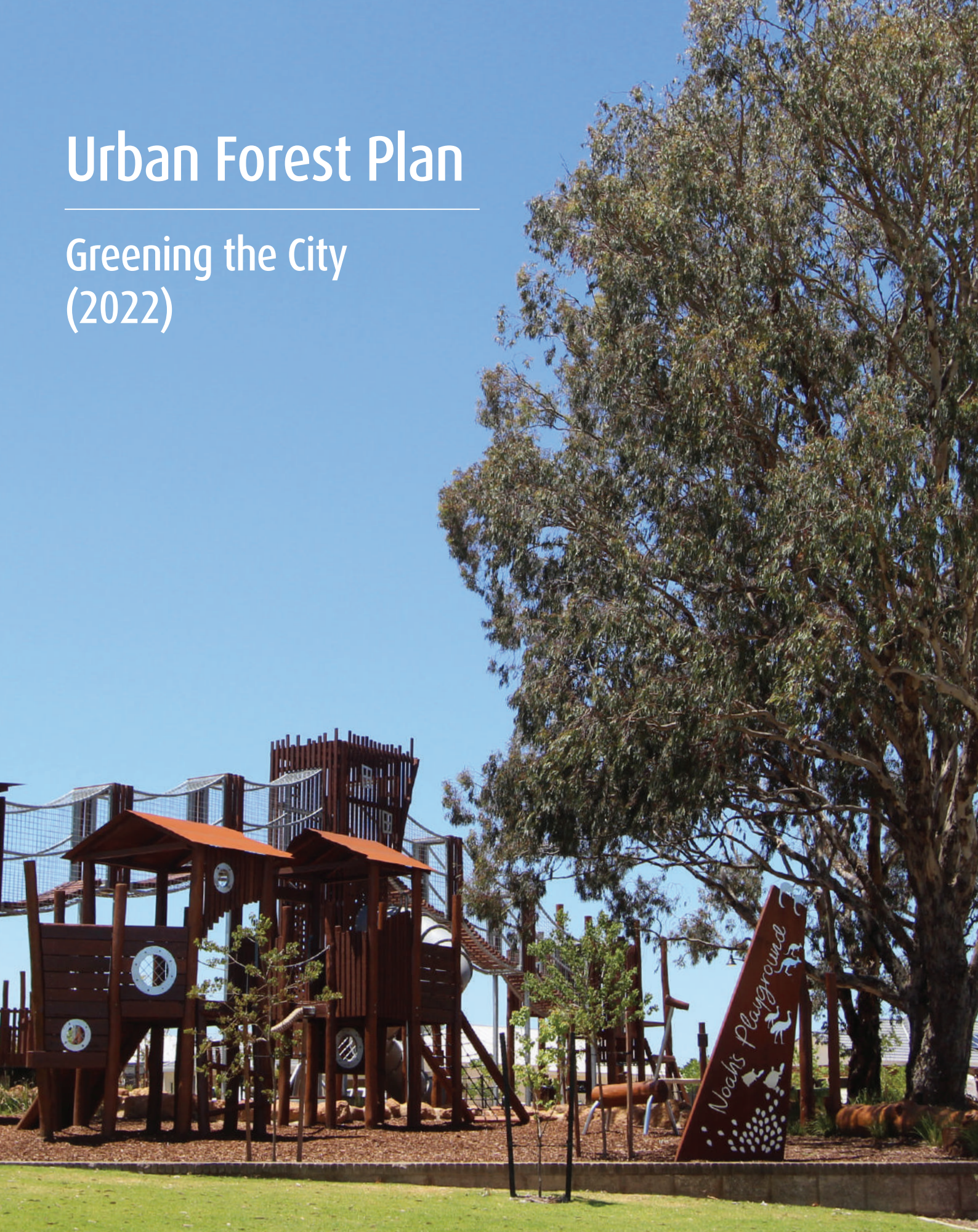


Urban Forest Plan

Greening the City
(2022)



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city of swan



STIRLING SQUARE,
GUILDFORD



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Summary

The City of Swan recognises that trees provide an important service in urban areas due to their ability to absorb carbon and purify the air that we breathe. They also help to cool outdoor spaces particularly in heat-absorbing paved areas. Trees and other vegetation have a significant role in providing amenity, liveability, habitat for biodiversity and in supporting mental wellbeing for our community.

The Urban Forest Plan (the Plan) represents an integrated approach to supporting and enhancing our urban forest within the City's operations and in the wider community. Achieving cohesive urban forest outcomes requires commitment, leadership and consistent effort across the entire organisation.

This Plan seeks to provide healthy and diverse landscaping on public and private land supporting biodiversity, preserving natural amenity and protecting valuable natural plant resources as the region develops. The Strategy will set the City's policy for urban forestry defining future actions required to deliver a cohesive and connected urban forest in the City of Swan.



**JAMES STREET,
GUILDFORD**





Introduction

Many local authorities across the Swan Coastal Plain are seeking to address the issue of tree canopy loss within their boundaries. This loss of tree canopy is occurring due to a variety of reasons and these are common across all local authorities. This has led to rapid decline in the tree canopy across the Perth metropolitan area and an acceptance in City planning and environmental disciplines that the liveability of our urban spaces will be substantially reduced if this decline is not addressed. There are strong indications that parts of our community are beginning to reach a similar conclusion.

The City of Swan is experiencing loss of its tree canopy as clearing of vegetation increases with continued development. This gradually erodes the City's urban tree canopy, reducing the ability of trees to provide important services such as shade, amenity, habitat and forage for fauna and reduction of the urban heat island (UHI) effect. The Environmental Protection Authority (EPA) has noted that heat-wave related deaths in Perth could more than double by 2050 as a result of the urban heat island effect and climate change.

