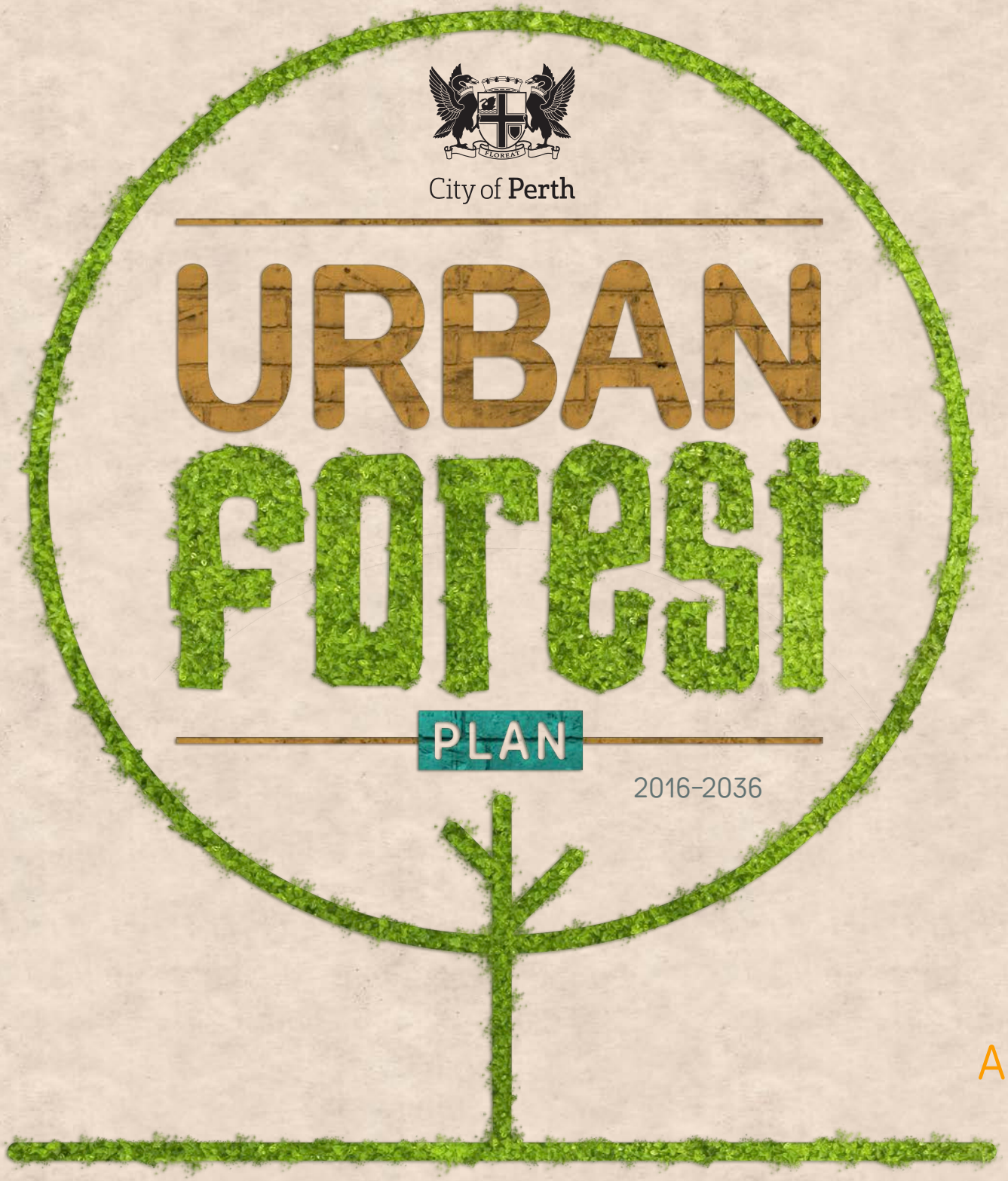
City of Perth

URBAN FOREST

PLAN

2016–2036



Addendum 2017

Contents

Vision

The urban forest will be recognised and valued as an important asset and a key element of infrastructure, one that continues to deliver a range of benefits for our community's physical and mental well-being and the overall liveability, landscape character, biodiversity and climate resilience of our City.

The urban forest will be planned and managed in an integrated manner that above all optimises canopy cover and protects and promotes its sustainable growth, health and resilience in the face of continued urbanisation and climate change challenges.

William Street – Perth

Executive summary

This addendum sets out the findings of new research undertaken to provide information on additional street and parkland trees planted on land recently acquired by the City of Perth within the Crawley/Nedlands area and Elizabeth Quay.

The purpose of this research is to determine if the inclusion of this new tree population will have a significant impact on the goals and objectives of Stage One of the City of Perth Urban Forest Plan.

