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ARNCLIFFE & BANKSIA GREEN PLAN

Prepared for the Office of Open Space and Parklands
Department of Planning and Environment | 26 September 2018

Quality Information

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1.0

EXECUTIVE SUMMARY

This section of the report provides a high level summary of the process undertaken to prepare this Green Plan for the Planned Precinct of Arncliffe and Banksia. It outlines key findings and recommendations for the short, medium and long term planning of open space, biodiversity and tree canopy to realise targets defined by the Department of Planning and Environment.

The population of the Arncliffe and Banksia Planned Precinct is expected to significantly increase by 2036. This growth, combined with the introduction of new residential and mixed use development, provides the opportunity to address the demands for open space and recreational activities.

The Green Plan provides a framework for the provision of the new open space, open space infrastructure, together with an integrated tree canopy network and green links will ensure these opportunities are met.

The open space infrastructure initiatives are identified in this Green Plan and classified into one of two categories:

- Committed Initiatives
- Initiatives for Investigation

These aspirational opportunities have been identified to future proof the ability to be realised through acquisitions, negotiations or various other funding opportunities.

This Green Plan process includes:

- Background study of the current urban design context.
- Data collection and analysis of the strategic planning context and existing statutory planning controls.
- Investigation on current open space and tree canopy provision.
- Inclusion of the proposed changes to zoning, new forecasted dwellings and subsequent population growth.

In assessing the background research and drawing insights from community interviews, we have identified the following key elements for Arncliffe and Banksia:

- The Green Plan vision statement and guiding principles are built upon and synthesise previous planning strategies with major community needs. The overarching vision will focus on identifying new opportunities for an improved network of open space based on accessibility, quality and safety as key drivers. Moreover the vision will emphasise the role of existing and future open space as corridors for an enriched biodiversity and it will underline the importance of defining a more structured tree canopy coverage to enhance liveability, health and well-being.

- The Open Space Plan in this document proposes opportunities for improved accessibility, safety and quality of the existing open space. The proposal includes acquisition of public and private owned lands, definition of green and blue links, enhancement of existing open space and accessibility improvement to both Arncliffe and Banksia train stations.
- The provision for new open space initiatives to accommodate a future population of 25,000 people. These initiatives include providing pedestrian focused streets that are comparable to linear park environments and quality laneway treatments that provide for passive recreation and high quality outdoor experiences.
- Identifies a new pedestrian and cycling connection across the Cooks River between Cahill Park and Tempe Recreation Reserve.
- The Tree Canopy Plan identifies a new tree canopy strategy focusing on public land and following a set of technical assumptions. It investigates a realistic future provision of tree canopy coverage that could be achieved by planting new trees on road corridors and possible future open spaces. The Tree Canopy Plan **proposes a total of 996 new trees** to be added to public areas within the Precinct.

2.0

SETTING THE SCENE



This section of the report sets the scene in describing the existing site and context for the Arncliffe and Banksia Planned Precinct. It provides an understanding of the context and an examination of the proposed growth in the Precinct to determine how these elements will influence the provision of open space and tree canopy.



2.1 INTRODUCTION

Overview

This Green Plan undertakes a review of the Arncliffe and Banksia Planned Precinct with respect to the provision of open space and tree canopy. The purpose of this document is to understand the desired growth of the Precinct and respond with a plan that focuses on the provision of high quality and integrated open spaces and enhanced tree canopy. In doing so, the plan addresses how the provision of open space and tree canopy meets the needs and expectations of the community in creating high quality, best practice outcomes as the Precinct undergoes significant change.

The Precinct is located 12 kilometres south of the Sydney CBD and to the west of Sydney Airport. It is identified as a priority growth area in the Greater Sydney Commission's Eastern City District Plan.

The importance of the Precinct adjoining the southern portion of the Global Economic Corridor, presents a unique opportunity for renewal and a coordinated plan. The NSW Government is looking to provide new homes and jobs located close to transport and social infrastructure such as open space and schools.

Following feedback received from the community and local council during the development of the existing planning documentation and community discussions for the Precinct, the Department of Planning and Environment (DPE) understands that the provision of open space throughout Arncliffe and Banksia is of high importance. In response, the Green Plan reviews and analyses recommendations on open space, recreation and tree canopy to date and to develop the Planned Precincts Green Plan for Arncliffe and Banksia.

Report Structure

The Green Plan comprises four key sections:

- Setting the Scene**
 This section describes the existing physical and policy context for the Arncliffe and Banksia Planned Precinct. It provides an overview of existing documentation, an understanding of the context and an examination of the proposed growth in the Precinct to determine how these elements will include the provision of open space and tree canopy.
- Building the Structure**
 This section defines a vision for the Arncliffe and Banksia Planned Precinct by defining what will be the enduring legacy for the existing and future local community. This is followed by establishing design principles that will protect and safeguard this legacy through the evolution of the Precinct.
- Defining the Place**
 This section prepares a design response for the Arncliffe and Banksia Planned Precinct that communicates the vision for open space and tree canopy in the Precinct. The purpose of this is to allow the community to understand what the open space and streets will look and feel like in addition to how open spaces and streets can be used.



2.2 SITE ANALYSIS

This section of the report sets the scene for the Arncliffe and Banksia Planned Precinct.

The Greater Sydney Commission's Eastern City District Plan has identified the Precinct as a priority growth area. The southern end of the Global Economic Corridor adjoins the Precinct and presents a unique opportunity for renewal and a coordinated plan.

The study area Precinct is located approximately 12 kilometres south of the Sydney CBD and approximately 4km to the west of Sydney Airport. The Precinct encapsulates the area surrounding Arncliffe Train Station and a small portion surrounding Banksia Train Station.

The Precinct is dissected by four major highways. The Princes Highway defines the route from the north to the south of the Precinct. Furthermore, Marsh Street provides an additional entry route into the study Precinct. Forest Road and M5 Motorway provide a primary east / west connection into the Precinct.

The following site and context analysis has been undertaken for the Precinct:

Site Analysis

- Existing Precinct character;
- Existing open space and tree canopy;
- Existing walking distances to open space;
- Existing street network and hierarchy including pedestrian, bicycle, public transport and vehicular movement; and
- Existing natural features including topography, waterways and vegetation.

Character Zones

There are six distinctive character zones within the green plan study boundary. These include:

1. Light Industrial (infrastructure and manufacturing)
2. Commercial Centre
3. Town Centre
4. Low Density Residential
5. Medium Density Residential
6. Highway

Key findings

The key findings from the analysis are:

- The Princes Highway, Forest Road, Marsh Street and M5 Motorway run across the Precinct, creating significant barriers to pedestrian and cyclist connectivity.
- Existing open spaces within the Precinct are only minor green pocket parks. Larger open spaces within 200 metre walking distance from the Precinct boundaries include Gardiner Park, Arncliffe Park, Cahill Park and Barton Park Wetlands.
- A total of 21.25 hectares of open space is currently provided in the Precinct and within 200 metre walking distance from the site boundaries. Considering the existing population of 11,000 people, this equates to 19.8 sqm of open space per person, or 2 hectares of open space per 1,000 people.
- A majority of residents live within 200 metre of open space, while all residents live within 400 metres of open space. The 200 metre accessibility gaps are mostly localised around the central area of the Arncliffe Precinct along Forest Road and Wickham Street, and around the periphery north and south of the Banksia Precinct.
- A total of 19.2% of tree canopy coverage over public and private land is currently achieved across the Precinct.
- Cycle and pedestrian connectivity is limited across the infrastructure barriers of major roads, highway and railway line.
- There are no Endangered Ecological Communities in the Precinct and there is an opportunity to strengthen biodiversity corridors through a "blue and green grid" drawing upon overland flow paths, drainage lines and nearby creeks including Wolli Creek and Muddy Creek.