The City anticipates our population growing to 240,000 by 2036 representing a 54% increase in residents. In this scenario, the existing urban forest will be placed at significant risk, therefore the City has a responsibility to ensure this forest is retained and protected. Open space, district parklands, green corridors and streetscapes are critical in supporting biodiversity, mitigating heat and preserving natural amenity as the metropolitan projected population approaches 3.5 million by 2050.

This Plan represents an integrated approach to addressing these issues by supporting and enhancing our urban forest within the City's operations and throughout the wider community. Achieving cohesive urban forest outcomes requires commitment, leadership and consistent effort across the entire organisation.

This Plan seeks to provide healthy and diverse landscaping on public and private land supporting biodiversity, preserving natural amenity and protecting valuable natural plant resources as the region develops. The Plan will set the City's policy for urban forestry defining future actions required to deliver a cohesive and connected urban forest in the City of Swan.



**CNR SWAN AND HUGH STREET,
GUILDFORD**

What is an Urban Forest?

An urban forest comprises of trees and other vegetation within urban areas of the City. It also includes the soil and water that supports vegetation. The urban forest includes both native and exotic flora species, irrespective of land ownership or location.

This encompasses vegetation within any streetscape, river and creek embankment, bushland, wetland, park and transport corridor. It also includes trees and vegetation within private properties such as backyards, front setbacks (verges), rooftops and vertical gardens.

It incorporates canopy trees, namely vegetation greater than 3 metres that provide permanent reliable shade and recognised flora communities.

The urban forest consists of the larger population of trees rather than individual trees. The “tree canopy” can be measured over time as a canopy cover proportion of the total land area.

Why do we need an Urban Forest Plan?

Canopy trees, street trees and other vegetation are an important community asset that contributes to the liveability of the urban environment and the quality of life for its people. Our community is coming to realise that trees and vegetation have more than ornamental value and should be viewed as critical infrastructure that must take priority over other forms of urban infrastructure.

A comprehensive plan is necessary to bring together the various services and disciplines that the City undertakes which directly, and indirectly, impacts the presence of canopy trees and other vegetation composing the urban forest. The Plan has relevance to the following services offered by the City:

- Governance
- Asset management / Construction and Maintenance
- Planning and Development control
- Marketing and Public Relations
- Community Engagement
- Project management
- Parks/Natural Area Management
- Sustainable Environment

The plan aims to improve the quality and distribution of tree canopy and vegetation forest on both public and private land.

Benefits of Urban Forestry

A connected and cohesive urban forest has a range of benefits. Canopy trees and vegetation are seen as important assets that contribute to the liveability of a place and to the quality of life and urban vitality for residents and visitors.

Trees provide many environmental, economic and social benefits. Urban forestry best practice among local governments across Australia, independent research and the State Government document Urban Forest of Perth and Peel (WAPC, 2014) all identify the numerous benefits trees have in urban areas.

Key benefits arising from sufficient canopy trees and other vegetation are summarised in the table below.

| Environmental | Economic | Social |
|--|--|--------------------------------------|
| Improving air quality | Reduce energy demand and cost | Encourage outdoor activity |
| Reducing stormwater flows and nutrient loads | Increased property values | Enhanced sense of place and identity |
| Provision of habitat and forage for biodiversity | Avoid costs of infrastructure damage and renewal | Improved community cohesion |
| Greenhouse gas emission absorption | Decreasing health costs | Reduced heat-related illness |
| Greater adaptability to changes in climate | Marketing the City and boosting local business | Improved mental wellbeing |

Urban Forest Outcomes

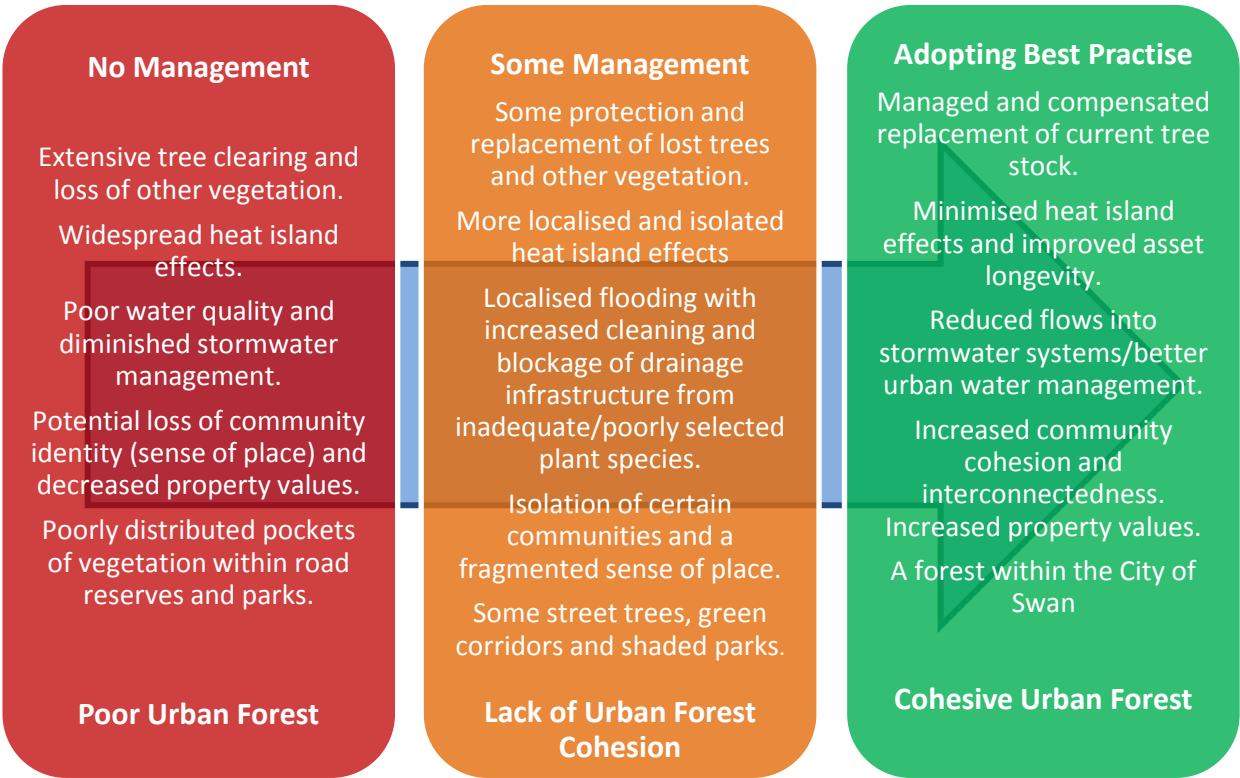
Achieving good outcomes in our urban forest is dependent on our ability to develop and implement an integrated organisational approach and the level of support we are able to generate in the wider community. Urban forestry combines both amenity and science balancing the biophysical and socio-economic influences which underlines the need to enact an integrated organisational approach.