Findings indicate that these new trees share many of the same issues and challenges previously identified in Stage One. The main findings are summarised as follows:

Levels of canopy cover

- canopy cover over the public realm in Crawley/Nedlands is estimated to be 27 percent

The Urban Heat Island effect

- a number of 'hot-spots' have been identified in Crawley/Nedlands around the hospital campus and the area south west of the main University of Western Australia (UWA) campus

- with the completion of construction of the public realm at Elizabeth Quay, surface temperatures appear to have lowered in the central and eastern section. Land along its western boundary continues to have high land surface temperatures

Aging trees

- over a quarter of trees (28%) will have reached the end of their ULE in the next 15 years and will require replacement

- a strategic replacement plan will be required for avenues of Queensland Box in Crawley/Nedlands

Tree diversity

- there is an over reliance on trees from the Myrtaceae family, which make up more than two thirds (68.7%) of the tree population

- in terms of tree species, the percentage of Queensland Box (18.7%) and WA Peppermint (15.3%) exceeds recommended standards

Tree health

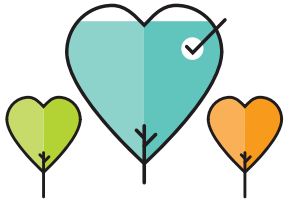
- while 80 percent of trees are in good or excellent health, this is below the targeted standard of 90 percent

The inclusion of the additional population of street and parkland trees is considered to have had a minimal impact on Stage One, and is limited to:

- updating the replacement planting plan for aging trees
- the development of a strategy to improve the health of trees in the new areas

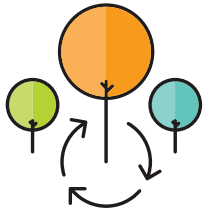
Goal 1:

Protect existing trees



Goal 2:

Replace aging trees

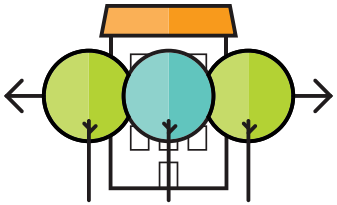


Goal 3:

Promote sustainable water management

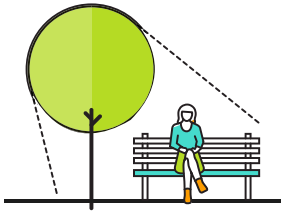
Goal 4:

Increase canopy cover



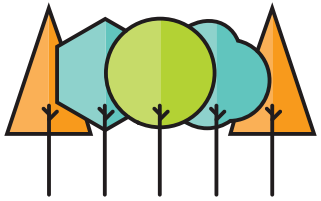
Goal 5:

Prioritise tree planting to help cool public spaces and City 'hot-spots'



Goal 6:

Promote balance and resilience in species composition



Goal 7:

Maintain tree health

Goal 8:

Implement a 'whole-of-forest' management approach

Goal 9:

Promote community engagement

1.0 Introduction

The urban forest is a valuable asset and a key element of city infrastructure, delivering a range of community benefits that help improve city liveability, promote community health and well-being and climate resilience.

Stage One of the City of Perth Urban Forest Plan sets out a vision, goals and objectives for the City's population of street and parkland trees. It is a strategic action plan focused on promoting the long term health and resilience of these trees to maximise the level of community benefits delivered. Stage One was adopted by Council in September 2016.

1.1 Addendum

This addendum is a separate supporting document to Stage One. It provides information on the nature and condition of the new population of street and parkland trees recently acquired by the City of Perth due to:

- the amalgamation of the Crawley/Nedlands area within the City of Perth boundaries as a result of the enactment of the City of Perth Act (2016)
- completion of the Metropolitan Redevelopment Authority project at Elizabeth Quay (see Figure 1).

The purpose of this addendum is to:

- set out the key findings from additional research carried out to assess the performance of newly acquired trees against indicators for urban forest management
- identify the main issues and challenges
- summarise the impact on the goals and objectives established in Stage One

Additional research included:

- Street and Parkland Tree Audit (2016)
- thermal imaging data (2014 & 2017)

