STAGE THREE REPORT PRINCIPLES

Urban Forest Strategy
Ku-ring-gai Council

FINAL – Revision 0

Document Quality Assurance

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Revision Schedule

Revision	Report Description	Submission Date	Author(s)
Revision 1 v1	Draft Stage Three Report for internal review (90%)	02/01/2022	Gwilym Griffiths, Riley Faulds, Briony Williams
0	Stage 3 Report - Principles	18/03/2022	Gwilym Griffiths, Riley Faulds, Briony Williams

Disclaimer

Table of Abbreviations

Abbreviation	Definition
BASIX	Building Sustainability Index
BPL	Bushfire-prone lands
DA	Development Approval
DCP	Development Control Plan
DPE	Department of Planning and Environment
LEP	Local Environment Plan
LGA	Local Government Area
POS	Public Open Space
SEPP	State Environmental Planning Policy
STMP	Street Tree Master Plan
ULE	Useful Life Expectancy
WSUD	Water-Sensitive Urban Design

Note: the 'urban boundary' or 'urban area' in this Strategy refers to the area of the Council excluding C1-zoned land (National Parks and Nature Reserves).

Executive Summary

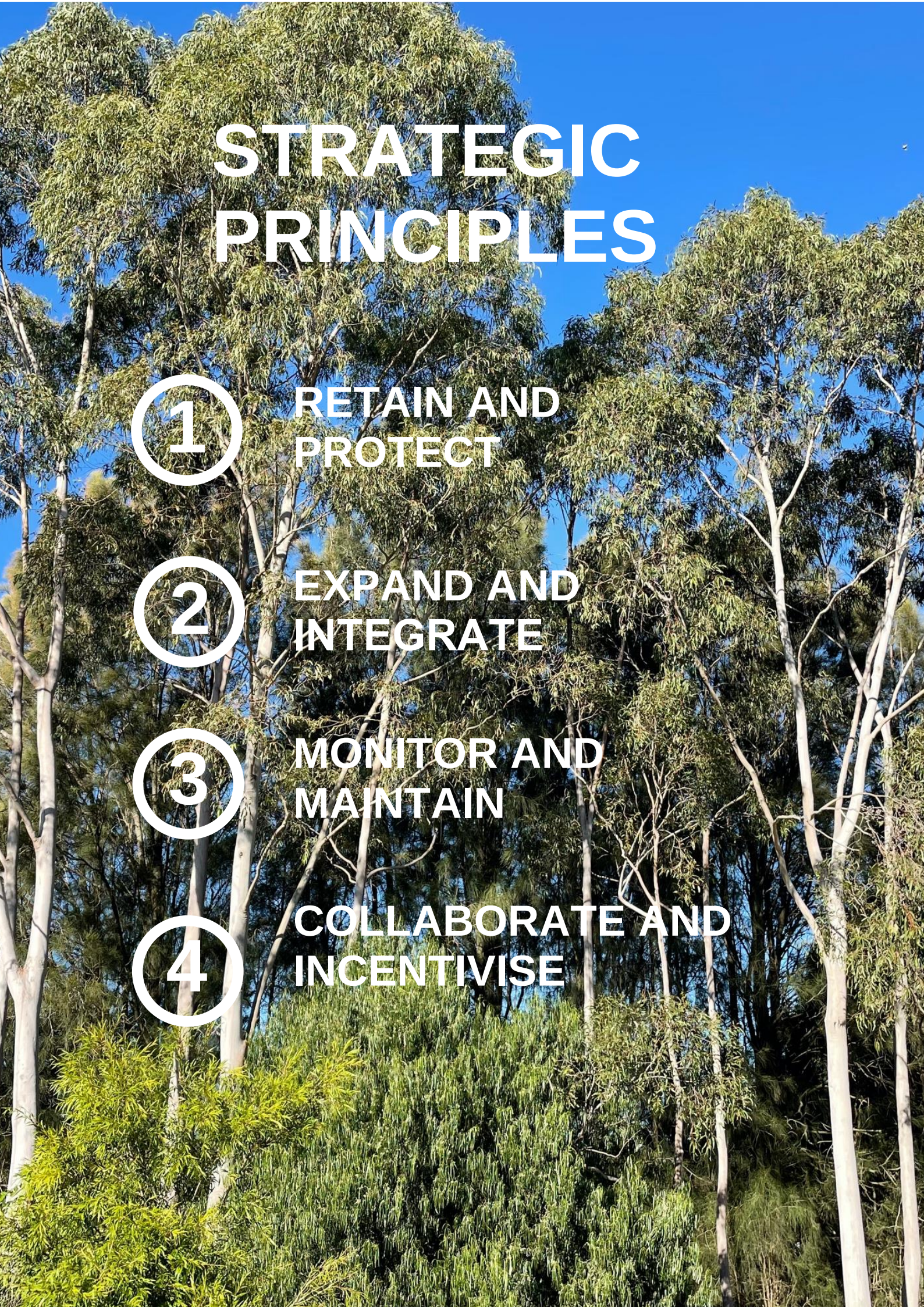
This report comprises Stage Three of the Ku-ring-gai Council Urban Forest Strategy. It outlines a range of Strategic Principles, Goals, and Actions for the implementation of the Strategy.The four main Principles are:

1. Retain and Protect
2. Expand and Protect
3. Monitor and Maintain
4. Collaborate and Incentivise

These Principles seek to guide a range of Strategic Actions which will contribute to improved management and expansion of Ku-ring-gai's urban forest. The urban area covered by this Strategy is defined as the Local Government Area (LGA) excluding C1-zoned land (National Parks and Nature Reserves). An Implementation Plan for these Actions is included in this report.

A range of canopy targets has been developed for each Land Zone, Suburb, and Local Centre across the Council. These targets guide canopy expansion and management to ensure this Urban Forest Strategy is delivered in an effective, efficient manner to maximise the benefits of improved canopy cover across the Council.

Planting and supporting sufficient trees in the next ten years to reach these targets in the longer term would result in a Council-wide canopy increase of 287.3 ha, which is approximately a 9.4% increase in canopy from 3059.0 ha (45% of the total Council area) to 3346.3 ha (49.3%).



STRATEGIC PRINCIPLES

1. RETAIN AND PROTECT
2. EXPAND AND INTEGRATE
3. MONITOR AND MAINTAIN
4. COLLABORATE AND INCENTIVISE

1 PRINCIPLE ONE

RETAIN AND PROTECT

Key to increasing urban tree canopy is protecting what you have.

Trees take many years to mature and provide valuable canopy. Ku-ring-gai is fortunate to have an established urban forest with good canopy cover (total urban LGA canopy area of 44%). Priority needs to be given to protecting these existing assets, both on public land and private land.

GOAL

1.1 PROTECTION OF EXISTING TREES ON PRIVATE LAND

60.8% of the land in Ku-ring-gai's urban boundary (Figure 2) is privately owned, and this land contributes 49.6% of total canopy to the urban forest.

Considering that tree canopy on privately owned land contributes nearly half of the overall total canopy of the Council's urban forest, focus must be given to protecting trees on private land, in order to meet urban forest targets and maintain a high level of canopy cover.

The majority (73%) of privately owned land in Ku-ring-gai is classified as Residential. The remaining private land is mostly zoned as Business and Local Centres, Infrastructure and Special Activities.

The minimum canopy cover target for Residential-zoned land is 40% (Table 2**).** This would require an additional 175 ha of canopy, a 13.2% increase on the current canopy cover level of 1318 ha (35.6% of total Residential land zoned area).

A further breakdown of canopy targets for land use zones is in Table 2, and for each suburb in Table 3.

Protecting trees on private land is a complex practice as there are multiple legislated controls that are relevant beyond the jurisdiction of Council, such as State Environmental Planning Policies (SEPPs), which allow for significant development to occur with limited Council oversight. Development has been identified as a major threat to protecting and increasing canopy cover on privately owned land, as has the 10/50 Vegetation Clearing Scheme, which bypasses Council tree protection controls.