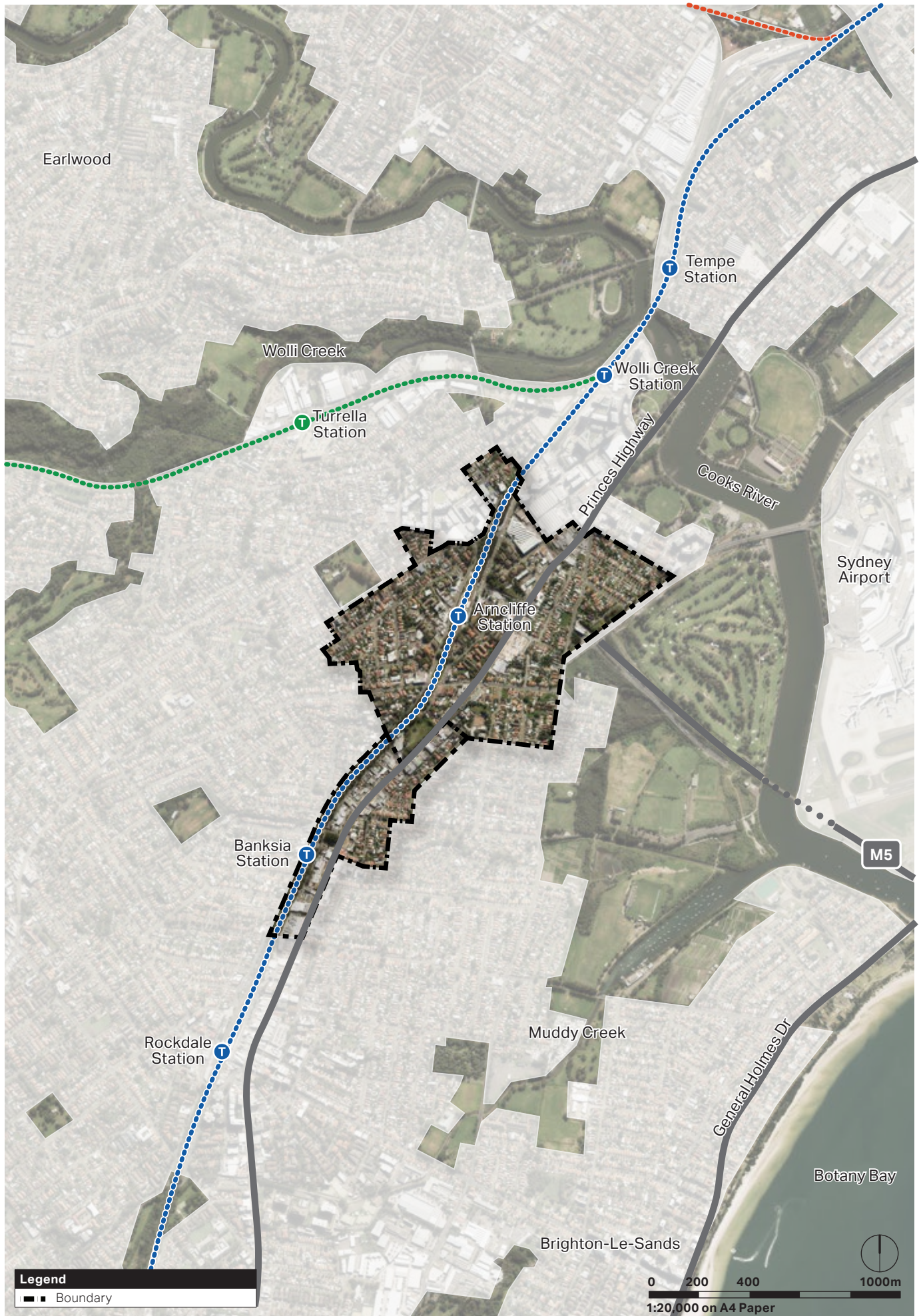


Figure 1 Aerial photo of Arncliffe and Banksia Planned Precinct (Source: AECOM, 2018)

2.2.1 PRECINCT CHARACTER

The overall Precinct character includes light industrial, commercial centre, town centre, low density residential, medium density residential, and major roads. The landscape neighbourhood character includes steep topography and exposed sandstone escarpment that compliments the single family period dwellings. In contrast, both the commercial centre and town centre are characterised by flat topography, formal urban grid and minimal tree canopy cover. In Arncliffe, larger parks, such as Arncliffe Park and Cahill Park, are located in close proximity to either the commercial town centre or low density residential zones. Similarly in Banksia, Gardiner Park is located within a 10 minute walk from the station.

In general, tree canopy cover throughout the Precinct study area varies and is relatively low. For example, tree canopy in the low and medium density residential zones is minimal. Tree canopy cover in the large portions of the light industrial, town centres, commercial centres and major roads is non-existent. The species found are varied and inconsistent; ranging from predominantly *Lophostemon confertus* (Brush Box) and other species such as *Tristanopsis laurel* (Watergum) and the occasional *Jacaranda mimosifolia* (Jacaranda), *Ficus Hillii* (Hill Fig).

The topography of the precinct is relatively flat with steeper topography towards residential area in Arncliffe.

General access to open space is limited due to major roads dissecting the spaces making walkability difficult and unsafe.

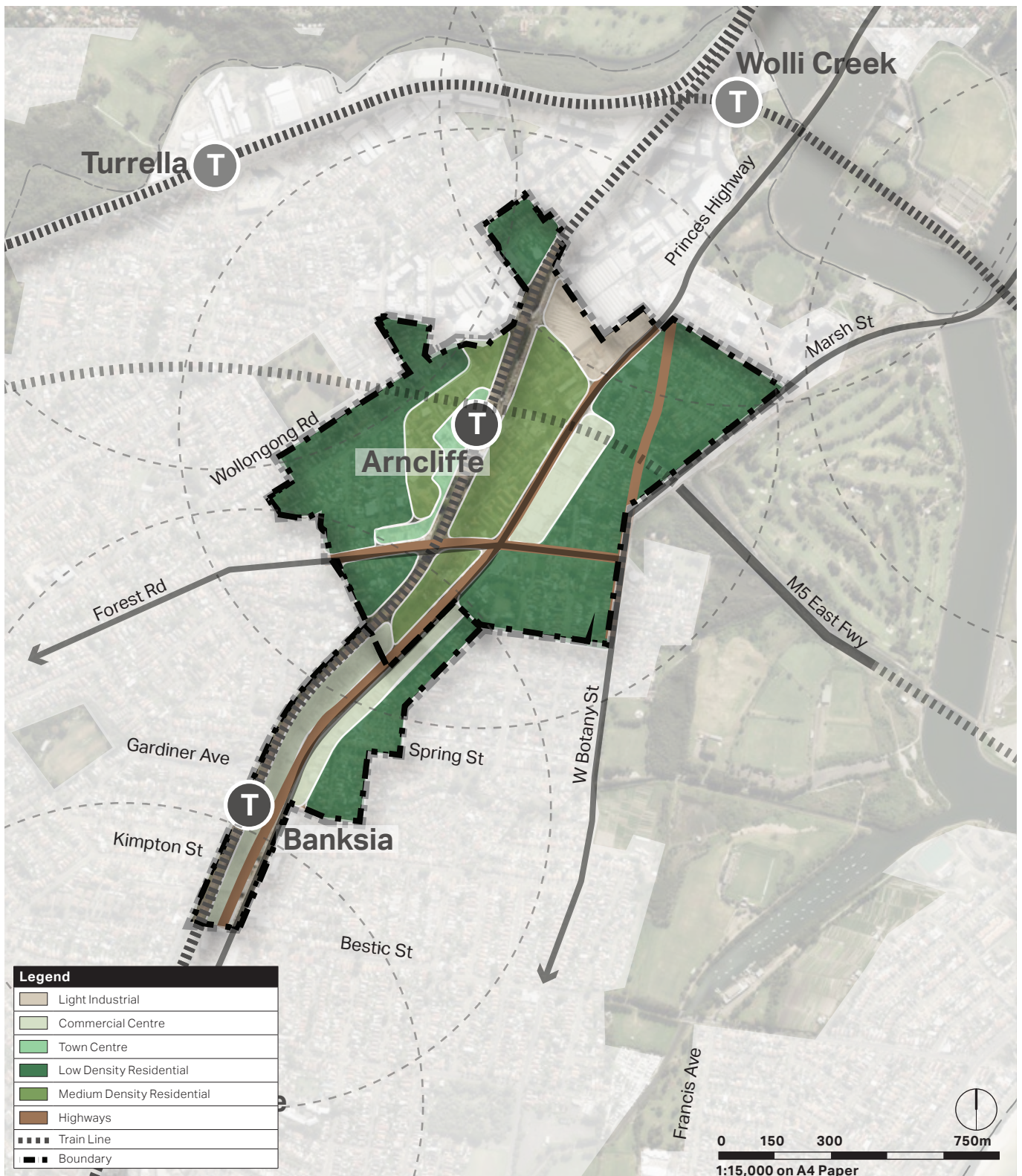


Figure 2 Precinct character zones (Source: AECOM, 2018)