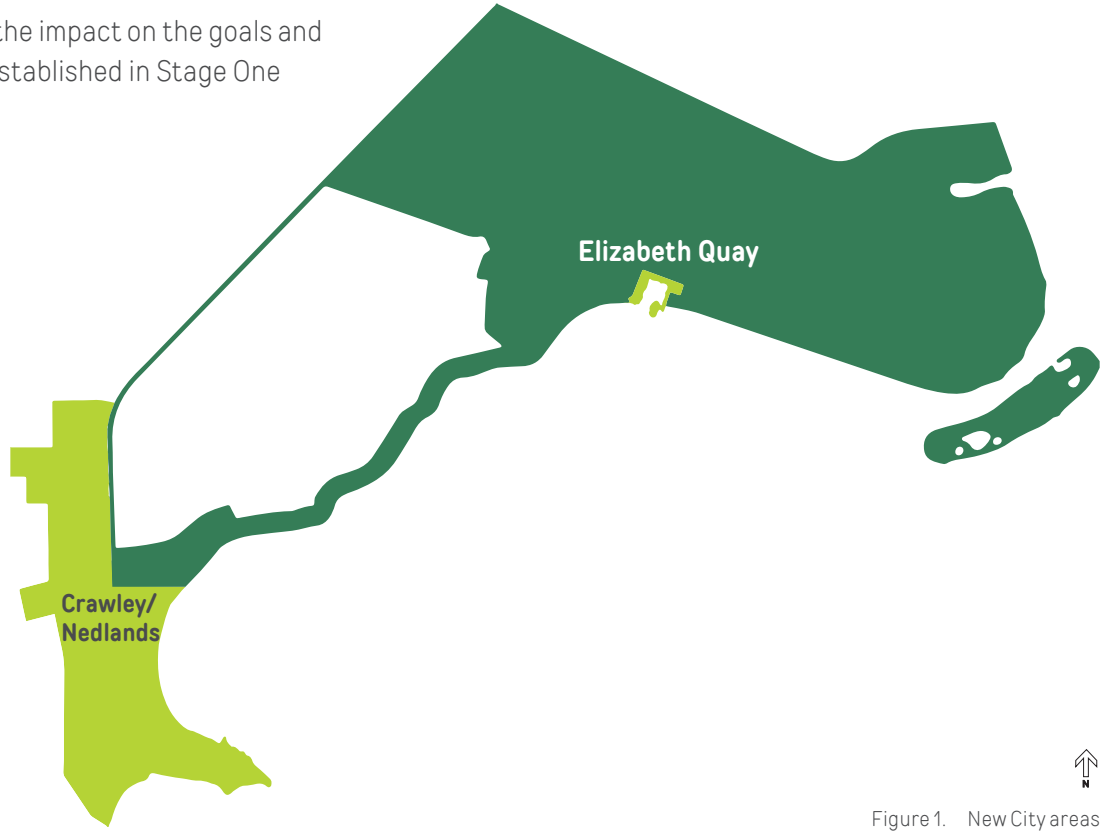


Figure 1. New City areas

J H Abrahams Reserve - Crawley

2.0 What we have

The City has acquired an additional 1723 trees including:

- 1590 trees in Crawley/Nedlands
- 133 trees in Elizabeth Quay

Further information on how this overall population is broken down by location, tree family and species is summarised in Figure 3.

Collectively these trees have an estimated amenity value of $11 million. This figure excludes the ecosystem services that these trees provide.

2.1 Levels of canopy cover

Information on canopy spread, collected as part of the Street and Parkland Tree Audit (2016), indicates that the canopy cover over the public realm in Crawley/Nedlands is approximately 27 percent (see Figure 2).

This is a high figure and can be partly attributed to the predominance of residential/recreational land uses in the area.

The inclusion of Elizabeth Quay has added approximately 0.4ha of canopy cover to the City's public realm.