Council can control certain aspects of the management of trees on private land via their Local Environment Plans and Development Control Plans. The actions below aim to achieve canopy cover protection and increase via these mechanisms.

ACTIONS

1 PRINCIPLE ONE

RETAIN AND PROTECT

1.1.1 Undertake a holistic review of Council LEP and DCP controls to improve the protection of trees and provision of new trees on private land, including deep soil and planting requirements.

1.1.2 Develop a suite of standard Development Approval (DA) conditions to ensure consistency and application of best-practice tree management on private land.

1.1.3 Develop a range of tree protection and tree planting specifications in line with industry best practice for use by developers on private land.

GOAL

1.2 PROTECTION OF TREES ON PUBLIC LAND

32.9% of the land in Ku-ring-gai's urban boundary is Council owned, and this land contributes 42.7% of the Council's urban canopy (Figure 1 and *Figure 2*).

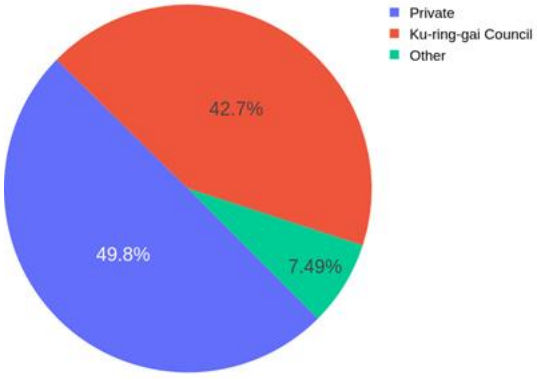


Figure 1: Proportional contribution of each land tenure type to canopy cover. Council land includes Council-managed land like parks, road reserves, and municipal buildings. 'Other' consists of State and Federal government land, and all other land tenure classes.

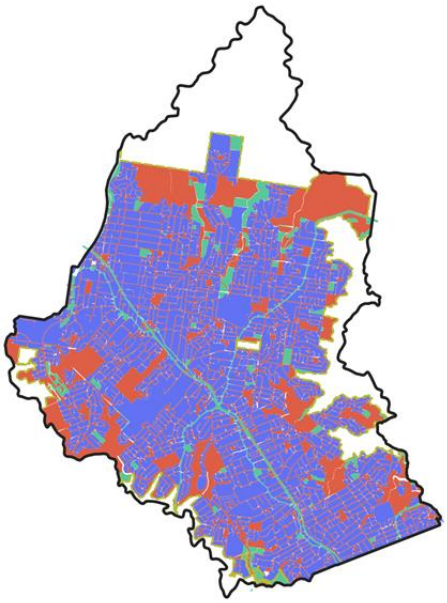


Figure 2: Distribution of private land (purple), Council-owned land (red), and other tenure (green) across the LGA.

Urban public trees provide many essential services for Kur-ring-gai and its residents, from temperature reduction to improved health and wellbeing. To ensure these services are maximised it is vital that existing established trees are retained and protected.

Ku-ring-gai Council values and maintains their public tree population and aims to only remove trees if they are dead, dying or dangerous. Much of the pressure on public trees can come from the interface with

1 PRINCIPLE ONE

RETAIN AND PROTECT

private development and from infrastructure and utility service providers (including Sydney Water, Ausgrid, Transport for NSW).

ACTIONS

1.2.1 Manage public trees to their full ULE and only remove trees when all other options to retain the tree are exhausted. Develop an assessment criteria or framework to facilitate a consistent approach to removal and provide the public with clarity around processes.

1.2.2 Implement the use of 'Tree Bonds' on publicly owned trees to protect and maintain the health of these trees as part of any future development applications. Develop a public tree valuation framework to allow placement of monetary values against tree assets. Development of this framework should be considered as part of the broader LEP and DCP review (action 1.1.1).

1.2.3 Investigate mechanisms (LEP and DCP controls) to require developers to bundle power cables adjacent to new developments and provide expanded soil volumes/vaults for new public domain tree plantings (in built-up areas).

1.2.4 Develop a range of tree protection and tree planting specifications in line with industry best practice for use by developers and utility service providers on public land.

1.2.5 Maintain clear lines of communication and establish processes with utility service providers in the area to ensure value is placed on protecting trees. Advocate for improved processes and practices.

1.2.6 Prioritise the protection and health of existing mature trees when infrastructure conflicts arise. Budget for the implementation of alternative designs or engineering solutions to allow for trees to be retained.

GOAL

1.3 ENSURE URBAN FOREST DIVERSITY AND PROTECT AGAINST PESTS AND DISEASES

A key potential threat to any urban forest is attack from pests and diseases. Effective management of pest and diseases is becoming even more of a focus due to climate change. With increased temperatures and altered weather events conditions may favor various pathogens and allow them to thrive. If mechanisms are not in place to manage these outbreaks our urban forest could be at risk.

Ensuring species diversity within the urban forest is an important way to protect against the impact of pest and diseases. A highly diverse urban forest is a resilient urban forest.

1 PRINCIPLE ONE

RETAIN AND PROTECT

ACTIONS

1.3.1 Develop a 'Plant Pest and Disease Management Plan' with a focus on appropriate weed and pest hygiene practices for horticultural and arboricultural staff and contractors, and pest and disease monitoring and control guidelines. Set benchmarks of acceptable levels of pest/disease and establish actions for management within this Plan.

1.3.2 Integrate regular inspections and disease testing of significant street and park trees with the urban forest monitoring program.

1.3.3 Assess canopy species diversity within the urban forest, with an emphasis on priority areas (this action is linked to action 3.2.4 'Develop a public tree inventory database'.)

2 PRINCIPLE TWO

EXPAND AND INTEGRATE

Expand tree planting programs and integrate capital programs to increase canopy on public land.

Key to any successful urban forest program is the planting of trees. Presently, Council removes more trees on average than it replants. This will inevitably result in a decrease of tree canopy cover on public land. Public land increasingly needs to accommodate more trees as pressure on private trees increases, and it is essential that Council has a well-resourced tree planting program to facilitate an increase in canopy on public land.

Aligning tree planting programs and integrating capital project delivery is necessary to achieve improved canopy outcomes. All parts of Council should be actively seeking to incorporate tree planting in their projects where possible. Integrated project delivery leads to greater cost efficiencies and improved services for the community.

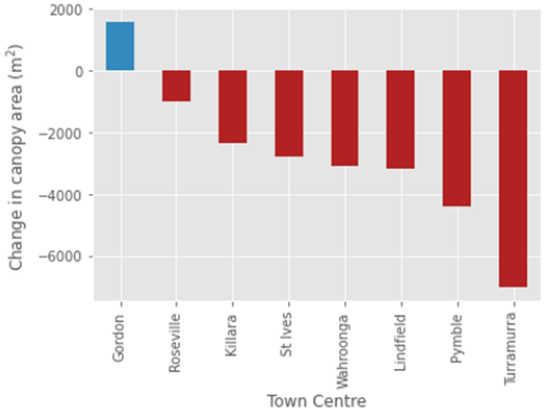
GOAL

2.1 INCREASE TREE PLANTING ON COUNCIL LAND

In 2020, average canopy cover of road reserves was 38.2%. **Our target is to increase average canopy cover on road reserves to a minimum of 45%** (Table 1)**.** Road reserves with below ground power services can achieve greater canopy cover and should aim for 50%. To increase canopy cover on all roads to 40% will require 69.5 additional ha of canopy.

The average canopy cover of Public Open Space (POS) was 40.9%. **The minimum canopy target for POS is 45% (**Table 2**).** To achieve this, the Council must plant an additional 14.6 ha of canopy in Public Open Space.

Town Centres will need to accommodate the majority of the increasing population within the Council, and therefore are likely to experience canopy loss from development. Figure 3 shows the loss of canopy in m^2 from current canopy cover levels to projected canopy cover in 2026. To compensate for the loss of canopy as a result of private development, increased planting on public land will be required. See Table 4 for specific Town Centre canopy targets.