Light Industrial (infrastructure and manufacturing)

Generally this zone consists of large format service and industrial land uses with minimal pedestrian amenity. This zone includes a mix of building typologies including industrial warehouses, car services and dealerships. The density of people on the streets is low due to the car-oriented nature of this zone. In addition, the streets are generally not safe to cross due to lack of crossings and speeding traffic. Streetscapes are generally wide encouraging higher reliance on car mobility with minimal walkability. The overall tree canopy in streets is very minimal to non-existent.



Commercial Centre

This zone is characterised by one to two story buildings, consisting of a medium density commercial core bound by the Princes Highway, Forest Road and low density residential on adjacent sides. In addition, the public domain consists of large warehouses, car showrooms, services and other commercial services. As the zone transitions to low residential (towards Arncliffe) exposed sandstone escarpment define that transition in landscape character. The streetscapes consist of small trees with minimal and patchy tree canopy cover.



Town Centre

This zone consists of low rise local shops bounded by low density residential and in close proximity to high density residential to the north in Wollie Creek. The zone is easily accessible due to the adjacent Arncliffe train station and some mixed use buildings adjacent to low density residential. The public domain is underutilised due to poor amenity, narrow footpaths, cluttered street furniture and comprises an inconsistent materials palette. The streetscapes consist of patchy and disconnected tree canopy with varied tree maturity.



Low Density Residential

This zone consists of two distinctive neighbourhood characters, Arncliffe residential character zone (north) and Banksia residential character zone (south). The residential neighbourhood in Arncliffe includes predominantly single family brick houses. There is an existing unresolved scale transition between recent large apartment buildings to the north and the predominantly low scale residential neighbourhood. The residential neighbourhood in Banksia is predominantly leafy and green with inconsistent tree canopy and single family period dwellings. The streets in both zones generally include wide carriageways and some pedestrian pathways and laneways. Access to the commercial town centres and open spaces requires crossing busy roads such as the Princes Highway, Marsh Street, Wickham Street and West Botany Street.



Medium Density Residential

This zone consists of predominantly two to three story buildings. Older apartment buildings in this zone are characterised with walk-up brick built form with a low fence at the front. More modern apartments are generally characterised with contemporary façades, above average finish with glass balconies and double height lobby. Tree canopy cover is inconsistent in type and height. In addition, majority of tree canopy cover is located within private property behind fences. Streets are wide making the public domain experience dominated by cars. In addition, the footpaths are narrow with narrow grass verge on either side.



Highways

The overall Precinct is defined by four major roads including the Princes Highway, Forest Road, Marsh Street and M5 Motorway. These corridors limit pedestrian permeability and connectivity of neighbouring residents to open spaces. In addition, due to its arterial nature, the corridors are characterised by minimal tree canopy cover and pedestrian amenity.

2.2.2 STREET NETWORK + HIERARCHY

Major infrastructure barriers characterise this Precinct.

Adjacent to Sydney Airport and dissected by the M5 East Freeway, the site is crossed by major traffic flows outward and toward the City.

A sparse network of secondary roads is supported by a more dense grid of local and minor residential streets, which generally present a wide *right of way* but poor streetscaped vegetation and sidewalk maintenance.

The T4 Illawarra train line cuts through the Precinct in a north-south direction and affects vehicles circulation.

OPPORTUNITIES

- The Precinct celebrates good accessibility to surrounding major infrastructure such as Sydney International Airport and surrounding major highways. The M5 East Freeway and Forest Road provide a primary east and west connection into the Precinct. In addition, Princes Highway defines a north and south gateway into the site .
- Generally, some portions of the residential zone within the Precinct are characterised with wide verges that lack tree canopy cover. These verges have the opportunity to include additional tree canopy.
- Both Arncliffe and Banksia train station are accessible by the surrounding community within the Precinct.

CHALLENGES

- High traffic level due to strategic location within major infrastructure and lack of a well established secondary roads network affects the general accessibility to open space.
- Poor quality of internal existing roads to be enhanced through both streetscaped vegetation and urban tree canopy.
- Train line as physical barrier for vehicular, bike and pedestrian circulation.



Figure 3 Street network

2.2.3 TRANSPORT AND CYCLING

The east side of the train line is characterised by access to major bus routes to the Sydney CBD, Bondi Junction and Randwick, while the western side has a more local public transportation coverage.

Bicycle off road paths run only across Barton Park, the other bicycle routes are on road and distributed along the railway line and out of the Precinct Boundary along Hirst St, Lorraine Ave and nearby Wolly Creek along Hannam St. No bicycle network coverage is provided among the residential neighbourhoods of both Arncliffe and Banksia.

The T4 Illawarra rail line acts as a barrier and affects internal circulation for public transportation, bicycles and pedestrians. Several rail crossings are distributed along the Precinct but are sparse throughout the Banksia Precinct.

OPPORTUNITY

- Good accessibility to local and regional public transportation.
- A network of large residential roads offers the opportunity to implement bicycle routes within neighbourhoods.
- The existing Cooks River off road cycle path offers opportunities to link and expand the on and off road bicycle network through the entire Precinct.

CHALLENGES

- Currently poor bicycle network affected by physical barriers and site topography. The Open Space Plan will have to investigate opportunities to expand the cycling network through definition of green and blue links.
- Strong physical barriers in the southern part of the Precinct affect circulation and accessibility.