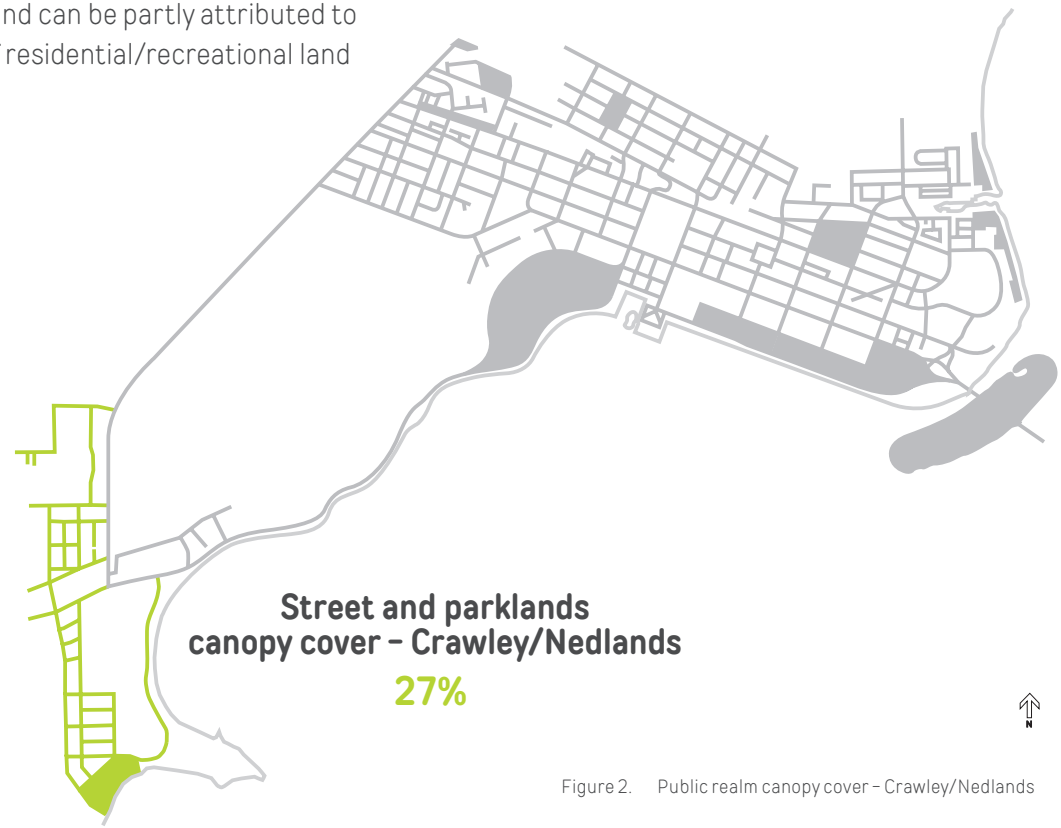


Figure 2. Public realm canopy cover – Crawley/Nedlands

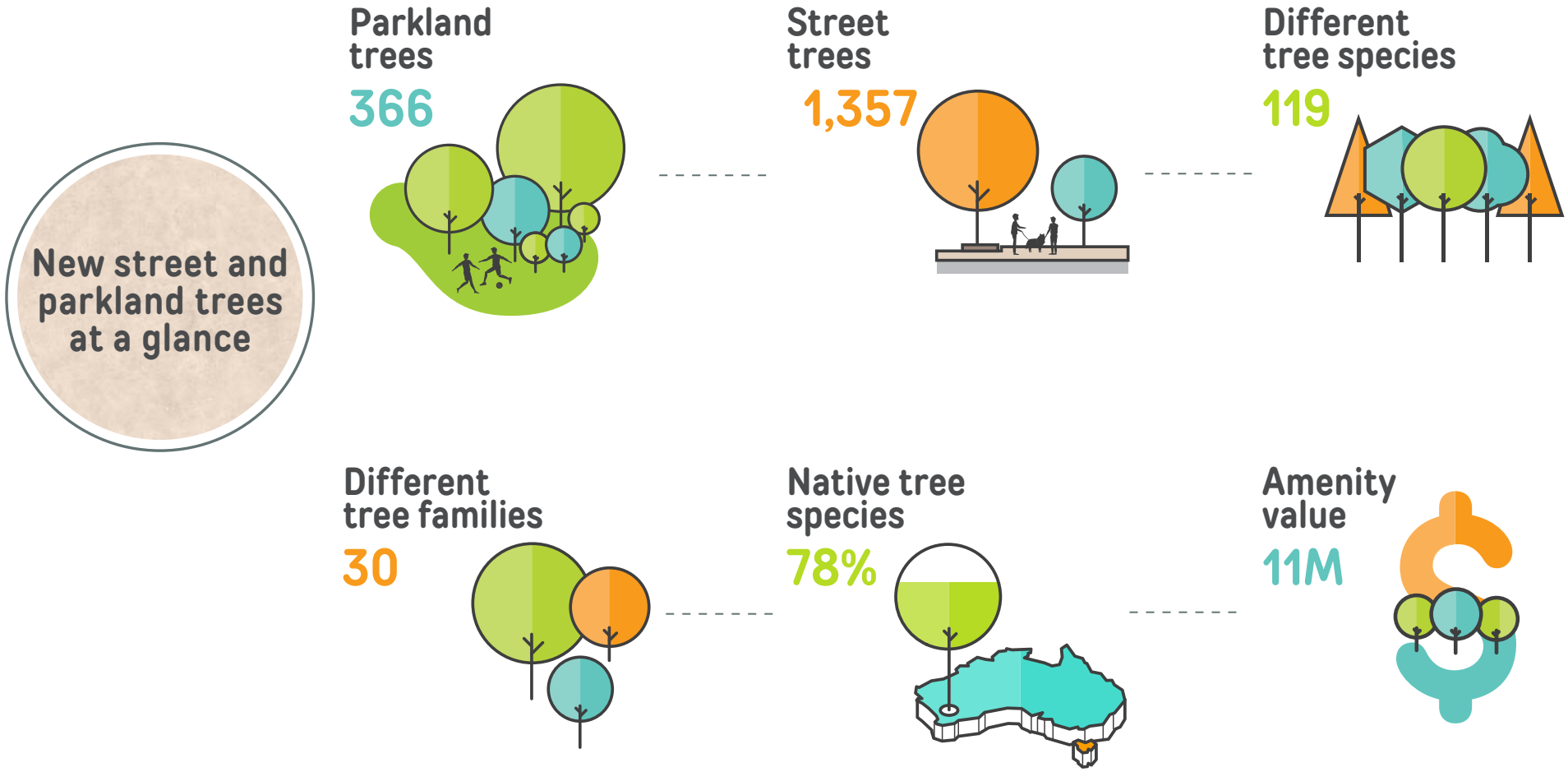


Figure 3. New street and parkland trees

2.2 The UHI effect

Additional satellite data was acquired to provide information on the day-time land surface temperatures for Crawley/Nedlands, mid-morning on 10 January 2014. A number of 'hot-spots' have been identified, concentrated as follows:

- around the hospital campus, located in the north-west of the Crawley/Nedlands area, where there are large areas of surface car parks and exposed road and roof surfaces
- land to the south-west of the main University of Western Australia (UWA) campus

The areas around J H Abrahams Reserve and Matilda Bay Reserve are cooler (see Figure 4).