2 PRINCIPLE TWO

EXPAND AND INTEGRATE

Figure 3: Projected loss of canopy area (m^2) in order of increasing canopy loss, for each Town Centre.

ACTIONS

2.1.1 Develop, fund and deliver an expanded ongoing 'Urban Forest Replenishment Program' to increase canopy cover and offset projected tree losses. Ensure the 'Urban Forest Replenishment Program' allows for adequate establishment maintenance of trees.

2.1.2 Implement tree planting replacement ratios in line with Council's 'Draft Offset Code of Practice'.

2.1.3 Prioritise, fund and align planting programs with the Ku-ring-gai 'Public Domain Plan' precinct plans for each Town Centre.

2.1.4 Develop a 'Street Tree Master Plan' (STMP) or similar to guide future tree planting programs. This plan should incorporate a tree planting prioritisation framework that incorporates heat, canopy mapping, Town Centres, major cycle and pedestrian routes and social vulnerability mapping. Reference STMP to Council's 'Green Grid Plan'.

2.1.5 Develop a program to convert above-ground powerlines to bundled cables or underground services in areas where existing high value trees are being impacted and in areas with lower-canopy cover to make room for larger sized trees. Work with service providers to form a partnership to achieve this.

GOAL

2.2 INTEGRATE DELIVERY OF GREEN, BLUE AND GREY INFRASTRUCTURE CAPITAL PROGRAMS

ACTION

2.2.1 Establish culture and processes that promote collaboration and best-practice urban forest management.

2.2.2 Integrate capital delivery programs to ensure all projects consider opportunities for improved urban forest outcomes. All new capital or infrastructure renewal works should incorporate and appropriately budget for new tree planting and greening where practical.

2.2.3 Embrace innovative civil infrastructure design solutions such as structural soil and soil vaults for built-up areas where soil volume is limited, and green roofs or green walls for areas where building footprints restrict traditional plantings.

2.2.4 Incorporate WSUD principles (such as passive irrigation) as established in the Ku-ring-gai 'Water Sensitive City Policy and Strategy', for new tree planting projects.

2 PRINCIPLE TWO

EXPAND AND INTEGRATE

GOAL

2.3 INTEGRATE URBAN ECOLOGY VALUES INTO PROGRAMS

Biodiverse and ecologically rich urban areas promote resilient and livable cities. When appropriately integrated, urban ecology values can enhance the benefits of the urban forest and provide improved soil and water quality and pollution mitigation, and support overall tree health.

ACTION

2.3.1 Ensure the planning, design and management of public open spaces, including through private development, considers and incorporates ecological values, such as use of native species and use of understorey planting to promote multi-layered ecosystems with good vertical complexity.

2.3.2 Continue to incorporate 'habitat trees' in the landscape where appropriate. Habitat trees are trees (live or dead) that are retained or modified to include (fauna) species-specific habitat hollows. Develop an assessment framework in collaboration with Council's ecology team to determine where and when to retain or incorporate these habitat trees.

3.4.3 Develop a 'Timber Reuse' policy and investigate opportunities to utilise wood from urban trees as a timber resource. Kur-ring-gai is home to many high-value timber tree species and when these trees require removal, they are usually turned into wood chips, the lowest value product possible. Timber could be used in Council projects (e.g., logs in playgrounds) or milled and provided to the community. Proceeds from timber sales could be used to fund tree planting projects and contribute to the circular economy.

GOAL

2.4 IMPROVED MANAGEMENT OF TREES IN BUSHFIRE PRONE LAND

Bushfires pose a significant threat to establishment, retention and management of trees. Much of the Ku-ring-gai area is designated as 'bushfire prone land' (*Figure 4*) and comes under state legislation that impacts how trees are managed.

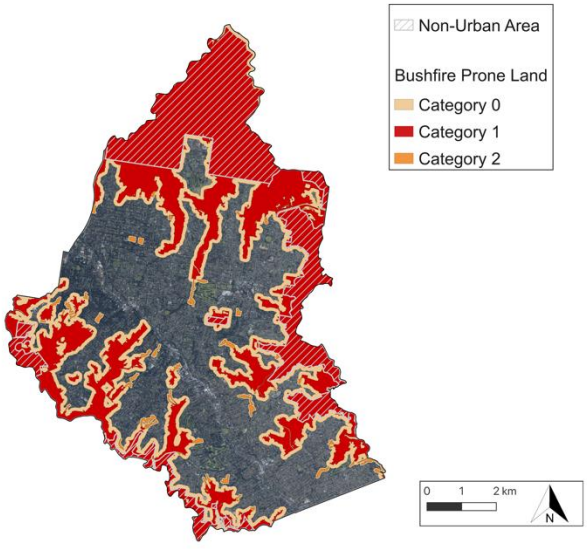


Figure 4: Map of Bushfire Prone Lands in the LGA

2 PRINCIPLE TWO

EXPAND AND INTEGRATE

ACTION

2.4.1 Investigate/develop guidelines for tree planting in bushfire prone lands, for both public and privately owned land.

2.4.2 Collaborate with research institutions, agencies and relevant stakeholders in the trial of bushfire resistant species in bushfire prone areas.

2.4.3 Develop processes for assessing future greening initiatives to ensure they align with the Ku-ring-gai Council Bushfire Management Policy 2020 and other related legislation.

2.4.4 Deliver tree planting programs in Bushfire Prone Land in coordination with Council's Bushfire Technical Officer and in line with best practice knowledge determined as part of action 2.4.2.

3 PRINCIPLE THREE

MONITOR AND MAINTAIN

You need to know what you have to know how to manage it.

Having good data on the urban forest is critical for day-to-day decision-making and high-level strategic planning. It can provide valuable insights into the quality and value of your tree assets and uncover underlying issues or barriers to achieving targets. It will ensure resources are being directed to where they are required the most.

Vegetation extent and condition are necessary factors to know in order to maintain it throughout its life cycle. It is important to identify and quantify trees and record tree maintenance and planting activities. This will help to minimise resource use and minimise losses when investing in urban forestry programs.

While the present focus of this Strategy is urban canopy cover, there are many other quantitative and qualitative measures and targets that can be included in regular monitoring and reporting, which relate to the development and management of a healthy and resilient urban forest. Health and condition of the urban forest are as important as canopy cover. Urban forest composition, structure and age class are important measures of urban forest success, as a diverse forest is a resilient forest. Mapping urban forest landscapes and habitat values will help to identify opportunities for the creation and enhancement of corridors through targeted planting of particular species according to the Biodiversity Policy. Monitoring air quality and temperature can also be used to assess the health and success of the urban forest. In addition, the contribution of the forest to soil and water resources and the carbon cycle, and its socioeconomic impacts can be used as other methods of evaluation.

GOAL

3.1 MONITOR VEGETATION AND CANOPY COVER

Accurately monitoring changes in canopy cover will enable evaluation of the effectiveness of the management interventions and greening programs and will help to achieve targets and objectives.

ACTION

3.1.1 Acquire airborne imagery of the Council on a biennial basis (every two years) throughout the implementation of the Strategy (10 years) to identify changes in cover. Acquisitions should use the same metrics and parameters each time and assess canopy cover based on 3m and 10m height stratification.

3 PRINCIPLE THREE

MONITOR AND MAINTAIN

3.1.2 Use acquired airborne imagery to accurately record the number of trees removed on public and private land, as a cross-reference to Council's record-keeping and monitoring of illegal tree removal.

GOAL

3.2 MONITOR LAND SURFACE AND AIR TEMPERATURE

Spatial analysis of urban heat islands is an important tool to measure the success of the urban forest. Investigating the relationship between vegetation and canopy cover, and land surface temperature can be used to develop a framework to prioritise green infrastructure and mitigate high urban temperatures.

ACTION

3.2.1 Acquire airborne thermal imagery data on a biennial basis (every two years) throughout the implementation of the Strategy (10 years) to identify urban heat islands and the relationship between vegetation cover and land surface temperature.