Developing an urban forest requires specific management practices and funding to maximise the physiological, sociological, and economic and aesthetic benefits that trees and other vegetation provide. The degree of success achieved throughout the lifecycle of this plan will depend on the degree to which current policy and management practices are amended and implemented and funding arrangements are realised across the City.

In a diverse City like the City of Swan, successful urban forestry must be contextually appropriate to particular locations. Different areas or suburbs may require a tailored approach to planting or protection of trees and vegetation to achieve the wider benefits and greatest value for residents and the environment.

The following diagram depicts the expected urban forestry scenarios with three levels of applied management with resultant outcomes.

A connected and cohesive urban forest is best achieved through actively adopting a ‘best practise’ management approach:



Strategic Framework



In order to demonstrate that the work done within the Swan community contributes to the achievement of global imperatives, the City of Swan has made the decision to demonstrate the alignment of our Strategic Community Plan to the United Nations Sustainable Development Goals (SDG's).

This decision represents a clear indication of the City's intent to demonstrate that our activity will contribute to the achievement of both local and global objectives.

The City remains committed to working within our framework to continue to adapt, support and empower communities to be aware of the changes they can make that contribute to global solutions.

The City lists below the two SDG's that are to be pursued through this Urban Forest Plan.



The City's Strategic Community Plan (SCP) establishes the strategic direction for the community over its ten year lifecycle and is considered the principal strategy and planning document.

Under the Natural Environment KRA, the SCP details a vision of environmentally sustainable leadership and stewardship for its parkland and natural environment. The Plan recognises the many high value natural assets (natural lands, open space, and wetlands and waterways such as the Swan River). The City is committed to understanding and managing environmental impacts into the future, and preserving and protecting the ecological values of these assets.

Two key outcomes are identified in the Plan which relate to protecting the City's natural environment, particularly for trees and vegetation:

| | | |
|---|--|---|
| N1 Outcome: Our environment is protected for future generations | N1.2 Adapt to the effects of climate change | N2.2 Implement policy changes through planning, building and land management and infrastructure |
| N2 Outcome: Biodiversity retention | N2.1 Preserve and protect local ecology and biodiversity of natural ecosystems | N2.1.1 Conserve open spaces, natural vegetation and bushland |
| | N2.2 Reduce adverse impacts on biodiversity | N2.2.1 Protect waterways through appropriate land management practices. |

Under the Built Environment KRA this plan also identifies a vision for diverse, connected and sustainable places with three outcomes relating to community, infrastructure and transport which require consideration when planning and developing the City's built assets. However the role of the City's natural assets, particularly its trees and vegetation, is also important as these play an important role in fostering diverse, connected and sustainable places for our community. This is recognised in the SCP as follows

| | | |
|---|---|---|
| B1 Outcome: Community places to live, recreate and work | B1.1 Facilitate and integrate housing options, local services, employment and recreational spaces | B1.1.4 Provide appropriate open space to recreate and connect |
| | B1.2 Build a sense of place through open spaces | B1.2.1 Create and align Place Land Use Plans |
| B2 Outcome: Infrastructure that meets community need | B2.1 Manage current and future assets and infrastructure | B2.1.1 Continue to improve asset management practices |
| | B2.1 Maintain and protect heritage | |
| B3 Outcome: Sustainable transport solutions | B3.1 Advocate and provide alternative transport | B3.1.2 Provide bicycle and pedestrian connections |



**TERRACE ROAD,
GUILDFORD**

Urban Forest Snapshot

The City has a very diverse urban fabric and there is significant variation of built form depending on the age, location and housing characteristics of a particular suburb. Urban form in the City can range from traditional grid street patterns with larger lots and relatively smaller building footprints mostly established during early colonial settlement (i.e. Guildford and Woodbridge) to more contemporary master-planned estates with smaller allotments, reduced street frontages and comparatively larger building footprints (as seen in Ellenbrook and the newer suburbs of Bennett Springs, Brabham and Dayton).

The variation in the suburban layouts and built form characteristics of each suburb across the City shows that achieving desired tree canopy outcomes and providing ongoing management of the urban forest requires a strategic and tailor-made approach to implementation. Planting and protection regimes for canopy trees and other vegetation must respond to the context in which they are located and reflect the specific needs of the local community and environment.



**HAZELMERE STORE,
HAZELMERE**

Tree Canopy Coverage Demonstrated


Characteristics of urban form, community expectations and development trends dictate the predominance of vegetation coverage in a particular area or suburb. Trees are typically retained in areas where there is more space to accommodate their canopy and root system.