In the 2014 satellite data Elizabeth Quay emerged as a 'hot-spot' area. This was most likely because it was under construction at that time, with large areas of bare, unirrigated land surface.

Construction of the public realm has since been completed and current satellite data has been acquired (2 January 2017). This indicates that land along the western boundary of Elizabeth Quay continues to have high land surface temperatures, whereas temperatures in the central and eastern sector appear to have been lowered (see Figure 4 – Insert).

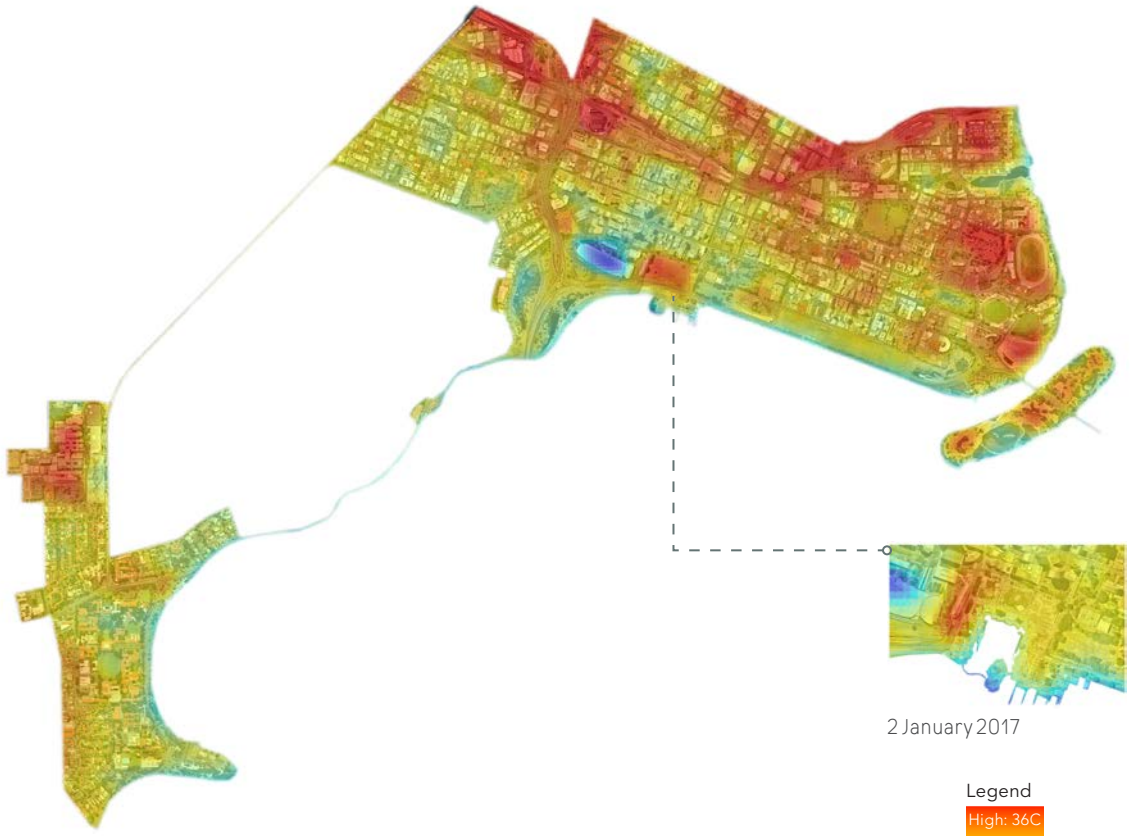


Figure 4. Satellite imagery – 'hot-spots'

2.3 Age diversity

The new tree population is performing reasonably well with regard to age diversity, with the majority in the mature age class.

Just over one quarter are juvenile, most likely reflecting new tree planting that has recently taken place at Elizabeth Quay. Approximately 70 trees are in the post-mature class meaning that the tree is likely to be within 90 percent of its expected life span in terms of age (see Figure 5).

A small number of 'veteran' trees are present including the large Moreton Bay Figs at Elizabeth Quay and some Flooded Gum in J H Abrahams Reserve.