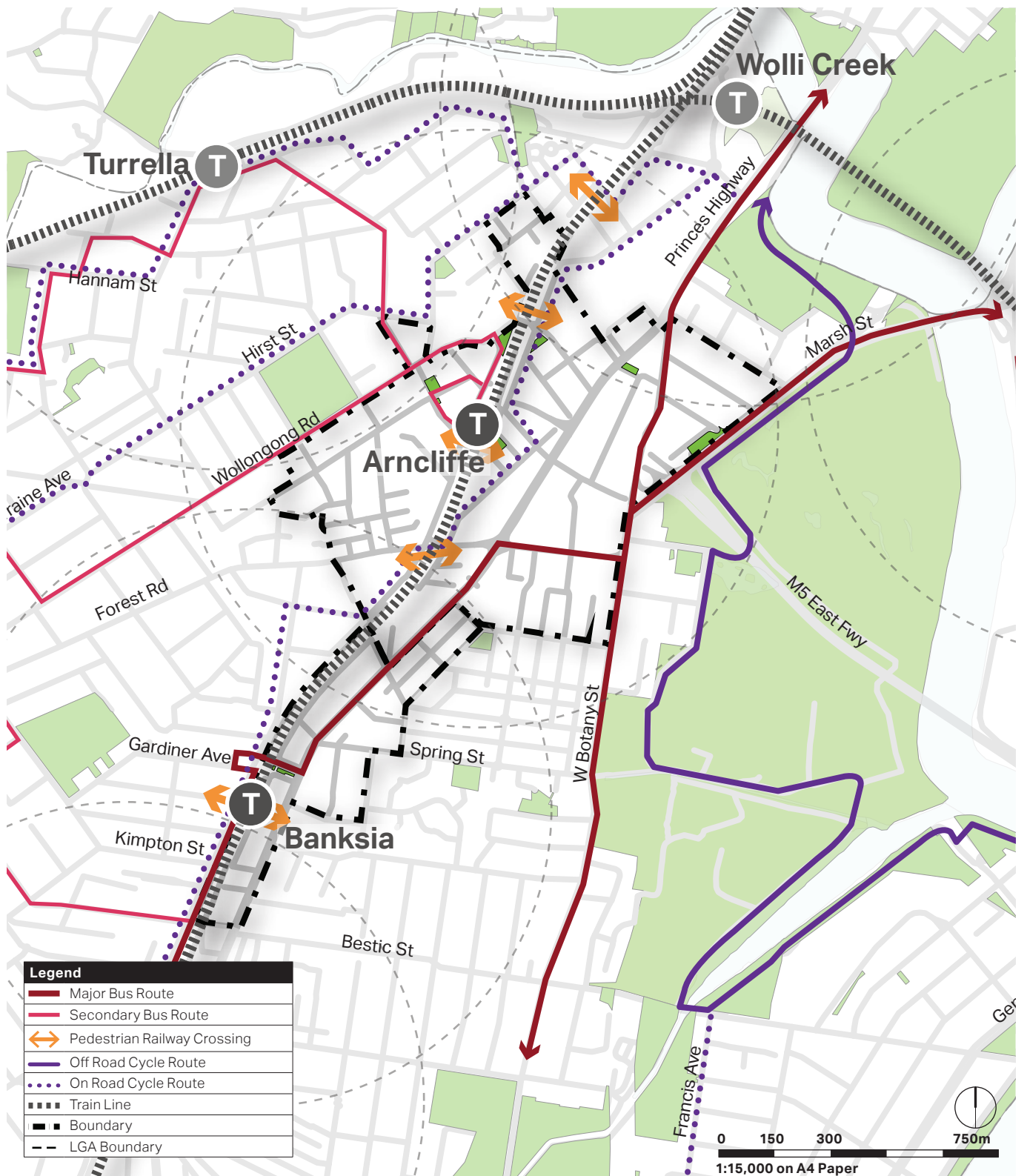


Figure 4 Transport and cycling (Source: AECOM, 2018)

2.2.4 NATURAL FEATURES

The site has a complex topography, with a ridge running south-west to north-east and steeply sloping down to the nearby Cooks River. This natural formation of the ground defines the site as a sensitive area for flooding phenomena.

OPPORTUNITIES

- The steepness of the site allows the definition of view corridors toward both the city centre skyline and the nearby Cooks River. The Open Space Plan should take into account these corridors to further enhance their value.

CHALLENGES

- A more integrated green infrastructure network featuring WSUD strategies will provide mitigation measures against possible flooding.
- The complex topography of the Precinct will affect pedestrian and bicycle routes, bringing an additional constraint in terms of physical barriers running across the site. The Open Space Plan will have to investigate possible future opportunities for alternative green and blue links to define an extended network for bicycles and pedestrians.

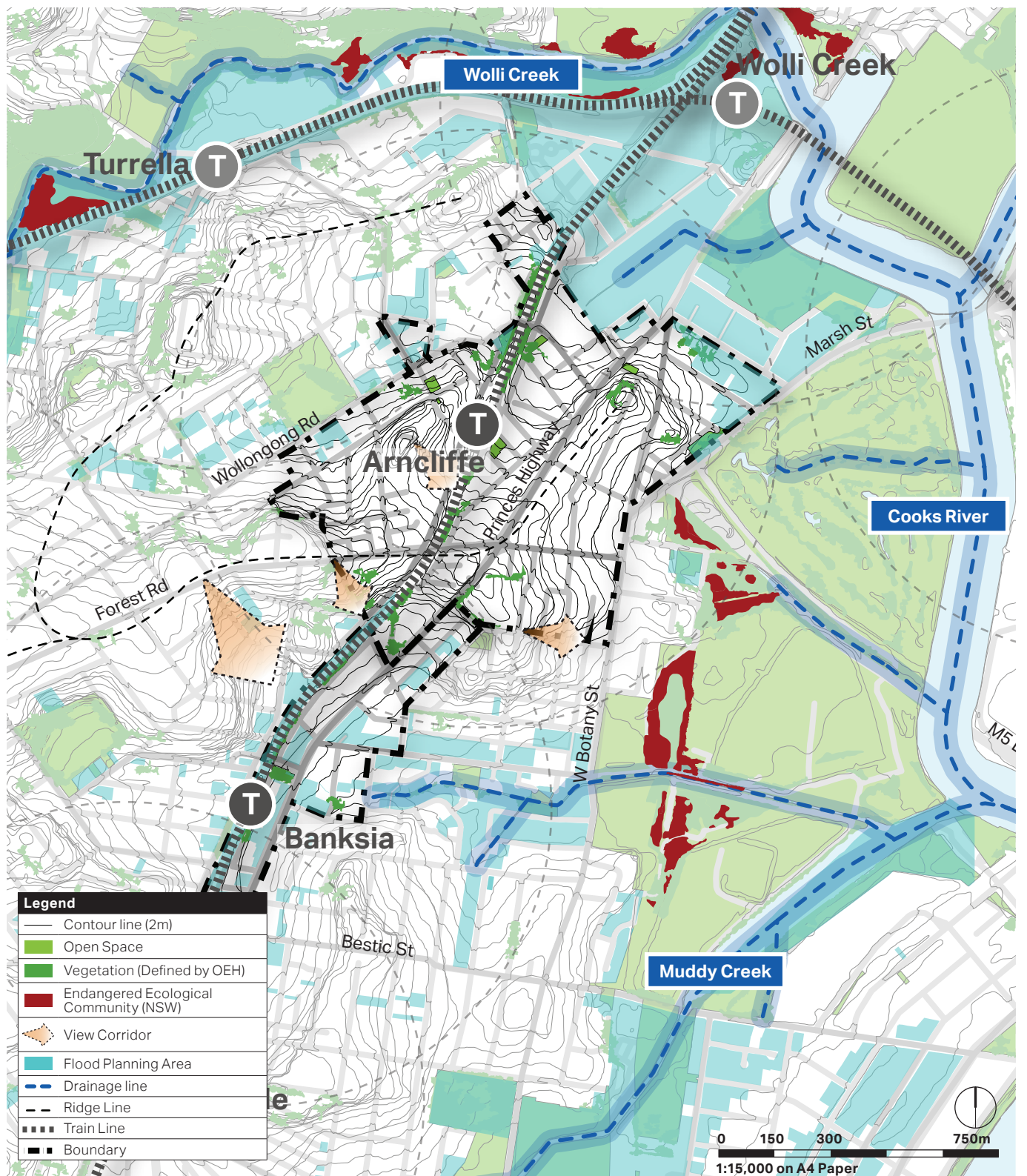


Figure 5 Natural features (Source: AECOM, 2018)

2.3 OPEN SPACE AND TREE CANOPY ASSESSMENT

2.3.1 OPEN SPACE ASSESSMENT

Over the 97 hectares of the Arncliffe and Banksia Planned Precinct, only approximately 1 hectare is existing open space. The green areas within the boundaries have an average size not exceeding the 0.1 hectare with the exceptions of Woorona and Marsh St Reserves, respectively of 0.15 ha and 0.23 ha. However, by including the accessible open spaces within 200 metre walking distance from the boundaries, the number increases up to a total of approximately 21.9 hectares, and it comprises few major parks such as Gardiner Park, Arncliffe Park, Cahill Park and Barton Wetlands.

The existing open spaces have been classified under three categories:

- **Pockets Parks**, for parks smaller than 0.4 hectare and with a catchment area of 300 metres walking distance.
- **Local Parks**, for parks in size between 0.4 to 1 hectare and with a catchment area of 400 metres walking distance.
- **Neighbourhood Parks**, for parks in size between 1 to 5 hectares and with a catchment area of 800 metres walking distance.

The existing open spaces do not offer a wide range of recreational activities or sport facilities, but they are mostly utilised as green open space and children’s playgrounds.