It is evident that a larger building footprint to site area ratio (i.e. plot ratio) has a direct correlation to the presence of canopy trees on private land. This is demonstrated in more established suburbs such as Guildford and Woodbridge which contain larger lots with comparatively smaller building footprints and larger setbacks. In these areas there is generally greater tree canopy coverage compared to more modern suburbs with lower plot ratios.


This reduction of tree canopy coverage is evident within the suburbs encompassing the Urban Growth Corridor and areas that are undergoing residential densification. Suburbs that support infill development are also susceptible to having reduced tree canopy coverage as plot ratios are not conducive to supporting established trees. Redevelopment often leads to clearing of vegetation on private lots and within the street verge to accommodate new dwellings and crossovers for vehicular access onto the road network.

Verge widths and the presence of obstructions such as footpaths and overhead powerlines are physical constraints dictating where street trees can be located. In areas where there are more hard surfaces, reduced setbacks and vehicle crossovers, it is much more difficult to provide canopy trees within the public realm.

The following tables depict the various tree canopy coverage ranges expressed as a percentage within the area of an aerial photograph and some of the historical reasons for the presence of canopy trees

| Canopy Coverage (%) | Urban Area Example |
|---------------------|--|
| Less than 5% | <p>Aveley (Zelena Terrace)</p>  <p>Built Environment characteristics :</p> <ul style="list-style-type: none"> • Medium density (R30 - R60). Smaller allotments and larger dwelling footprints • Reduced front setbacks • Limited private open space. • Reduced verge widths and median strips. • Footpaths abut road trafficable area. • Low retention of remnant vegetation and less established trees • Rear loaded lots with garages at the rear of medium density dwellings restricting trees and other vegetation. • High proportion of impervious surfaces. • Influenced by Liveable Neighborhoods 3rd Edition and Residential Design Codes of WA |

| Canopy Coverage (%) | Urban Area Example |
|---------------------|--|
| 5-10% | <p>Ellenbrook (Woodlake Boulevard)</p>  <p>Built Environment characteristics :</p> <ul style="list-style-type: none"> • Low to medium density (R20-R40). Moderate lot area to building footprint ratio (plot ratio). • Moderate areas of private open space. • Generous front setbacks from the street. • Moderate verge widths and road medians. • Footpaths are separated from the trafficable area of the road. • Moderate level of established vegetation. • Moderate levels of impervious surfaces. • Influenced by Liveable Neighborhoods 2nd Edition and the Residential Design Codes of WA |

| Canopy Coverage (%) | Urban Area Example |
|---------------------|---|
| 10-15% | <p>Stratton (Waterlily Drive)</p>  <p>Built Environment characteristics :</p> <ul style="list-style-type: none"> • Low (R20) density. Moderate lot area to building footprint ratio (plot ratio) • Moderate areas of private open space. • Moderate setbacks from the street. • Moderate verge widths. • Footpaths abut the trafficable area of the road. • Moderate levels of established vegetation. • Moderate levels of impervious surfaces. |

| Canopy Coverage (%) | Urban Area Example |
|---------------------|---|
| 15-20% | <p>Woodbridge (Montreal Street)</p>  <p>Built Environment characteristics :</p> <ul style="list-style-type: none"> • Low density residential development (R15-20) with some medium density (R30) infill. • Combination of smaller and larger backyards. • Established mature vegetation on both private and public land. • Larger front setbacks. • Wide road reserves and generous verge widths. • Footpaths separated from the road by verges accommodating street trees. |

| Canopy Coverage (%) | Urban Area Example |
|---------------------|--|
| More than 20% | <p>Guildford (Meadow Street)</p>  <p>Built Environment characteristics :</p> <ul style="list-style-type: none"> • Large provision of public open space with well-established canopy trees. • Built environment incorporates mature trees and other vegetation. • Larger lot to building footprint ratio (low plot ratio). • Wide road reserves and larger verge widths. • Larger areas of private open space. • Generous side setbacks. • Lower residential density and little infill development |



Urban Forest Plan Principles

This Plan provides the basis for the City of Swan to manage canopy trees and vegetation as a collective integrated entity or asset class. The strategic principles strive to increase the overall percentages of tree canopy coverage, maximising the social, economic and ecological benefits that trees bring in addition to improving the aesthetic values throughout the City.

The following underlying principles form the foundation of the Plan, guiding the effective delivery of actions and quality of outcomes:

- A good quality urban forest contributes towards many social, environmental and economic benefits and outcomes for the City along with residents and visitors.
- The urban forest with its comprising tree canopy and green spaces should be protected, preserved and enhanced to achieve the wide range of benefits.
- The City of Swan has a responsibility to ensure the tree canopy and green spaces are protected, managed and monitored to secure quality urban forestry outcomes into the future.

Urban Forest Plan Objectives

The following objectives seek to deliver greater tree canopy coverage and a cohesive urban forest:

Adapt with best practice

Adopting green asset management practices which are responsive, meaningful and compliance oriented will ensure best outcomes for urban forestry are achieved in the long term. Adopting innovative and improved management practices supports positive urban forestry outcomes across the City. Adaptive management practices and organisational decision making should be directed at proactive, rather than reactive, approaches.

Measure and Evaluate

Establish meaningful baseline data and measurement tools to assess the distribution (quantity) and cohesion (quality) of the City's urban forest. Use relevant data and monitor urban forestry activities and decision making capabilities. Recognise the value of the urban forest, treating canopy trees and vegetation as tangible assets that require ongoing management. This will enable the City to effectively manage tree assets on public land. Assess the contribution that the urban forest has on the City's liveability, environmental functionality and local economy.

