding

▶ Fran Hunt

▶ Iain Gilmour

▶ John Tuer

▶ Angie Tuer

▶ Judy Coleridge

▶ Lona Hughes

▶ Lucinda Pickering-Quinn

▶ Peter Aspin

▶ Philip Pool

▶ Sophie Kennedy

▶ Tony Legg

▶ Rosemary Thornes

▶ Gillian Gardner

▶ Martin Sutton

▶ Ian Cupper

▶ Duncan Slater

▶ Natural England North Mercia Innovation Fund

For more information please
contact the Tree Team at
Shropshire Council
01743 254643
trees@Shropshire.gov.uk