3.2.2 Focus planting efforts in areas identified as urban hot spots (in conjunction with action 2.14 – 'Develop a tree planting prioritisation framework'

3.2.3 Use thermal imagery to inform urban design, such as street width and building height, building and surface material used, and new park placement.

3.2.4 Invest in and trial innovative smart technologies for real-time monitoring of air temperature in different streetscapes to quantify the effect of street design and planting on air temperature. Use this data to feed back into planting efforts and urban design.

GOAL

3.3 MANAGE THE CONTRIBUTION OF THE URBAN FOREST TO SOIL AND WATER RESOURCES

The interaction between urban trees, surrounding infrastructure, soils and water is complex. There are positive correlations between the growth rate of trees, fine-root biomass and water infiltration rates. Appropriate and considered planting of trees has the potential to intercept stormwater runoff and reduce the requirement for additional irrigation. Trees have great potential for urban stormwater management, and research is required to develop policy mechanisms to encourage their cost-effective implementation.

ACTION

3.3.1 Trial innovative smart technologies for real-time monitoring of soil moisture and plant growth for targeted water application and early mitigation of tree disorders.

3 PRINCIPLE THREE

MONITOR AND MAINTAIN

3.3.2 Consider waterways and stormwater runoff with new plantings, in order to appropriately intercept runoff.

3.3.3 Develop policy mechanisms to encourage cost-effective implementation of urban stormwater management.

GOAL

3.4 IMPROVE ASSET AND DATA MANAGEMENT

Most Councils are recognising trees as assets in their operational planning and maintenance programs and managing their trees with a 'whole of life' asset management approach. This ensures that risks from trees are managed and that costs associated with maintaining trees over their life cycle are accounted for.

A tree inventory is the most powerful and accurate method of collecting and analysing urban forest data in the public realm; it will provide metrics such as species diversity, tree health and condition, useful life expectancy and risk profile, in an easily accessible format.

Council manages approximately 22,400 public trees. Currently, the maintenance of these trees is carried out on a reactive basis and according to risk.

ACTION

3.4.1 Audit trees in priority areas on Council-managed land (excluding bushland) and develop a tree inventory database. Utilise existing aerially acquired tree data as a base for this inventory. Collect additional fields such as species, condition, risk profile and ULE via ground-based assessment.

3.4.2 Opportunistically collate audit data on trees outside priority areas on private and public land.

3.4.3 Investigate options to incorporate the tree inventory database for priority areas into Council's asset management system. If Council's system is not suitable for recording tree data, a proprietary tree asset management software may be appropriate.

3.4.4 Ensure the inventory is maintained as a 'live' asset management database. This includes adding newly planted trees into the database and recording all removals and maintenance works on Council trees as they happen.

3.4.5 Develop and implement an internal auditing tool to monitor the success of annual planting programs. Incorporate tree planting targets into delivery program KPIs.

3.4.6 Improve record keeping for private tree applications and DAs to enable accurate monitoring of tree removal on private land.

3 PRINCIPLE THREE

MONITOR AND MAINTAIN

GOAL

3.5 IMPROVE TREE MAINTENANCE PRACTICES

ACTION

3.5.1 Identify a budget source and implement a proactive tree maintenance program to enable improved risk management. The proactive program should be based on priority areas determined by volume of traffic (pedestrian and vehicle) and the risk profile of trees, and be scheduled on a cyclic basis.

3.5.2 Undertake a whole-of-life cost analysis for tree maintenance based on tree inventory findings (action 3.2.1) and ensure future operational maintenance budgets align with increased tree planting programs.

3.5.3 Undertake an operational service review to assess and make recommendations regarding best use of tree maintenance and tree planting resources.

4 PRINCIPLE FOUR

COLLABORATE AND INCENTIVISE

Raising awareness of the benefits of trees across the community will drive change.

Bring the community along for the journey – a strong relationship with your community will improve how well Council can deliver on these urban forest goals.

One of the biggest barriers to achieving improved urban forest programs is limited community awareness and understanding of the need for improved urban forest planning and greening outcomes.

Partnering with and empowering local residents and organisations will help build urban forest awareness and support for the protection, management and increasing of urban canopy.

GOAL

4.1 ENABLE, SUPPORT AND EMPOWER THE COMMUNITY TO ACTIVELY PARTICIPATE IN THE PLANNING AND MANAGEMENT OF TREES

ACTION

4.1.1 Develop and fund a tree giveaway program. These programs can help to increase tree canopy on private land while also providing the opportunity to positively engage with the community and promote the benefits of trees. Align these programs with established tree events such as 'National Tree Day', or local community events like farmers' markets or festivals.

4.1.2 Develop and expand on existing community education programs such as 'Smart Schools'.

4.1.3 Increase involvement by Traditional Owners in decision making and management of public spaces and explore opportunities to re-introduce cultural practices into the urban landscape.

4.1.4 Conduct regular community planting days to involve and engage with the community. Continue to deliver corporate planting days. Align these programs with established tree events such as 'National Tree Day'.

GOAL

4.2 INCENTIVISE INCREASED CANOPY ON PRIVATE LAND

ACTION

4.2.1 Investigate a new grant/subsidy program for residents to assist with the ongoing maintenance of trees on private land. This could include subsidies towards gutter cleaning, additional green waste collections, tree inspections and/or subsidised pruning of trees on private land.

4 PRINCIPLE FOUR

COLLABORATE AND INCENTIVISE

4.2.3 Provide community information and support relating to tree maintenance and planting on private land. Develop a list of suitable tree species for use by the community.

GOAL

4.3 ADVOCATE FOR GREATER RECOGNITION OF GREEN INFRASTRUCTURE

Advocacy is an important part of building urban forest awareness and support for trees. This advocacy needs to occur both externally and internally.

Ku-ring-gai Council has a positive history of engaging and collaborating with infrastructure agencies and providers such as Ausgrid, Transport for NSW, Sydney Water, utilities providers, and individuals and should continue to do so.

ACTION

4.3.1 Continue to actively participate in working groups and forums that seek to improve the recognition of trees as essential assets.

4.3.2 Advocate for BASIX and other sustainability tools to be updated and strengthened to incorporate green infrastructure.

4.3.3 Identify champions within Council to advocate and lead the implementation of this strategy and associated urban forest programs. Form an Urban Forest Working Group of staff who share responsibility for the Urban Forest Strategy and establish clear lines of communication and processes.

IMPLEMENTATION PLAN

HIGH - within 12 months MODERATE - 2 to 3 years LOW – 4 to 5 years

GOAL	ACTION	RESPONSIBILITY	PRIORITY	FUNDED
PRINCIPLE ONE – RETAIN AND PROTECT				
1.1 PROTECTION OF EXISTING TREES ON PRIVATE LAND	1.1.1 Review LEP and DCP controls	Manager Urban & Heritage Planning	MODERATE	Existing resources
	1.1.2 Standard DA conditions	Manager Development Assessment Services	MODERATE	Existing resources

	1.1.3 Develop tree protection and planting specifications for private land	Manager Development Assessment Services Manager Urban & Heritage Planning Manager Technical Services	HIGH	Existing resources
1.2 PROTECTION OF TREES ON PUBLIC LAND	1.2.1 Develop assessment criteria/framework for public tree removal	Manager Technical Services	HIGH	Existing resources
	1.2.2 Implement the use of 'Tree Bonds'	Manager Development Assessment Services	MODERATE	Existing resources
	1.2.3 Develop tree protection and planting specifications for public land	Manager Technical Services	MODERATE	Existing resources
	1.2.4 Require developers to bundle power cables and install expanded soil volumes for new trees	Manager Urban &Heritage Planning	MODERATE	Existing resources
	1.2.5 Clear communication with utility service providers	Manager Technical Services	ONGOING	Existing resources
	1.2.6 Prioritise protection of existing trees within infrastructure	Manager Infrastructure Services Manager Development Assessment Services Manager Environment & Sustainability Manager Technical Services Manager Urban & Heritage Planning Major Projects	ONGOING	Existing resources