Protect and Regulate

Protect and preserve tree assets through outcomes based regulation. Protection and preservation of canopy trees and other vegetation within ecological corridors prevents long term costs involved with replacement planting. Preventative measures for urban forestry protection and preservation are more cost effective and efficient than revegetation and replanting. Implementing regulatory controls which protect and preserve existing canopy trees and other vegetation at all stages of planning and development will enhance the City's decision making capabilities.

Lead and Govern

Effective leadership and intra-organisational collaboration will ensure the intent of the Urban Forest Plan is understood across the organisation, Council and by the community. Dynamic leadership and governance ensures the successful deployment of resources, services and projects to strengthen and improve the City's Urban Forest across all levels of decision making. Promote and lead programs, projects and plans that improve the quality and distribution of the urban forest.

Enhance Engagement

Promote awareness, community participation and capacity building with the community to improve the delivery of urban forest programs and activities, establishing vegetation and tree canopy priorities at a 'grass roots' level. Engaging with the general public and key stakeholders allows the City to foster positive urban forestry outcomes and support community ambitions. Increase community knowledge, raise awareness of, and engagement with the City's urban forest.

Strategies and Actions

The following table depicts various strategies which address the objectives of urban forestry in the City, taking into consideration the City's integrated planning framework and Strategic Community Plan (SCP) and relating to the Urban Forest Strategy's objectives as outlined above.

| Objective | Strategy | Specific Action Details |
|----------------------|--|---|
| Adaptive Management | A1. Establish priority planting locations for canopy trees and other vegetation in public areas, providing amenity and shade in locations where deficiencies exist. | A1.1 Develop implementation plans focusing on tree canopy planting priorities and recommended tree species through identified locations, preferably utilising a whole of street approach. |
| | A2 Treat urban forest entities (canopy trees, public vegetation and public open space areas) as 'green' assets. | A2.1 Investigate methods to ensure the City is compensated for the real cost of removed trees in the public realm resulting from development. |
| | A3 Ensure canopy trees plantings and vegetation stock are resilient and contextually appropriate. | A3.1 Review the City's landscaping standards (i.e. Landscaping and/or Planting Guidelines) to ensure appropriate and consistent selection of species and genetic diversity within tree stock. |
| | | |
| Measure and Evaluate | M1 Maintain the City's urban forest and monitor the comprising tree canopy through data collection and mapping | M1.1 Report on tree canopy and heat island data to assess canopy change as a result of development and to inform policy responses. |
| | | |
| Protect and Regulate | P1 Protect and preserve existing tree stock through appropriate policy and outcomes based regulation. | P1.1 Adopt a local planning framework to guide vegetation protection and retention through all stages of planning and development, including compliance with relevant Australian Standards. |

| Objective | Strategy | Specific Action Details |
|-----------|---|---|
| Lead | L1 Strengthen internal and external relationships between key urban forestry proponents and stakeholders that assist in developing and managing the City's urban forest. | L1.1 Track progress against agreed targets in this plan and report progress to Council and community annually. |
| | | |
| Engage | E1 Facilitate community urban forestry projects, programs and activities at a localised level. | E1.1 Develop and support regular opportunities for community planting events on suitable public land to contribute to the City's urban forest. E1.2 Investigate the role of the local business community in supporting the development of an urban forest in the City of Swan. |
| | E2 Support (with financial and technical input) community groups involved in urban forestry activities | E2.1 Ensure that urban forestry projects remain eligible and suitably funded under the City's community funding scheme |
| | E3 Respond to community expectations through innovative methods of engagement on urban forestry matters. | E3.1 Continually investigate and communicate innovative methods and technologies that assist and enhance community perceptions about the value of trees in the urban environment. |

Targets and Key Performance Indicators

| Key Performance Indicator | Description | Target | Collection Frequency | Responsibility |
|--|--|--|---------------------------------------|---------------------------------------|
| Percentage (%) growth in canopy by Local Area | Utilise available remote sensed data to assess existing coverage, location and stratification of trees (More than 3m in height) by place area and land tenure. | Achieve positive growth in Urban Forest Canopy across all Local Areas | Every five years Resurvey due 2023 | Strategic Planning |
| Volume of street trees planted | Record and assess number, position, size and species of street trees planted both by the City and by the development industry | Plant 1200 street trees per year. This represents 1% growth from baseline per annum in urban street trees planted in the City of Swan. | Annually | Assets |
| Number of people contacted in Community Education activities conducted by the City. | Record number of community members contacted through education activities directly related to improvement of City's Urban Forest. | N/A Record numbers only | Annually | Strategic Planning |
| Number and size of trees planted in public open space and natural areas of the City of Swan. | Record number and location of trees planted on land under City management. | N/A Record numbers only | Annually | Assets / Projects / Parks Maintenance |

Implementation

The Urban Forest Plan sets out the objectives and principles for the City in delivering a cohesive and connected urban forest and the strategies required by the entire organisation to accomplish these objectives. Implementation of the Plan requires commitment of human and financial resources if the objectives are to be met.

Successful implementation of the Plan requires commitment from all City business units to consider the urban forest as a unique and valuable asset that requires a higher priority in City programs, services and processes than demonstrated in the past. Successful implementation will also require participation and support from the community, private organisations, the development industry and public agencies / departments.

Implementation Goals

The focus of short term implementation works should be aimed at stabilising and rebuilding the recent loss of tree canopy coverage through the enhancement of urban forest health and the protection of existing tree stock from both human development and environmental disturbance (e.g. insects, disease, natural disasters and hotter/drier seasons). This can only be achieved with strong support for improving tree canopy coverage and stronger protection (as outlined in the Plan), through appropriate development controls such as Local Planning Policy and/or Scheme provisions, of the existing canopy. A key emphasis in the short term is to acknowledge the importance of the urban forest among City staff, elected members, business, institutions and the wider community so that trees are recognised as a valuable infrastructure asset.