Green areas, such as Almond St Reserve, Empress Reserve and Hattersley St Reserve, are frequently located on residual sites, at the edge of major infrastructure and not related to other public amenities such as schools, community halls or religious buildings.

OPPORTUNITIES

- Large green open spaces such as: Gardiner Park, Arncliffe Park, Cahill Park and Barton Park Wetlands are accessible within 200 metre radius from the Precinct boundaries and within 800 metres radius from the Arncliffe and Banksia train stations. The community’s demand for suitable sized open space can be implemented including these surrounding areas within the Open Space Plan strategies.
- Proposed upgrades for existing open spaces are already setting to implement the green infrastructure network and recreational areas. Further opportunities will be investigated following and enhancing these previous strategies.

CHALLENGES

- The current Precinct boundaries do not include any major open spaces, only small green pockets mostly utilised as playgrounds or lawn. Proper recreational activities will be held in the large surrounding parks outside of the Precinct.
- Underutilisation of the existing open spaces mostly due to their marginal location and lack of amenity.

Existing Open Space		Size (sqm)	Size (ha)	Scale	Hierarchy	Catchment	Recreation focus	
Within Precinct Boundaries	01	Belmore St Reserve	1,100	0.11	< 0.4 ha	Pocket	300m	Passive
	02	Almond St Reserve	1,300	0.13	< 0.4 ha	Pocket	300m	Passive
	03	Empress Reserve	850	0.08	< 0.4 ha	Pocket	300m	Passive
	04	46 Princes Highway	700	0.07	< 0.4 ha	Pocket	300m	Passive
	05	Hattersley St Reserve	600	0.06	< 0.4 ha	Pocket	300m	Passive
	06	Woorona Reserve	1,500	0.15	< 0.4 ha	Pocket	300m	Passive
	07	Marsh St Reserve	2,300	0.23	< 0.4 ha	Pocket	300m	Passive
Total within Boundary		8,300	0.83					
Within 200 metre walking distance from Boundaries	08	Gardiner Park	42,700	4.27	0.4 - 1.0 ha	Local	400m	Active
	09	Arncliffe Park	37,900	3.79	0.4 - 1.0 ha	Local	400m	Active
	10	45 Bonar St	2,400	0.24	< 0.4 ha	Pocket	300m	Passive
	11	Walker Street Reserve	1,300	0.13	< 0.4 ha	Pocket	300m	Passive
	12	Cahill Park	49,950	4.99	1.0 - 5.0 ha	Neighbourhood	800m	Active
	13	Barton Park Wetlands	39,550	3.95	1.0 - 5.0 ha	Neighbourhood	800m	Passive
	14	Riverine Park	8,950	0.90	0.4 - 1.0 ha	Local	400m	Passive
	15	Eve St Reserve	5,100	0.51	0.4 - 1.0 ha	Local	400m	Passive
	16	Lynwen Crescent	4,500	0.45	< 0.4 ha	Pocket	300m	Passive
	17	Beehag Reserve	4,450	0.44	< 0.4 ha	Pocket	300m	Passive
	18	Marinea St Reserve	1,950	0.19	< 0.4 ha	Pocket	300m	Passive
Total outside Boundary		210,500	21.05					
Total Existing Open Space		218,800 sqm	21.88 ha					

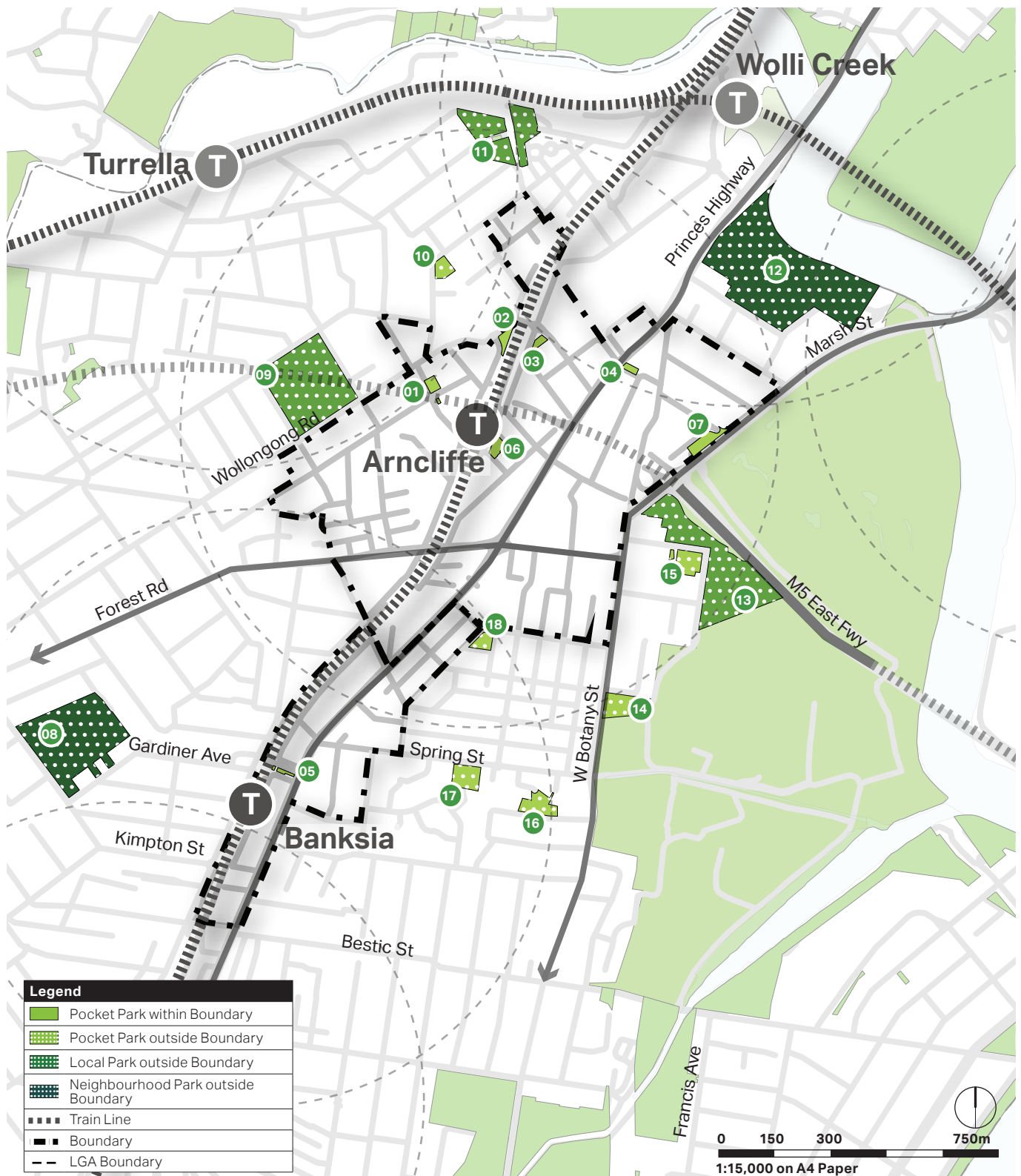


Figure 6 Existing open space (Source: AECOM, 2018)

2.3.2 WALKING DISTANCE TO OPEN SPACE

There are currently 21.9 hectares of open space provided in the Precinct and within 200 metre walk from the Precinct boundaries. There are 11,000 people currently living in the Precinct, this equates to 19.8 square metres (sqm) of open space per person, or 1.98 hectares of open space per 1,000 people.

Even though the existing ratio of open space per person is relatively high, the current network of open space is not distributed uniformly across the Precinct. In addition, multiple infrastructure barriers limit the real catchment area of each park. These conditions define a significant 400 metre accessibility gap mostly concentrated around the area of Forest Road and Wickham Street.

Considering the current and future open space provision ratio, the Green Plan overarching strategy primarily focuses on the open space quality, safety and accessibility. Future possible acquisitions and embellishments of existing open space will be investigated to improve these factors rather than merely adding new open space quantity.