1.3 ENSURE URBAN FOREST DIVERSITY AND PROTECT AGAINST PESTS AND DISEASES	1.3.1 Finalise 'Phytophthora & Myrtle Rust Awareness Strategy' and integrate into broader Plant Pest and Disease Management Plan	Manager Development Assessment Services Manager Technical Services Manager Environment & Sustainability Manager Infrastructure Services	MODERATE	Additional funding required
	1.3.2 Integrate regular tests/inspections for pests and diseases into urban forest monitoring programs	Manager Technical Services Manager Environment & Sustainability	HIGH	Existing resources
	1.3.3 Assess species diversity for the urban forest	Manager Technical Services Manager Environment & Sustainability	MODERATE	Existing resources
	1.3.4 Determine percentage of species overrepresentation in the urban forest	Manager Environment & Sustainability	MODERATE	Existing resources
PRINCIPLE TWO – EXPAND AND INTEGRATE				
2.1 INCREASE TREE PLANTING ON COUNCIL LAND	2.1.1 Develop an expanded ongoing 'Urban Forest Replenishment Program'	Manager Technical Services	HIGH	Additional funding required
	2.1.3 Align planting programs with 'Public Domain Plans' for each Town Centre.	Manager Infrastructure Services Manager Tehcnical Services	HIGH	Existing resources

	2.1.4 Develop a Street Tree Master Plan	Manager Urban & Heritage Planning	HIGH	Existing resources/ Additional resources
	2.1.5 Develop program to convert above ground powerlines to bundled cables/below ground services.	Manager Technical Services Manager Infrastructure Services	LOW	Additional funding required
2.2 INTEGRATE DELIVERY OF GREEN, BLUE AND GREY INFRASTRUCTURE CAPITAL PROGRAMS	2.2.1 Establish culture/processes to promote best urban forest management	Manager Urban & Heritage Planning Manager Environment & Sustainability	ONGOING	Existing resources
	2.2.2 Integrate capital delivery programs to ensure all projects consider urban greening	Manager Technical Services Manager Infrastructure Services	ONGOING	Existing resources
	2.2.3 Embrace innovative civil infrastructure design solutions	Manager Technical Services Manager Infrastructure Services	ONGOING	Additional funding required
	2.2.4 Incorporate WSUD principles	Manager Technical Services Manager Infrastructure Services Major Projects	MODERATE	Additional funding required
2.3 INTEGRATE URBAN ECOLOGY VALUES INTO PROGRAMS	2.3.1 Ensure planning, design and management of open space consider ecological values	Manager Technical Services Manager Urban & Heritage Planning Manager Infrastructure Services	ONGOING	Existing resources

	2.3.2 Incorporate 'habitat trees' into the landscape	Manager Technical Services Manager Environment & Sustainability	ONGOING	Additional funding required
	2.3.3 Develop a 'Timber Reuse' policy	Manager Environment & Sustainability	LOW	Additional funding required
2.4 IMPROVED MANAGEMENT OF TREES IN BUSHFIRE PRONE LAND	2.4.1 Develop planting guidelines for tree planting in bushfire prone land	Manager Environment & Sustainability	MODERATE	Existing resources
	2.4.2 Trial bushfire-resistant species for planting in bushfire prone areas.	Manager Environment & Sustainability	MODERATE	Existing resources
	2.4.3 Align greening actions with Council Bushfire Management Policy 2020	Manager Technical Services Manager Urban & Heritage Planning Manager Environment & Sustainability Manager Infrastructure Services Manager Development Assessment Services	ONGOING	Existing resources
	2.4.4 Deliver tree planting programs in Bushfire Prone Land in coordination with Council's Bushfire Technical Officer	Manager Technical Services Manager Environment & Sustainability		Existing resources
PRINCIPLE THREE – MONITOR AND MAINTAIN				

3.1 MONITOR VEGETATION AND CANOPY COVER	3.1.1 Acquire airborne imagery biennially	Manager Environment & Sustainability	ONGOING	Additional funding required
	3.1.2 Use imagery to identify tree removals	Manager Technical Services Manager Development Assessment Services	ONGOING	Existing resources
3.2 MONITOR LAND SURFACE AND AIR TEMPERATURE	3.2.1 Acquire airborne thermal imagery biennially	Manager Environment & Sustainability	ONGOING	Additional funding required
	3.2.2 Focus planting in urban hotspots	Manager Technical Services Manager Infrastructure Services Manager Urban & Heritage Planning	ONGOING	Existing resources
	3.2.3 Use thermal imagery to inform urban design	Manager Technical Services Manager Urban & Heritage Planning	ONGOING	Existing resources
	3.2.4 Trial real-time monitoring of air temperature	Manager Environment & Sustainability	LOW	Additional funding required
3.3 MANAGE THE CONTRIBUTION OF THE URBAN FOREST TO SOIL AND WATER RESOURCES	3.3.1 Trial real-time monitoring of soil moisture and plant growth	Manager Environment & Sustainability	LOW	Additional funding required
	3.3.2 Consider waterways and stormwater runoff with new planting	Manager Technical Services Manager Infrastructure Services	ONGOING	Existing resources
	3.3.3 Develop policy mechanisms to encourage urban	Manager Technical Services Manager Infrastructure Services Manager Development	MODERATE	Existing resources

	stormwater management	Assessment Services Manager Urban & Heritage Planning		
3.4 IMPROVE ASSET AND DATA MANAGEMENT	3.4.1 Audit all trees on Council managed land and develop database	Manager Technical Services	HIGH	Additional funding required
	3.4.2 Incorporate tree inventory into Council's asset management system	Manager Technical Services	HIGH	Existing resources
	3.4.3 Maintain inventory as a 'live' asset management database	Manager Technical Services	ONGOING	Additional funding required
	3.4.4 Develop and implement an internal auditing tool to monitor success of planting programs	Manager Technical Services Manager Infrastructure Services	MODERATE	Additional funding required
	3.4.5 Improve record keeping for private tree applications and DAs	Manager Technical Services Manager Development Assessment Services	HIGH	Existing resources
3.5 IMPROVE TREE MAINTENANCE PRACTICES	3.5.1 Identify a budget source and implement proactive tree maintenance	Manager Technical Services	HIGH	Additional funding required
	3.5.2 Undertake a whole of life cost analysis for tree maintenance	Manager Technical Services	HIGH	Existing resources

	3.5.3 Undertake an operational service review	Manager Technical Services	HIGH	Additional funding required
PRINCIPLE FOUR – COLLAORATE AND INCENTIVISE				
4.1 ENABLE, SUPPORT AND EMPOWER THE COMMUNITY TO ACTIVELY PARTICIPATE IN THE PLANNING AND MANAGEMENT OF TREES	4.1.1 Develop and fund a tree giveaway program	Manager Technical Services Manager Environment & Sustainability	MODERATE	Additional funding required
	4.1.2 Develop and expand on existing community education programs	Manager Environment & Sustainability Manager Visitor Experience & Events	MODERATE	Existing resources
	4.1.3 Increase involvement by Traditional Landowners in decision making and management of public spaces	Manager Environment & Sustainability Manager Urban & Heritage Planning	ONGOING	Existing resources
	4.1.4 Conduct regular community planting days	Manager Environment & Sustainability	ONGOING	Existing resources
4.2 INCENTIVISE INCREASED CANOPY ON PRIVATE LAND	4.2.1 Investigate a new grant/ subsidy program for residents	Manager Environment & Sustainability	HIGH	Additional funding required

	4.2.2 Provide community information and support relating to tree maintenance and planting	Manager Environment & Sustainability Manager Technical Services	MODERATE	Existing resources
4.3 ADVOCATE FOR GREATER RECOGNITION OF GREEN INFRASTRUCTURE	4.3.1 Actively participate in working groups/forums	Manager Technical Services Manager Urban & Heritage Planning Manager Environment & Sustainability Manager Infrastructure Services Manager Development Assessment Services	ONGOING	Existing resources
	4.3.2 Advocate for BASIX to be updated	Manager Urban & Heritage Planning Manager Development Assessment Services	LOW	Existing resources
	4.3.2 Form a regular working group of staff who oversee the Urban Forest Strategy implementation – this is the Urban Forest Team	Manager Urban & Heritage Planning Manager Environment & Sustainability	HIGH	Existing resources

CANOPY TARGETS

The canopy targets below were designed based on the land zoning used by the Council (*Figure **5***).