The medium and long term goals require the City to work towards expanding its planting programs and undertaking additional maintenance of canopy trees on public land. It will also require the City to continue its work in restoring and managing natural areas such as bushland reserves and foreshore reserves with careful consideration to the species, shape, stature and quality of planting stock. In addition to selecting appropriate tree and vegetation species for a site, the City must ensure there is a sufficient volume of planting area for root systems to allow trees to reach full maturity and maximise the canopy coverage potential. Calculated and considered planting is required to maximise success of City and community planting programs.

Successful implementation of the plan requires taking an adaptive management approach based on a foundation of comprehensive data and monitoring of tree canopy coverage across the City, by Local Area.



Targets and Priorities

Although urban forest targets can be measured in a number of ways, the most tangible and widespread method is the calculation of urban canopy trees expressed as a percentage of land area coverage as outlined in the Vegetation Height Strata Zonal Canopy Height Statics report prepared in 2017 by Astron.

Targets provide a way of measuring the City's progress towards reaching specific objectives through implementation of actions and setting goals for urban forest metrics. These measurements include tree canopy coverage (by Local Area, suburb or land tenure) and land surface temperature/Heat Island Effect reduction.

This plan proposes that the City sets an overall target to incrementally increase tree canopy coverage in each Local Area for the City's urban areas. The agreed incremental target is contained in the KPI and Target table earlier in this document. This incremental target approach represents a balance between unavoidable vegetation loss through development, natural attrition, new plantings and the natural growth rates of existing tree stock.

Incremental tree canopy targets will be assessed for each Local Area in five year intervals as existing tree canopy coverage, development expectations and physical constraints vary throughout the City due to the diversity and history of the established urban environment.

Priorities for planting programs will initially focus on those areas with a limited supply of canopy trees.



Planting Priorities

The City of Swan will prioritise planting of canopy trees where the need is identified to achieve multiple objectives (i.e. provide amenity and “walkability” for pedestrians and reduce public health risks for residents), where deficiencies exist in the connectivity of the tree canopy and where they can be physically provided without affecting the health and longevity of planted trees and nearby services.

Using GIS and the City’s Landscaping Guidelines, the following areas should be prioritised for planting of canopy trees:

- Established residential areas with low tree canopy coverage.
- Pedestrian and cycle routes which have disconnected tree canopy and require infill planting.
- Areas adjacent to river and wetlands (buffers) requiring revegetation which facilitate ecological corridors and linear movement of fauna species.
- Unused local road reserves and verges which provide opportunities for infill planting of street trees.
- Parklands and bushland reserves requiring revegetation or additional vegetation.

The type, location and number of canopy tree plantings depends on the species and separation required to achieve successful root growth and therefore provide a healthy and abundant tree canopy.

Funding Arrangements

A critical element of a successful urban forestry program is how planting priorities will be funded. Various financial arrangements should be considered by the City to ensure canopy trees can be planted, maintained and replaced in a timely and cost effective manner. Asset management plans alone will not provide the basis of good urban forestry outcomes if there is no budget to undertake planting regimes. The City must therefore establish funding mechanisms which deliver the greatest benefit. Funding opportunities can come from a number of different sources and can be tailored depending on the scale and nature of desired outcomes.



| Funding Arrangement | Description | Advantages | Disadvantages |
|--|---|---|--|
| Annual capital allocation and program budgets from rates revenue only. | <p>Implement project based on provision of annual budgetary allocations for tree purchase and associated programs</p> | <ul style="list-style-type: none"> • Easier to manage • Can be applied across the entire City. • Can have a positive effect on Gross Rental Values therefore provide some return on investment in the long-term. • Improve services and facilities for the community. | <ul style="list-style-type: none"> • Available funds may restrict program diversity and impede implementation at required pace • Can be difficult to gain political support. • Long-term benefits accrue to the City • Requires high levels of financial justification. |
| Urban Forest funding. | <p>Utilise existing internal financial systems to support the implementation of urban forestry outcomes within the City.</p> <p>Funds could come from various sources including</p> <ul style="list-style-type: none"> • Annual funding allocations. • Fines for illegal removal or damage to trees • Grant funding • Sponsorship inputs from business community • Informal offsetting of the City's carbon footprint • Voluntary informal offsetting of community carbon emissions <p>Disbursement of funds would be guided by the Urban Forest Plan and subsequent documents as a part of normal budgetary process.</p> | <ul style="list-style-type: none"> • Multiple input funding opportunities. • Excellent branding opportunities. • Can be a valuable form of marketing and garner community support. | <ul style="list-style-type: none"> • May be seen as lacking transparency by community members if unspent or use lacks transparency • Increased resource requirement in applying various input sources. • Increased revenue would need to be spent using existing resources as it is unlikely that the money could fund additional FTE |
| Grants. | | <ul style="list-style-type: none"> • Specific grants are available for urban forestry projects in Australia. • Funds are non-repayable and acquittal is documented. | <ul style="list-style-type: none"> • Limited by conditions established by the Government department, foundation or trust allocating the funds. • One-off provision of funds (i.e. not continuous / recurrent) |

Monitoring and Review

The development and management of a resilient and cohesive urban forest requires ongoing evaluation and assessment of the resources, benefits and values that additional canopy trees and other vegetation delivers.

Initially, the primary data collected for assessing urban forestry outcomes will be tree canopy coverage and Urban Heat Island (UHI) mapping, undertaken at five year intervals. Progress of canopy coverage and UHI effects will be reported through Local Area Plans and other suitable City publications.

Additional data needs to be identified to improve the City's ability to quantify the value of environmental services provided by the urban forest, assess tree survival, forest health and measure structural and genetic diversity, habitat characteristics and landscape/ecological connectivity.