The key issues identified for managing age diversity include:

- maintaining a good range of age diversification through regular planting cycles
- valuing the retention of older mature trees as part of future urban development
- protecting veteran trees

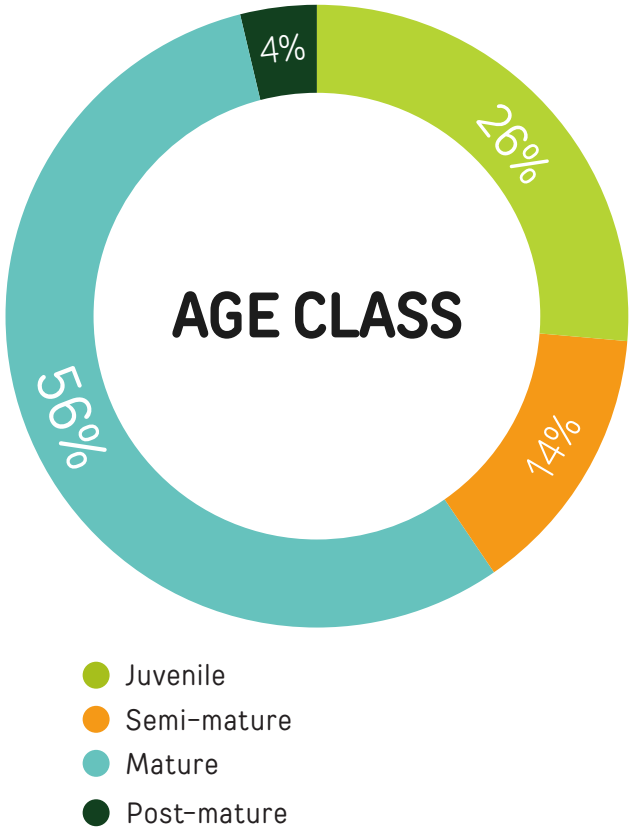


Figure 5. Age class

2.4 Aging trees

The new tree population faces challenges in terms of levels of Useful Life Expectancy (ULE), the measure of the potential life span remaining for a given tree in its existing location.

Over one quarter of trees will require replacement in the next 15 years (see Figure 6). This includes approximately 110 trees to be replaced in the next 5 years (32 of which are dead). Approximately 370 additional trees will require replacement in the next 15 years.

Key contributing factors include:

- declining health of existing Queensland Box and WA Peppermint trees in Crawley/Nedlands due to their age and/or environmental factors associated with poor successive seasonal rainfalls over the last decade
- poor stock and planting practices for juvenile trees

Many of the Queensland Box trees are planted in avenues along a number of residential streets in Crawley/Nedlands, where they have been identified as providing high levels of visual appeal and good levels of canopy cover. A strategic replacement plan will be required for those trees reaching the end of their ULE, to ensure that these positive qualities are maintained into the future.

Around **6%** of street and parkland trees (approx. 110 trees) will require replacement in the next **5 years.**

A further **22%** (approx. 370 trees) will require replacement in the next **5 –15 years.**

Of the top ten tree species, two have significant issues in terms of ULE, with nearly all of the Native Frangipani (92%) and nearly half of the Queensland Box (42%) requiring replacement within the next 15 years.

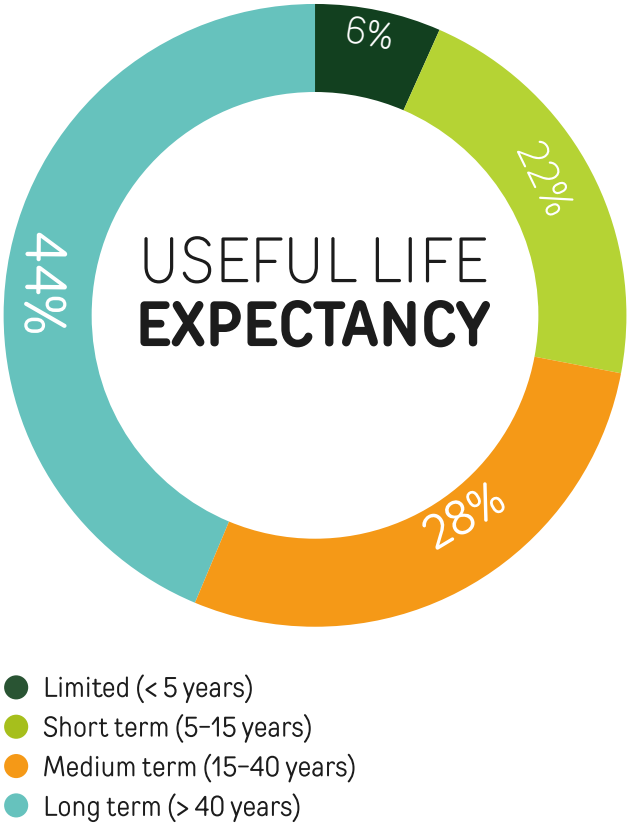


Figure 6. Useful Life Expectancy

Figure 7. ULE of street and parkland trees

2.5 Tree diversity

The new tree population is heavily over reliant on one tree family. Over two thirds of the total population is comprised of trees from the Myrtaceae family, making it the largest family present (see Figure 8).