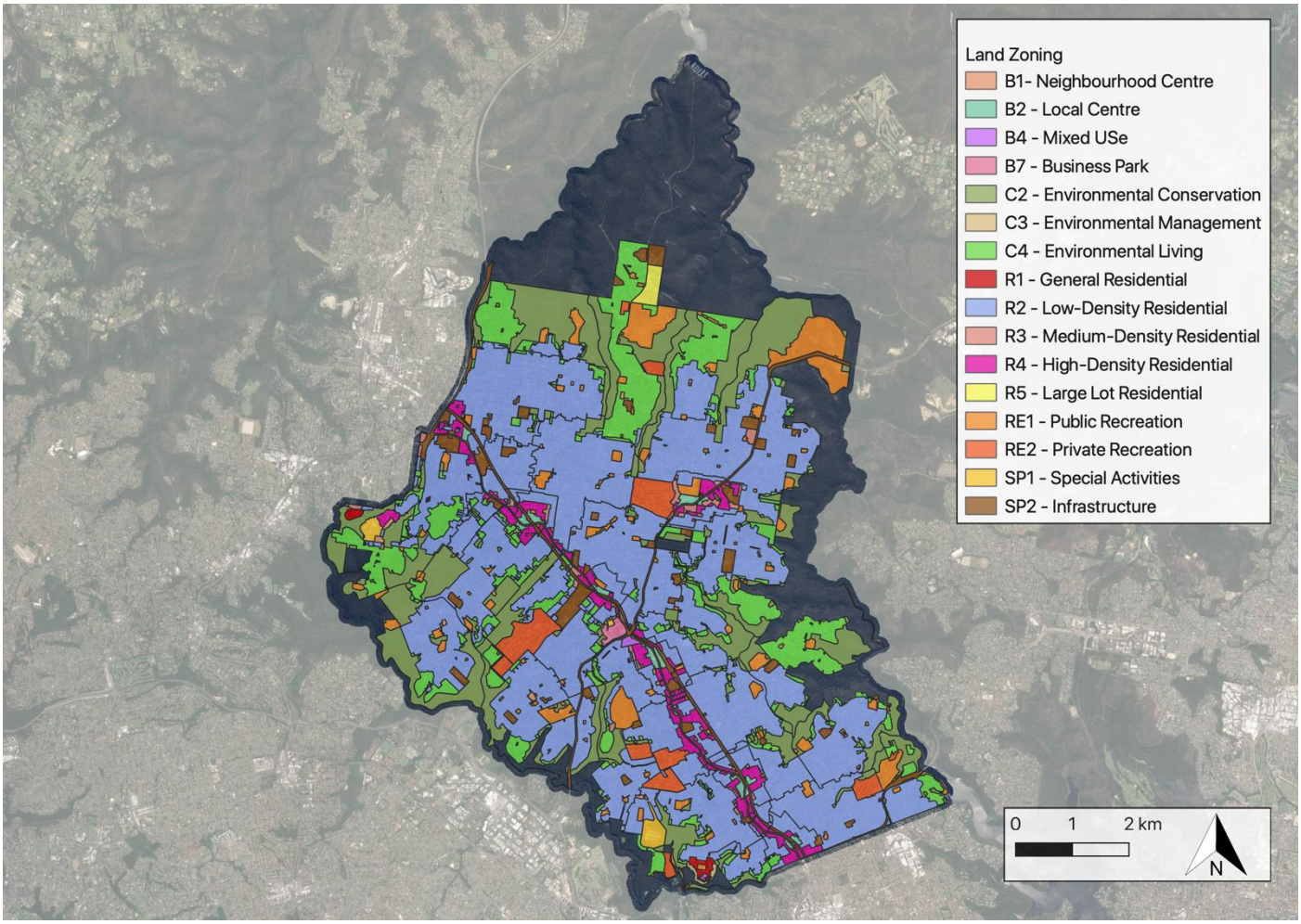


Figure 5: Land Zoning Across the LGA

Targets (**Table 3** and **Table 4**) were set based on either the DPE 'Draft Urban Design and Place Guide, where possible, or using the current mean canopy cover of that land zone. 'Canopy Targets' were then set for Streets and POS (Table 1), by Land Zone across the LGA (Table 2).

Canopy Targets were set by adjusting all land parcels to the Minimum Levels for that category. For the purposes of effective analysis, it was assumed for this process that land parcels which are already above the Minimum level would experience no change in canopy cover.

Therefore, the Canopy Target columns in each table represent what this resulting canopy cover percentage would be for each category/row. Across the whole Council, the results of this would be a canopy increase of 287.3 ha, which is approximately a 9.4% increase in canopy from 3059.0 ha (45% of the total Council area) to 3346.3 ha (49.3%). Based on the initial tree inventory developed from aerial imagery, the average canopy area of trees in the LGA is 69.5 m^2; this is between the mature canopy area estimate of medium (50.27 m^2) and large trees (113.1 m^2) in the NSW 'Greener Neighbourhoods Guide'. Using the average of 69.5 m^2, a canopy increase of 287.3 ha (Table 2) would require planting approximately 41 300 trees with an average mature canopy area of 69.5 m^2. However, factoring in attrition rates of planted trees, the required number of plantings is likely to be higher than that. When considering each land use zone and suburb's required plantings, the following estimate might be useful:

For every hectare of additional canopy, approximately 144 trees will need to be planted and supported to maturity, assuming an average mature canopy area per tree of 69.5 m^2.

There will be some loss of canopy in particular parts of the Council, particularly due to development in Town Centres (**Table 4**). The targets in the tables below, include the calculations for total extra canopy required across each category. Any extra loss to canopy will need to be offset with additional planting to stay on track with targets. They also highlight both which Land Zones, suburbs and parts of suburbs have low canopy relative to others, and which of these is furthest from the DPE/mean targets and therefore should be prioritised for planting of canopy and other vegetation.

Table 1: Canopy targets for streets and Public Open Space (POS).

Land Zone	Area (ha)	Canopy (ha)	Current Canopy (%)	Canopy Target (%)	Additional canopy required (ha)
Streets	1020.1	389.5	38.2	45.0	69.5
POS	1609.2	1189.4	73.9	77.5	57.7

Table 2: City-wide Land Zone based canopy targets (excluding C1 – National Parks).

Land Zone	Area (ha)	Canopy (ha)	Current Canopy (%)	Canopy Target (%)	Additional canopy required (ha)
B1	12.3	2.8	23.2	27.7	0.6
B2	36.8	6.1	16.6	17.6	0.4
B4	5.2	0.6	12.4	12.3	0.0
B5	1.2	0.3	25.4	35.0	0.1
B7	12.8	2.9	22.6	35.0	0.0
C2	1250.4	1042.5	83.4	86.1	34.4
C3	5.7	3.8	67.0	67.0	0.0
C3	866.1	357.3	41.3	46.7	47.5
R1	14.0	4.1	29.1	40.0	0.8
R2	3453.3	1237.3	35.8	40.0	156.8

R3	43.4	14.0	32.2	40.0	3.6
R4	191.9	63.1	32.9	40.0	13.6
R5	21.4	5.7	26.8	40.1	2.8
RE1	358.8	146.8	40.9	45.0	23.3
RE2	176.4	67.5	38.3	47.4	16.2
SP1	33.9	12.6	37.1	37.1	0.0
SP2	302.5	89.5	29.6	31.7	6.5
W1	4.9	2.1	42.3	44.0	0.1
Total	6790.8	3059.0	45.0	49.3	287.3

Table 3: Breakdown of Suburbs into Land Zone based canopy targets.