Recurrent data collection and monitoring will allow the City to measure the success of the Urban Forest Plan and improve practices at the local and sub-regional level. The key areas for information development of the City's urban forestry data include:

- **Total canopy coverage** including canopy cover, density and vegetation by location (suburb and Local Area) and land tenure (public vs. private).
- **Urban heat island effects** to assess the impact of canopy trees and vegetation on climate improvement and response to climate change. Establish a thermal map relationship between urbanisation, UHI and canopy coverage.
- **Urban forest composition**, structure and age class including species, diameter at breast height (DBH), height and age.
- **Urban forest landscape mapping** to assess connectivity and cohesion of the urban forest and how vegetation draws public open space and urban ecological corridor values together.

Monitoring and review of the relevant data will assist in securing ongoing community support and funding and ensure the City remains committed and accountable when implementing the Plan.

Glossary of Terms

Asset Management Plan

A procedural/operational plan for the delivery of information, recommendations and resources needed to effectively and proactively manage (public) tree assets within the City.

Built Environment

The living patterns and structures constructed within a geographic area.

Canopy Tree

Where the upper layer of a tree crown exceeds 3 metres in height and provides reliable shade and habitat for other flora and fauna.

GIS

Geographic Information System – a system used to capture, store, manipulate, analyse, manage, and present spatial or geographic data. Used within the organisation as an assessment tool and also to provide information to the wider community (via. the City’s Intramaps software).

Greenspace

Areas of turf, trees or other vegetation set apart for recreational or aesthetic purposes within an urban environment.

Keighery Scale

An industry accepted tool for assessing the condition of natural areas.

Land Surface Temperature

Land Surface Temperature (LST) is the radiative skin temperature of the land surface, as measured in the direction of a remote sensor. LST influences the difference of energy between ground and vegetation, and determines the surface air temperature.

POS

Public Open Space including river frontage.

Significant Tree

Trees which have special significance to the community (i.e. cultural, historical or environmental) and should therefore have a level of protection greater than that which is already provided for under existing Council policy.

SULE Assessment

An assessment of the Safe Useful Life Expectancy of a tree.

Understorey

Underlying layer of vegetation consisting of trees and shrubs between the tree canopy and the ground cover.

Urban Fabric

The physical characteristics of an urban environment including building types, thoroughfares, open spaces, frontages, verge widths and streetscapes but excluding sociocultural, economic and natural environmental aspects.

Urban Forest

The collective population of trees and other vegetation within the City of Swan’s “urban” zoned lands, irrespective of land ownership.

Urban Heat Island (UHI)

Areas within the urban environment that are typically higher in surface temperature than surrounding rural areas due to development and human activities.

Walkability

A qualitative measure of how friendly an area is to walking. It is based on factors such as the location of footpaths, connectivity, accessibility, land use functions, safety and the presence of shade.



Canopy Analysis by Suburb

| Local Area | 2016 canopy by Local Area (%) | Suburb and 2016 Canopy Coverage (% of total area) | Urban Fabric Characteristics |
|------------|-------------------------------|---|--|
| Altone | 12.1% | Lockridge (12.65%) | 1960s modified grid. Predominantly residential development with interspersed walkability. Good opportunities for revegetation. |
| | | Kiara (10.58%) | 1970s/80s curvilinear road network (automobile suburb with cul-de-sacs), moderate verge widths and moderate walkability. Good opportunities for revegetation. |
| | | Beechboro (10.87%) | Late 1970s early 1980s curvilinear road network (automobile suburbs with cul-de-sacs). Block sizes typically 600m ² -800m ² with moderate verge widths allowing good street tree planting opportunities. |
| | | Bennett Springs (10.18%) | Late 20th century new urbanism (reflecting Liveable Neighbourhoods and R-Code R20 average residential density) consistent lot sizes 290m ² -650m ² with large dwelling footprints and reduced side and rear setbacks. Modified grid road layout with narrow verge widths limiting additional street trees. Moderate walkability. |
| Ballajura | 6.73% | Ballajura (9.70%) | 1970s/80s curvilinear road network (automobile suburb with cul-de-sacs), moderate verge widths and moderate walkability. Moderate opportunities for revegetation. |
| Bullsbrook | 8.78% INCLUDES RURAL LAND | Bullsbrook (11.18%) | Mix of modified grid with some areas of curvilinear modified rectangle road layout. Some contemporary new urbanism development. Irregular walkability and verge widths depending on the local area. |
| Ellenbrook | 11.6% | Ellenbrook (7.2%) | Late 20th century new urbanism (reflecting Liveable Neighbourhoods) mix of lot sizes, housing typologies and quasi grid layout. Defined civic and commercial core. Some narrow verge widths in parts. Generally good walkability. |
| | | The Vines (15.43%) | A mix of rural sprawl and semi-rural with development and residential densities much lower than typical urban areas (being planned around a golf course). Some pockets of higher density residences/modified grid pattern in parts. Generally well vegetated on lower density dwelling sites. Moderate walkability. |
| | | Aveley (10.03%) | Late 20th century new urbanism (reflecting Liveable Neighbourhoods and R-Code R20 average residential density) consistent lot sizes 220m ² -750m ² with large dwelling footprints and reduced side and rear setbacks. Modified grid road layout with narrow verge widths limiting additional street trees. Moderate walkability. |