Myrtaceae trees make up more than 70 percent of the populations of both street trees in Crawley/ Nedlands, and parkland trees in J H Abrahams Reserve.

One new tree family, Plumbaginaceae, has been introduced to the urban forest as a result of the inclusion of the new areas.

There is a relatively diverse range of tree species present within the new areas. However, both the Queensland Box and the WA Peppermint exceed recommended standards for tree diversity (see Figure 9). There is significant potential to increase the representation of other tree species in any new or replacement planting within the population of street trees in the Crawley/Nedlands area.

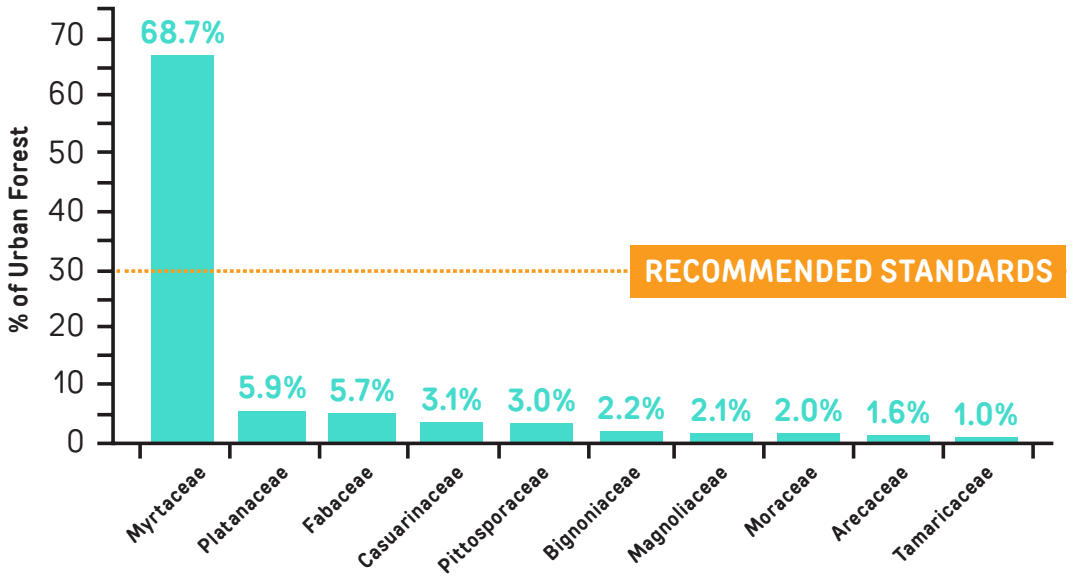


Figure 8. Tree diversity: representation of top ten tree families

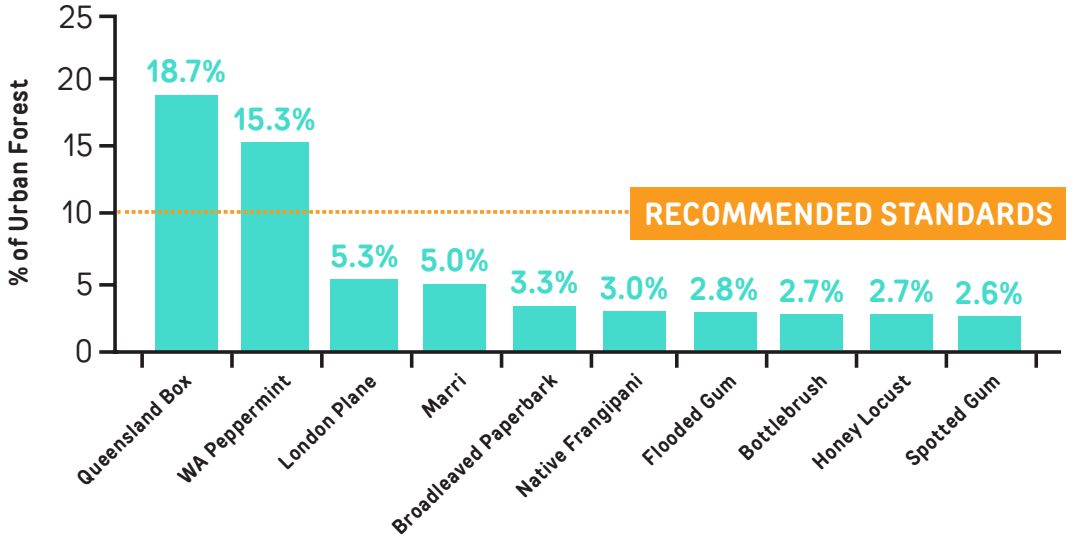


Figure 9. Tree diversity: representation of top ten tree species

Residential Street – Nedlands

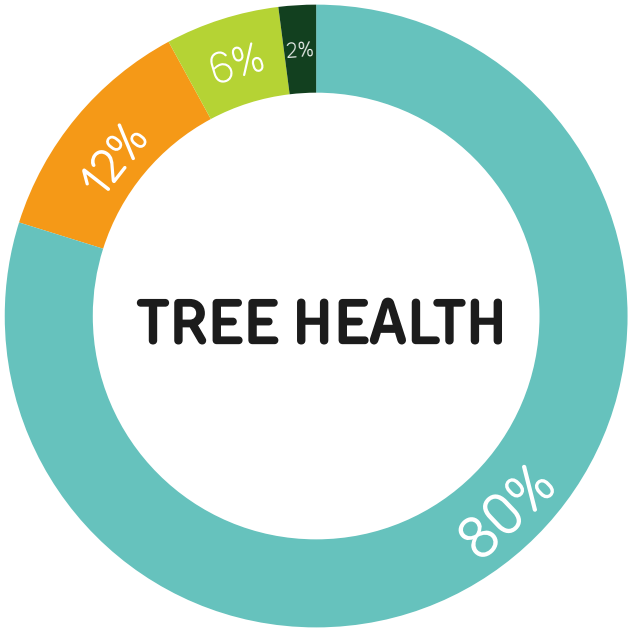


Figure 10. Tree health

2.6 Tree health

In terms of tree health, 80 percent of new trees are in good or excellent health (see Figure 10). This compares to 92 percent of trees in Stage One, which exceeded the target of 90 percent of trees being in good or excellent health.

A range of health issues have been identified that must be addressed to improve tree health. Some of these are consistent with findings in Stage One, including:

- environmental issues
- deteriorating structural condition
- tree risk
- management and maintenance

Additional health issues which are specific to the new tree population include:

Root barriers

Root barriers have been placed around the majority of trees in the Crawley/Nedlands area. Possible long term implications for the in-ground stability and the on-going health of these trees need to be considered.

Watering

Watering techniques applied to juvenile trees could be improved to help maximise health levels within the population of street trees in Crawley/Nedlands.

Vandalism

A number of trees at J H Abrahams Reserve have been vandalised, which has had a negative impact on tree health.

Drainage

A range of issues have been identified that relate to the broader issue of drainage, as follows:

- the health of trees in the Barrack Square area appears to be currently affected by poor drainage and waterlogging of the tree pits
- the planting of street trees within soakwells in Elizabeth Quay is not in line with best practice as this has been known to reduce tree life span and hinder healthy root development