OPPORTUNITY

- A well established network of pocket parks guarantees a distributed coverage among the Precinct with the exception of the area around Forest Road and Wickham Street. The Open Space Plan will investigate future opportunities to improve the accessibility gap in the above mentioned area.

CHALLENGES

- The accessibility to open space for the area around Forest Road and Wickham Street has to be improved working on possible land acquisition and transform the infrastructural barriers into accessible and safe linkages.
- While parks offering playgrounds are quite well distributed among the entire Precinct, parks providing sport fields and recreational spaces are mostly located only around the periphery of the Precinct within Gardiner Park, Arncliffe Park and Cahill Park. The Open Space Plan will have to identify stronger linkages to guarantee a better accessibility towards these areas for the entire Precinct.

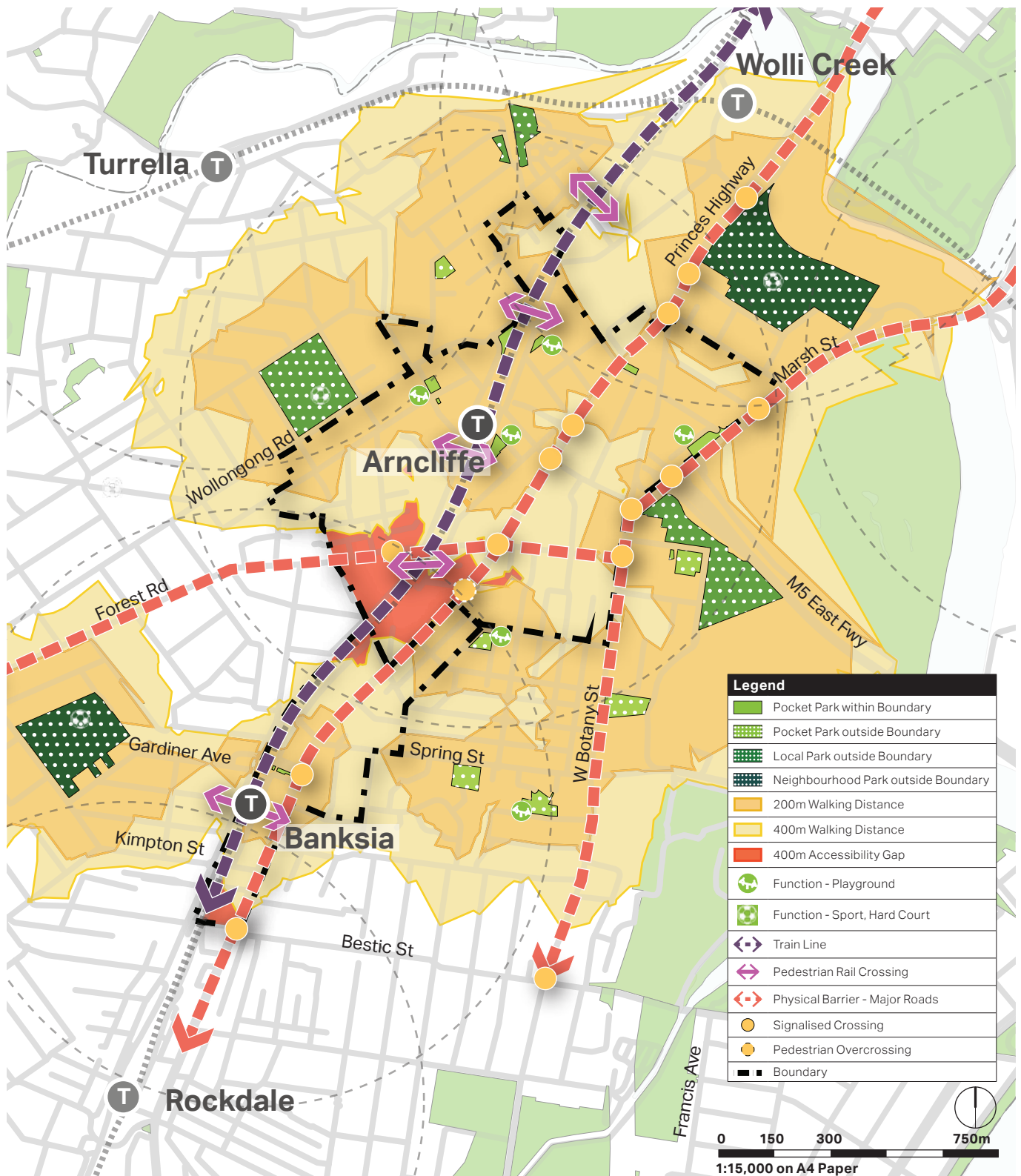


Figure 7 Walking distance to open space (Source: AECOM, 2018)

2.3.3 TREE CANOPY

Well distributed tree canopy coverage characterises the residential areas of the Precinct on the west side of the railway line. These zones have a higher coverage due to generous building setbacks from street frontages allowing for trees in the private and public land.

Within areas with denser building footprint, such as the commercial area along the Princes Highway and the light industrial zones in the northern portion of the Precinct, the tree canopy coverage becomes lower.

OPPORTUNITIES

- The Princes Highway Corridor Strategy (Part B) has identified general streetscape improvements to the Highway in the adjacent sections of Arncliffe and Banksia train stations. Some of these improvements include undergrounding overhead power lines and telecommunications cables. As a result, this would allow for larger tree canopy to be planted on both sides of the Highway. In addition, the Princes Highway is characterised with a wide carriageway and larger setbacks particularly near commercial areas surrounding Arncliffe and Banksia stations. Therefore, this provides the opportunity for additional trees to be added in order to balance the higher building footprint coverage.

CHALLENGES

- The northern periphery of the Precinct is currently undergoing major urban development. This has resulted in an urbanised character that lacks tree canopy and general amenity. Therefore, additional tree canopy within streetscapes need to be provided to mitigate the increasing density and uplift. In addition, local DCP should include expected percentage of tree canopy cover for future developments within the Precinct.

According to a collaborative research undertaken by AECOM, University of New South Wales, Low Carbon Living CRC and other consultancies, it has been found that tree canopy provides major benefits to the urban built environment.

The integration of tree canopy and tree canopy in our urban environments not only reduces the heat island affect, but it also provides other benefits such as:

- Improve perceived noise, smell aesthetics of streets and Precinct.
- Trees provide better shade and thermal comfort than shade structures.
- An effective cooling method is the integration of water and bushland.







	<p>HEALTH BENEFITS</p> <ul style="list-style-type: none"> • Walking and active transport is encouraged. • General reduced health budget costs. • Mental and physical health improvements.
	<p>PROPERTY VALUE</p> <ul style="list-style-type: none"> • Potential correlation between a 5% increase in shade with a \$15,000 increase in property value.
	<p>ECOSYSTEM and BIODIVERSITY</p> <ul style="list-style-type: none"> • Increased habitat and biodiversity in urban area. • Air pollution improvements as a result of more CO2 absorption and fine air particulates reduction.
	<p>INFRASTRUCTURE DURABILITY</p> <ul style="list-style-type: none"> • Asset lifecycle increased as a result of less UV damage. • Extended life of infrastructure (including sidewalk pavements and street asphalt).
	<p>AMENITY VALUE</p> <ul style="list-style-type: none"> • General amenity improvement and appeal of open space.
	<p>COMMUNITY</p> <ul style="list-style-type: none"> • Contributes to place character of place and strengthens community identity through social cohesion and community appreciation of open space. • Increased buffering and privacy by defining structure to urban form. • Reduced crime and providing cohesive green connections through city.



Figure 8 Tree canopy (Source: AECOM, 2018)

2.3.4 TREE CANOPY ASSESSMENT

An assessment of the existing tree canopy has been undertaken to establish those areas within the Precinct where there is an opportunity to expand the tree canopy cover by using the following targets set by the Government Architect’s Office:

- Tree Canopy - Urban zone target of 25%
- Tree Canopy - Suburban zone target of 40%

We have calculated the amount of tree canopy currently achieved on both public and private land across each of these land use areas which is outlined in the table below.