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
EAST KILLARA	B1	0.5	0.1	19.9	23.2	0.0	43.1	54.1
	C2	65.9	53.1	80.6	83.4	1.8		
	C3	83.7	21.5	25.7	41.3	13.0		
	R2	42.9	10.8	25.3	40.0	6.3		
	RE1	10.0	2.7	26.5	45.0	1.9		
	SP2	3.7	1.1	30.0	29.7	0.0		
	W1	1.8	0.5	25.7	22.7	-0.1		
EAST LINDFIELD	B1	0.1	0.0	11.2	23.2	0.0	37.1	49.6
	C2	45.2	31.4	69.4	83.4	6.3		
	C3	13.0	4.2	32.1	41.3	1.2		
	R2	132.8	35.9	27.0	40.0	17.3		
	RE1	9.0	3.2	35.9	45.0	0.8		
	RE2	0.3	0.1	38.5	45.0	0.0		
	SP2	3.5	0.8	23.4	23.4	0.0		
GORDON	B2	7.1	1.2	17.6	16.6	-0.1	45.0	47.7
	B4	4.0	0.6	15.4	12.4	-0.1		
	B5	0.5	0.2	40.0	25.4	-0.1		
	C2	65.4	56.4	86.3	83.4	-1.9		
	C3	35.4	17.4	49.1	41.3	-2.8		
	R2	191.3	71.7	37.5	40.0	4.8		
	R3	4.8	1.3	27.9	40.0	0.6		
	R4	23.7	6.7	28.3	40.0	2.8		
	RE1	29.3	11.3	38.4	45.0	1.9		
	RE2	0.0	0.0	0.0	45.0	0.0		
	SP1	0.4	0.2	38.5	39.0	0.0		
	SP2	16.2	3.1	19.0	18.4	-0.1		
KILLARA	B1	0.7	0.4	57.9	23.2	-0.2	34.7	41.7

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
	B2	0.9	0.2	19.9	16.6	0.0		
	C2	15.3	12.4	80.9	83.4	0.4		
	C3	10.1	4.2	42.1	41.3	-0.1		
	R2	316.7	103.3	32.6	40.0	23.4		
	R3	0.8	0.4	45.1	40.0	0.0		
	R4	30.2	11.1	36.7	40.0	1.0		
	RE1	10.4	5.4	51.9	45.0	-0.7		
	RE2	43.3	12.7	29.4	45.0	6.8		
	SP2	17.0	4.3	25.6	25.2	-0.1		
LINDFIELD	**B1**	0.8	0.1	16.5	23.2	0.1	41.5	45.9
	B2	6.8	1.1	16.3	16.6	0.0		
	B4	1.2	0.0	3.4	12.4	0.1		
	B5	0.3	0.1	21.6	25.4	0.0		
	C2	55.6	48.2	86.7	83.4	-1.8		
	C3	5.7	3.8	67.6	67.0	0.0		
	C3	29.8	11.0	37.0	41.3	1.3		
	R1	9.3	1.9	20.4	29.1	0.8		
	R2	256.7	87.6	34.1	40.0	15.1		
	R3	3.6	1.5	40.4	40.0	0.0		
	R4	28.4	9.4	33.1	40.0	2.0		
	RE1	13.0	5.4	41.2	45.0	0.5		
	RE2	6.2	4.1	66.4	45.0	-1.3		
	SP1	20.5	9.9	48.5	42.5	-1.2		
	SP2	15.1	3.7	24.4	22.6	-0.3		
	W1	1.1	0.6	57.8	57.8	0.0		
NORTH TURRAMURRA	**B1**	1.0	0.1	10.7	23.2	0.1	44.3	53.3
	C2	92.8	81.5	87.9	83.4	-4.2		

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
	C3	169.8	50.0	29.5	41.3	20.0		
	R2	2.8	1.1	37.8	40.0	0.1		
	R5	21.4	5.7	26.7	40.0	2.8		
	RE1	50.1	12.3	24.6	45.0	10.3		
	RE2	10.8	6.1	56.3	45.0	-1.2		
	SP2	18.8	5.9	31.3	33.3	0.4		
NORTH WAHROONGA	C2	141.8	99.8	70.4	83.4	18.4	53.1	65.1
	C3	69.0	22.4	32.4	41.3	6.1		
	R2	21.7	6.7	31.2	40.0	1.9		
	RE1	12.2	1.7	13.9	45.0	3.8		
	SP2	7.0	3.0	43.3	43.4	0.0		
PYMBLE	B2	3.0	0.7	24.1	16.6	-0.2	46.3	46.5
	B4	0.0	0.0	0.0	12.4	0.0		
	B5	0.3	0.0	0.1	25.4	0.1		
	B7	12.8	2.9	22.5	22.6	0.0		
	C2	58.5	55.0	94.0	83.4	-6.2		
	C3	39.9	26.0	65.2	41.3	-9.6		
	R2	399.2	160.6	40.2	40.0	-0.9		
	R3	4.0	1.4	35.6	40.0	0.2		
	R4	14.5	4.8	33.3	40.0	1.0		
	RE1	12.0	7.3	60.4	45.0	-1.8		
	RE2	50.8	23.7	46.6	45.0	-0.8		
	SP1	1.2	0.5	42.6	42.5	0.0		
	SP2	56.9	19.4	34.1	34.1	0.0		
ROSEVILLE CHASE	C2	0.4	0.0	8.4	83.4	0.3	44.0	55.5
	C3	29.8	24.2	81.1	41.3	-11.9		
	R2	24.1	10.3	42.9	40.0	-0.7		

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
	RE1	42.6	10.2	24.0	45.0	8.9		
	RE2	19.2	6.6	34.6	45.0	2.0		
	SP2	1.4	0.4	25.8	43.1	0.2		
	W1	7.1	3.0	42.7	83.6	2.9		
ROSEVILLE	**B1**	0.1	0.0	10.1	23.2	0.0	35.7	43.6
	B2	3.2	0.5	15.0	16.6	0.0		
	B5	0.1	0.0	8.0	25.4	0.0		
	C2	13.1	12.3	93.6	83.4	-1.3		
	C3	0.0	0.0	76.9	67.0	0.0		
	C3	15.0	8.9	59.4	41.3	-2.7		
	R1	0.0	0.0	0.0	40.0	0.0		
	R2	215.3	69.2	32.2	40.0	16.9		
	R4	17.1	5.5	32.4	40.0	1.3		
	RE1	7.0	3.2	45.6	45.0	0.0		
	RE2	15.4	4.8	31.2	45.0	2.1		
	SP2	12.9	2.4	18.7	43.1	3.2		
	W1	0.1	0.1	95.5	83.6	0.0		
SOUTH TURRAMURRA	**B1**	0.7	0.2	22.9	23.2	0.0	57.9	60.4
	C2	119.2	102.4	85.9	83.4	-3.0		
	C3	23.5	10.5	44.5	41.3	-0.8		
	R2	115.0	39.5	34.3	40.0	6.5		
	RE1	11.2	4.5	40.6	45.0	0.5		
	SP2	4.4	1.5	35.4	35.2	0.0		
ST IVES CHASE	**B1**	0.4	0.1	23.9	23.2	0.0	49.7	56.2
	C2	77.5	65.2	84.1	83.4	-0.6		
	C3	74.8	24.9	33.3	41.3	6.0		
	R2	59.3	16.8	28.3	40.0	7.0		