- monitoring of the Magnolia trees planted in the rain garden features on Barrack and William Streets within Elizabeth Quay is required as a number of these trees have previously died

Norfolk Island Pines – Barrack Square

There are a number of larger Norfolk Island Pines present in Barrack Square. Due to their size and visual prominence these may be considered as significant trees within the urban forest. However, a number of them are currently in decline and action should be taken to identify and address what may be causing this.

Kanimbla Road – Nedlands

3.0 Impact on the urban forest

The research findings indicate that the population of street and parkland trees in the new areas share many of the issues and challenges outlined in Stage One of the City of Perth Urban Forest Plan. Their inclusion will generally have a minimal impact on the vision, goals and objectives currently set out in Stage One.

Aging trees (ULE) and overall levels of tree health have, however, emerged as issues which will require amendments to the objectives listed under *Goal 2: Replace aging trees* and *Goal 7: Maintain tree health* within the Stage One document, as follows:

Aging trees

Due to the large number of trees identified in the new areas as needing replacement within the next 15 years, the replacement planting plan set out in priority objective 2.1 will require updating as follows:

Original replacement planting plan (as per Stage One)

Timeframe	Number of trees to be replaced
2017–2020	71 trees replaced annually (limited ULE)
2021–2035	95 trees replaced annually (short ULE)

Updated replacement planting plan

Timeframe	Number of trees to be replaced
2017–2020	99 trees replaced annually (limited ULE)
2021–2035	120 trees replaced annually (short ULE)

Tree health

With only 80 percent of street and parkland trees in good or excellent health action is required to improve health levels within the new areas.

An additional objective will be included under Goal 7 to develop and implement a strategy to improve the health of trees in the new areas.

J H Abrahams Reserve – Crawley

4.0 Next steps

With the completion of this addendum Stage One of the City of Perth Urban Forest Plan addresses the total population of street and parkland trees planted on land owned and/or managed by the City of Perth on land within its current boundaries.

The Urban Forest Implementation Plan is currently in development, scheduled for completion in mid-2017. The objectives and detailed actions set out in the Implementation Plan will drive the delivery of the vision and goals for Stage One and these will incorporate the amendments outlined in this addendum.