| Local Area | 2016 canopy by Local Area (%) | Suburb and 2016 Canopy Coverage (% of total area) | Urban Fabric Characteristics |
|-------------------------|-------------------------------|---|---|
| Guildford/ Hazelmere | 17.7% | Guildford (20.52%) | Mid-19th century grid street layout. Larger 1/4 acre allotments with smaller building footprints and larger verge widths contribute to the prevailing colonial streetscape. Larger lots influenced by Torrens Title subdivision pattern. Good walkability. |
| | | South Guildford (13.22%) | Mix of semi-rural and early 21st century new urbanism (reflecting Liveable Neighbourhoods and R20/30 average density). Limited planting areas on verge despite pedestrian network offering good walkability. Large industrial area with some pockets of bushland reserves. |
| | | Hazelmere (19.25%) | Mix of semi-rural, rural residential/rural sprawl, industrial superlots and pockets of early 21st century new urbanism (Waterhall Park). Larger allotments with smaller building footprints and significant trees on both public and private land. Wide road reserves and fair walkability. |
| Malaga | 4.1% | Malaga (3.80%) | Totally industrial subdivision, larger lots (500m ² -2000m ²) and some commercial ribbon development. Almost entirely dominated by vehicular traffic movements, poor walkability. Limited opportunities for vegetation in reserves. |



| Local Area | 2016 canopy by Local Area (%) | Suburb and 2016 Canopy Coverage (% of total area) | Urban Fabric Characteristics |
|-------------|-------------------------------|---|--|
| Midland | 14.2% | Viveash (13.16%) | 1960s/70s curvilinear road network (automobile suburb with cul-de-sacs), moderate to wide verge widths and good walkability. Good opportunities for revegetation. Includes high vegetated foreshore reserve (Reg Bond Reserve) |
| | | Woodbridge (20.55%) | Mid-19th century grid street layout. Larger 1/4 acre allotments with larger verge widths contribute to the prevailing colonial streetscape. Some infill development from 1980's/90s with grouped dwellings (duplexes and triplexes) limiting on site vegetation. Scattered street trees. Overall good walkability. |
| | | Midland (10.39%) | Triangular multiple grid orientations (historic subdivision layout from a previously railway focused movement network). Varying residential densities (low-high but average of medium) fair walkability. Verge widths vary. Infrastructure placement varies considerably due to dynamic nature of the urban environment. |
| | | Midvale (8.39%) | Residential component reflects infilled early 20th century urban grid layout. Rectangular block grid with traditional 1/4 acre lots occasionally infilled with grouped dwellings, reflecting the prevailing R20/50 (R-Code) residential density. Larger verge widths and good walkability. Limited deep soil areas and reduced verge widths restrict street tree planting opportunities. Poor walkability in this area. |
| | | Bellevue (13.09%) | Mid-19th century grid street layout. Larger 1/4 acre allotments with larger verge widths. Generous setbacks and 'worker cottage' type housing with smaller footprints. Some infill development from 1980's/90s with grouped dwellings (duplexes and triplexes) limiting on site vegetation. Scattered street trees. |
| | | Koongamia (17.56%) | Mix of 1970s/80s curvilinear (automobile suburb with cul-de-sac) road and 1960s modified grid pattern with some larger lots remaining from early-mid 20th century subdivision. Wider verges and smaller building footprints offering potential for revegetation. Contains moderate portions of well vegetated recreation reserves and linear parks. |
| | | | |
| Swan Valley | 9.97% | Middle Swan (12.07%) | Mix of 1970s/80s curvilinear (automobile suburb with cul-de-sac) road and 1960s modified grid pattern with some larger lots remaining from early-mid 20th century subdivision. Wider verges and smaller building footprints offering potential for revegetation/additional street trees. Moderate walkability (lack of connected footpaths). |

| Local Area | 2016 canopy by Local Area (%) | Suburb and 2016 Canopy Coverage (% of total area) | Urban Fabric Characteristics |
|-----------------------|-------------------------------|---|--|
| Swan View | 14.6% | Swan View (17.59%) | Mostly late 1960s/early 1970s modified grid. Predominantly residential with interspersed walkability. Pockets of 1970s/80s curvilinear road network (automobile suburb with cul-de-sacs) with moderate verge widths and moderate walkability. |
| | | Stratton (15.13%) | 1980s/90s curvilinear road network (automobile suburb with cul-de-sacs) with moderate verge widths, underground power lines and moderate walkability. Moderate revegetation opportunities exist within verge areas. |
| | | Jane Brook (12.20%) | Mix of semi-rural and early 21st century new urbanism (reflecting Liveable Neighbourhoods and R20/30 average density) and 1990s curvilinear modified grid. Well-connected pedestrian network offering good walkability. Limited areas of verge and retaining wall structures from undulated topography. |
| Upper Swan | 8.3% | Upper Swan (7.26%) | Mix of rural smallholdings/low density rural living (established Upper Swan townsite area) and early 21st century new urbanism (reflecting Liveable Neighbourhoods and R20/30 average density). Limited planting areas on verge despite pedestrian network offering good walkability. |
| Urban Growth Corridor | 10.4% | Dayton (9.35%)- | Early 21st century new urbanism (reflecting Liveable Neighbourhoods and R-Code R30/40 residential density) consistent lot sizes 140m ² -520m ² with large dwelling footprints and reduced side and rear setbacks. Modified grid road layout with narrow verge widths constraining additional street trees. Moderate walkability. |
| | | Brabham (10.24%) | Early 21st century new urbanism (reflecting Liveable Neighbourhoods and R-Code R30 residential density) consistent lot sizes 180m ² -520m ² with large dwelling footprints and reduced side and rear setbacks. Modified grid road layout with narrow verge widths limiting additional street trees. Moderate walkability. |
| | | Henley Brook (16.46%) | Predominantly rural living (rural residential) with an urban core comprised of late 20th century new urbanism. Mix of lot sizes, dwelling footprints and verge widths. Moderate potential for future canopy trees in both private and public land. |
| | | Caversham (10.02%) | Mix of semi-rural and early 21st century new urbanism (reflecting Liveable Neighbourhoods and R20/30 average density). Limited planting areas on verge despite the pedestrian network offering good walkability. Some pockets of bushland and foreshore reserves (Bennett Brook). |

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