Existing Conditions	URBAN	SUBURBAN
Land Area (ha)	55.9 ha	41 ha
Tree Canopy Cover on both Public and Private Land (%)	18.24%	20.63%
Tree Canopy Cover Target (%)	25%	40%
Canopy Cover Shortfall (%)	6.76%	19.37%

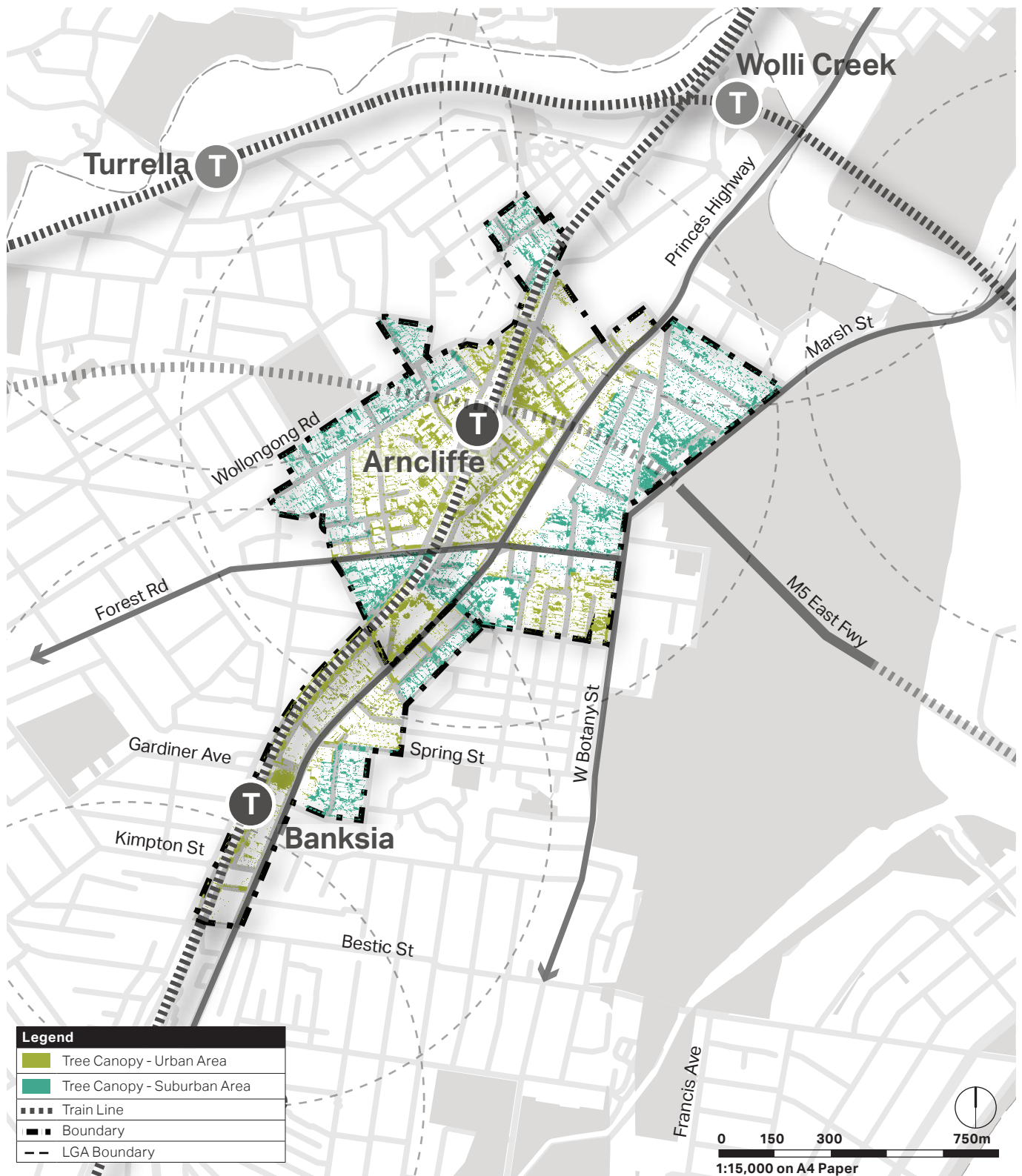


Figure 9 Existing tree canopy (Source: AECOM, 2018)

We have also highlighted the amount of tree canopy currently achieved on public land only, noting that the public domain is where the DPE and local governments have the greatest ability to influence the tree canopy.

If we take in account only the existing tree canopy within public lands, the existing percentage of canopy coverage gets lower values and defines a bigger shortfall to achieve the target tree canopy cover.

- For the urban area the shortfall rises from 6.8% to 19.7%
- For the suburban area the shortfall rises from 19.4% to 34.8%

These numbers emphasise the role played by the tree canopy coverage on private lands and highlight how much further urbanisation will impact on the overall coverage numbers.

Existing Conditions	URBAN	SUBURBAN
Land Area (ha)	55.9 ha	41 ha
Tree Canopy Cover only on Public Land (%)	5.3%	5.2%
Tree Canopy Target (%)	25%	40%
Tree Canopy Shortfall (%)	19.7%	34.8%

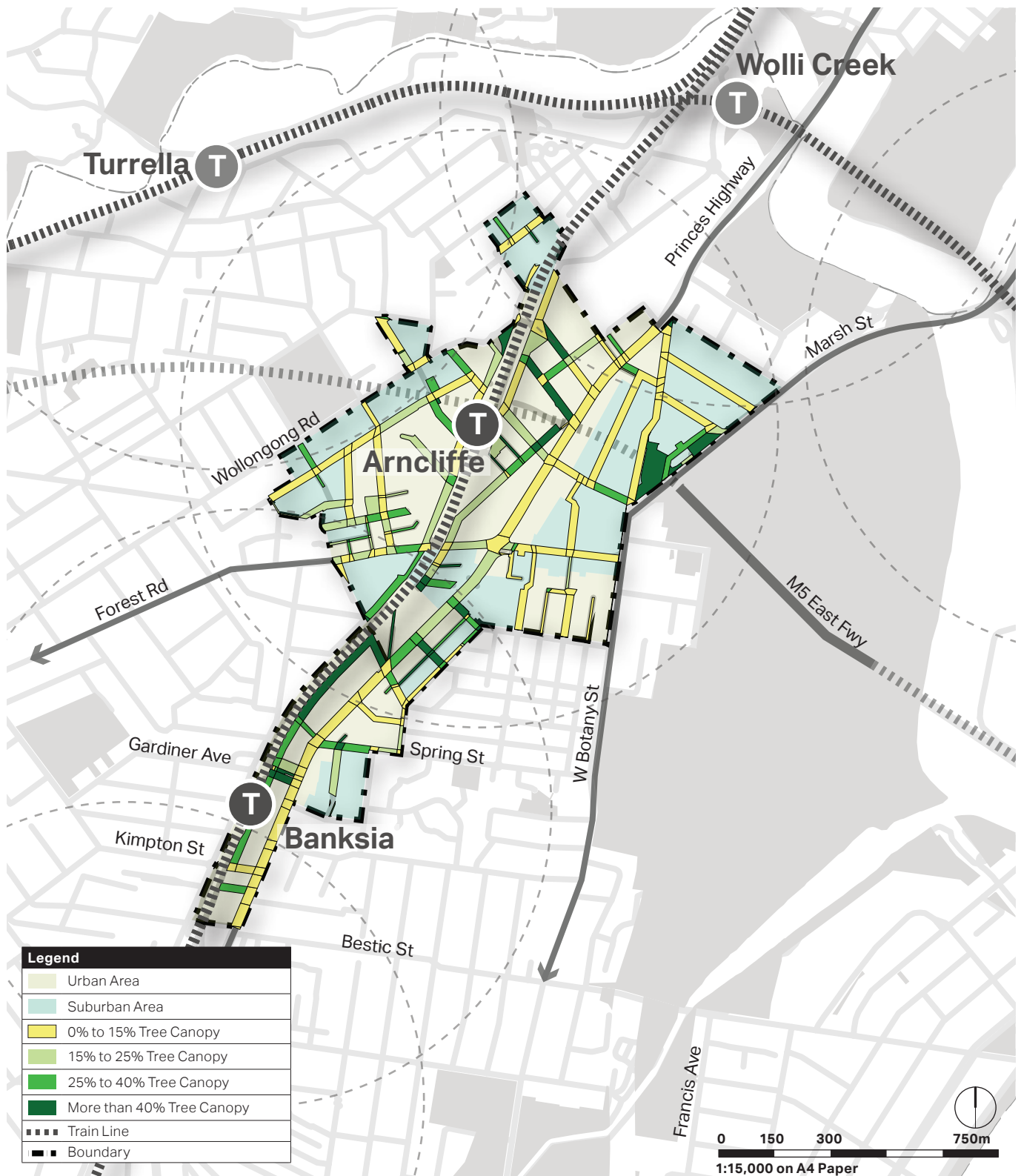


Figure 10 Tree canopy within road reserves and RE1 zoned areas (Source: AECOM, 2018)