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
	RE1	6.1	1.4	23.2	45.0	1.3		
ST IVES	B1	0.8	0.2	21.7	23.2	0.0	43.5	49.2
	B2	6.3	0.8	12.8	16.6	0.2		
	C2	205.3	163.7	79.7	83.4	7.5		
	C3	85.5	38.2	44.7	41.3	-3.0		
	R2	529.6	170.5	32.2	40.0	41.3		
	R3	19.5	5.6	28.4	40.0	2.3		
	R4	21.4	6.1	28.5	40.0	2.4		
	RE1	118.0	58.2	49.3	45.0	-5.1		
	RE2	40.9	11.4	27.9	45.0	7.0		
	SP2	53.2	16.0	30.0	30.1	0.0		
	W1	0.5	0.1	16.6	11.9	0.0		
TURRAMURRA	B1	0.7	0.1	15.7	23.2	0.1	47.0	47.2
	B2	7.1	1.2	17.1	16.6	0.0		
	C2	82.6	70.5	85.4	83.4	-1.7		
	C3	41.8	24.2	57.8	41.3	-6.9		
	R2	407.6	163.2	40.0	40.0	-0.1		
	R3	3.9	1.4	36.5	40.0	0.1		
	R4	26.4	9.9	37.4	40.0	0.7		
	RE1	19.0	8.2	43.4	45.0	0.3		
	RE2	0.0	0.0	27.9	45.0	0.0		
	SP2	12.2	4.0	32.5	31.9	-0.1		
WAHROONGA	B1	4.2	1.0	24.6	23.2	-0.1	50.1	50.4
	B2	2.5	0.3	13.6	16.6	0.1		
	C2	110.9	102.9	92.8	83.4	-10.5		
	C3	114.5	66.5	58.1	41.3	-19.3		
	R1	4.7	2.1	46.0	40.0	-0.3		

Suburb	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current suburb canopy cover (%)	Overall target for suburb (%)
	R2	429.2	181.4	42.3	40.0	-9.7		
	R3	4.7	2.0	43.4	40.0	-0.2		
	R4	26.1	8.2	31.4	40.0	2.2		
	RE1	15.1	6.9	45.8	45.0	-0.1		
	SP1	11.8	2.0	16.7	16.6	0.0		
	SP2	50.0	14.4	28.9	24.3	-2.3		
WARRAWEE	C2	1.2	1.1	94.0	83.4	-0.1	41.7	42.1
	C3	5.0	3.9	77.6	41.3	-1.8		
	R2	109.8	45.3	41.3	40.0	-1.4		
	R3	2.0	0.4	19.0	40.0	0.4		
	R4	4.2	1.4	34.7	40.0	0.2		
	RE1	0.8	0.6	74.2	45.0	-0.2		
	SP2	12.3	3.6	29.6	29.5	0.0		
WEST PYMBLE	B1	1.9	0.5	25.5	23.2	0.0	48.6	51.4
	C2	69.2	62.2	89.8	83.4	-4.5		
	C3	31.4	13.3	42.5	41.3	-0.4		
	R2	180.6	63.2	35.0	40.0	9.0		
	RE1	16.3	8.0	49.4	45.0	-0.7		
	RE2	7.1	4.1	57.4	45.0	-0.9		
	SP2	12.2	3.3	27.2	27.2	0.0		
	W1	1.5	0.8	54.4	59.9	0.1		

Table 4: Breakdown of Town Centres into Land Zone based canopy targets.

Town Centre	Land Zone	Area (ha)	Canopy (ha)	Canopy (%)	Target (%)	Additional canopy required (ha)	Current Town Centre canopy cover (%)	Overall target for Town Centre (%)

Gordon	**B2**	7.37	1.26	17.09	16.57	-0.04	34.0	38.4
	B4	3.97	0.61	15.35	12.35	-0.12		
	B5	0.54	0.21	39.98	25.42	-0.08		
	C2	1.28	1.16	90.21	83.37	-0.09		
	C3	12.26	6.66	54.34	41.25	-1.60		
	R2	132.83	47.48	35.74	40.00	5.65		
	R3	3.45	0.98	28.39	40.00	0.40		
	R4	29.15	8.47	29.06	40.00	3.19		
	RE1	3.08	1.30	42.27	45.00	0.08		
	SP1	0.41	0.16	38.48	38.97	0.00		
	SP2	16.49	3.40	20.62	12.12	-1.40		
Killara	**B1**	0.65	0.38	58.97	58.97	0.00	33.6	33.6
	B2	0.60	0.17	27.58	27.58	0.00		
	C2	0.00	0.00	0.00	0.00	0.00		
	R2	62.20	20.14	32.38	32.38	0.00		
	R3	0.78	0.35	45.10	45.10	0.00		
	R4	21.01	8.32	39.61	39.61	0.00		
	RE1	0.63	0.51	80.13	80.13	0.00		
	SP2 Water Supply System	8.73	1.93	22.14	22.14	0.00		
Lindfield	**B2**	6.83	1.12	16.32	16.57	0.02	34.5	39.1
	B5	0.34	0.06	18.91	25.42	0.02		
	C2	1.98	1.85	93.40	83.37	-0.20		
	C3	7.35	2.94	39.98	41.25	0.09		
	R2	151.01	53.02	35.11	40.00	7.38		
	R3	3.60	1.45	40.39	40.00	-0.01		
	R4	28.86	9.69	33.56	40.00	1.86		
	RE1	0.86	0.61	70.42	45.00	-0.22		
	SP2 Railway Infrastructure	14.56	3.68	25.27	28.00	0.40		
Pymble	**B2**	2.95	0.71	24.06	16.57	-0.22	41.4	42.2

	B5	0.28	0.00	0.07	25.42	0.07		
	B7	7.03	1.67	23.81	22.58	-0.09		
	C2	2.92	2.82	96.65	83.37	-0.39		
	C3	10.82	6.48	59.89	41.25	-2.02		
	R2	76.20	31.56	41.41	40.00	-1.08		
	R3	3.76	1.40	37.17	40.00	0.11		
	R4	12.98	4.27	32.94	40.00	0.92		
	RE1	2.49	1.63	65.30	45.00	-0.51		
	SP1 Defence	1.18	0.50	42.55	42.54	0.00		
	SP2 Water Supply System	19.08	6.76	35.44	28.74	-1.28		
Roseville	**B2**	3.17	0.48	15.03	16.57	0.05	35.1	39.7
	B5	0.02	0.00	4.80	25.42	0.00		
	C3	4.75	2.93	61.64	59.89	-0.08		
	R2	64.92	22.86	35.21	40.00	3.11		
	R4	16.58	5.26	31.70	40.00	1.38		
	RE1	0.95	0.56	59.16	45.00	-0.13		
	SP2 Classified Road	1.72	0.26	14.99	14.99	0.00		
	SP2 Railway Infrastructure	2.28	0.76	33.21	33.21	0.00		
St Ives	**B2**	6.29	0.80	12.77	16.57	0.24	34.5	44.3
	C2	6.79	6.57	96.77	83.37	-0.91		
	C3	10.38	6.83	65.83	41.25	-2.55		
	R2	131.66	43.68	33.18	40.00	8.98		
	R3	15.52	4.28	27.60	40.00	1.92		
	R4	21.37	6.10	28.54	40.00	2.45		
	RE1	11.56	5.19	44.88	45.00	0.01		
	RE2	40.92	11.43	27.93	45.00	6.98		
	SP2 Water Supply System	13.21	4.10	31.05	65.50	4.55		
Turramurra	**B2**	7.05	1.21	17.14	16.57	-0.04	43.9	44.9

	C2	3.92	3.75	95.58	83.37	-0.48		
	C3	17.89	11.81	66.03	41.25	-4.43		
	R2	172.18	75.88	44.07	40.00	-7.01		
	R3	6.07	1.83	30.16	40.00	0.60		
	R4	30.99	11.50	37.10	40.00	0.90		
	RE1	7.54	3.33	44.16	45.00	0.06		
	SP2 Railway Infrastructure	14.89	5.14	34.55	40.24	0.85		
Wahroonga	**B1**	0.29	0.14	47.01	23.16	-0.07	36.0	36.5
	B2	2.51	0.34	13.62	16.57	0.07		
	C2	0.03	0.00	7.79	16.57	0.00		
	R2	60.70	25.14	41.42	40.00	-0.86		
	R3	0.25	0.19	75.35	40.00	-0.09		
	R4	19.17	7.21	37.60	40.00	0.46		
	RE1	3.33	1.62	48.62	45.00	-0.12		
	SP2 Water Supply System	34.65	8.95	25.84	9.28	-5.74		