3.0

BUILDING THE STRUCTURE

This section of the report defines a vision for Arncliffe and Banksia by defining what will be the enduring open space legacy for the existing and future local community. This is followed by establishing design principles that will protect and safeguard this legacy through the evolution of the Precinct.

3.1 VISION STATEMENT

The vision for Arncliffe and Banksia has been developed following a review of previous strategic planning and vision setting for the Precinct and refined in consultation with the Department of Planning and Environment. The vision responds to previously articulated aspirations for the Precinct and adds a new layer focus on **open space, recreation, biodiversity and tree canopy**. Key documents reviewed to inform the vision include:

- Bayside West Precincts Draft Land Use and Infrastructure Strategy, Department of Planning and Environment (2017)
- Arncliffe and Banksia Station Precincts – Urban Design Report, Gallagher Studio and Architects (2016)
- Rockdale Open Space and Recreation Needs Analysis, Rockdale City Council (2015)
- Rockdale Open Space and Recreation Strategy, Rockdale City Council (2010)
- Rockdale Community Strategic Plan, Rockdale City Council (2013)
- Princes Highway Corridor Strategy, Rockdale City Council (2013)
- Rockdale City Urban Strategy, Rockdale City Council (2010)
- Rockdale Biodiversity Strategy, Rockdale City Council (2014)
- Draft Greener Places, Government Architect’s Office (2017)
- Sydney Green Grid Eastern District, Government Architect’s Office (2017)
- Greater Sydney Region Plan: A Metropolis of Three Cities, Greater Sydney Commission (2018)
- Eastern District Plan, Greater Sydney Commission (2018)

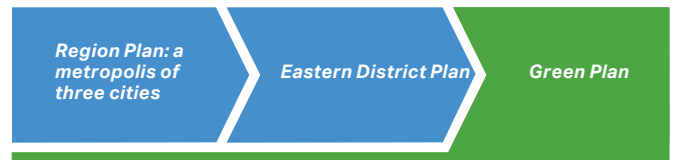
Arncliffe and Banksia are located within the Eastern City District as outlined in the Greater Sydney Commission’s metropolis of three cities. There are Ten Key Directions for the metropolis and the Eastern City District of which three apply to this Green Plan. These include;

A City for People – *Celebrating diversity and putting people at the heart of planning.*

A Well Connected City – *Developing a more accessible and walkable city.*

A City in its Landscape – *Valuing green spaces and landscapes.*

Greater Sydney Commission



Department of Planning

The overarching vision is to:

“Deliver green infrastructure that provides social, environmental and economic benefits for the people of Arncliffe and Banksia.”

Rockdale’s recent community consultation expressed a strong interest in the retention and improvement of existing open space and the provision of more high quality Green Space.

Key findings from the Rockdale community statement are:

- Improve pedestrian and cycle links to the network of open spaces to enhance connectivity towards district and regional open space facilities.
- Upgrade local parks and playgrounds to maximise the usage of existing open spaces.
- Plant more trees.
- Protect natural habitat and acquire recreational spaces

A City for People – Celebrating diversity and putting people at the heart of planning

A Well Connected City – Developing a more accessible and walkable city

A City in its Landscape – Valuing green spaces and landscapes

(Source: Eastern District Plan, Greater Sydney commission)



OPEN SPACE FOR RECREATION

Establish an interconnected network of open spaces that are flexible, safe and equitable to meet the multicultural community needs for recreation and foster their values for cultural diversity and active living.



OPEN SPACE FOR BIODIVERSITY

Connect Cooks River to Wolli Creek through biodiversity corridors to enhance the natural identity of the landscape and provide a range of environmental and social benefits.



TREE CANOPY

Reinforce tree canopy in the public domain to maximise comfort and enhance the liveability, health and well-being of both the community and the environment.

3.2 GUIDING PRINCIPLES

To support the implementation of the long term open space, recreation, biodiversity and tree canopy vision for Arncliffe and Banksia, a series of guiding principles have been identified. The guiding principles are intended to guide the decision making process in assessing and prioritising the enhancement of existing open space, the potential acquisition of new open space and the strengthening of biodiversity corridors and tree canopy across the Precinct.

The guiding principles are intentionally action-oriented. They describe what each design principle is, why it is important and how it can be achieved. Like the vision, it is recommended that the preliminary guiding principles outlined in this section of the report be tested with the existing Arncliffe and Banksia community to ensure their relevance and alignment with community needs and expectations.

PEOPLE 



**PRINCIPLE 1
COMMUNITY NEEDS**

Deliver a high quality public domain aligned with the community’s needs

To achieve this:

- Confirm the specific needs and expectations of the existing and future community
- Allocate investment aligned with these needs and expectations
- Optimise existing open spaces and adapt the function to best meet the needs of the community
- Provide high quality public domain and open space commensurate with the increased density occurring in the Precinct, particularly surrounding Arncliffe and Banksia train station
- Provide better connectivity between open spaces and through major road barriers such as Forest Road, West Botany Road, and Marsh street

**PRINCIPLE 2
HUMAN SCALE**

Plan for people-oriented spaces and streets to prioritise pedestrians

To achieve this:

- Incorporate human comfort index, by ensuring thermal, visual and acoustic comfort in public domain
- Ensure people focused movement by emphasising streets and footpaths as part of the public domain
- Think regionally to simplify pedestrian and cyclist connections to Turrella, Tempe and the airport
- Provide enhanced pedestrian connectivity between town centres, public transport services, cycle networks and natural systems
- Consider landscape setbacks on the Princes Highway to improve amenity for pedestrians and cyclists
- Offer a diversity of spaces and streets that can be programmed to deliver a variety of active and passive open spaces

**PRINCIPLE 3
LOCAL IDENTITY**

Enhance the local character and river identity to create a strong sense of place

To achieve this:

- Build upon the existing character, topography and heritage of the Precinct
- Investigate opportunities to integrate the heritage Southern and Western Sydney Ocean Outfall Sewer (SWSOOS) into the movement network
- Reinforce Arncliffe and Banksia’s close proximity to the Rockdale Wetlands Open Space Corridor, Cooks River and Muddy Creek
- Create destinations that are unique to the people and the place of Arncliffe and Banksia
- Consider street tree planting species that support the local character and assist in delivering an increased tree canopy

NATURE



**PRINCIPLE 4
NETWORK**

Create a network of open space to enhance biodiversity and connectivity

To achieve this:

- Deliver an integrated and coordinated “green and blue grid” of open space, biodiversity and water sensitive urban design corridors across the Precinct
- Enhance and sustain biodiversity through a connected network of bushland, wetland and foreshore habitats
- Establish clear connections to nearby open space and natural amenity, such as the Cooks River and Rockdale Wetlands Open Space Corridor, which are currently difficult to access
- Provide high amenity connections for pedestrians and cyclists through the Precinct and along the Cooks River
- Reinforce visual connections between open spaces, including Gardiner Park, Arncliffe Park and Cahill Park

**PRINCIPLE 5
QUALITY**

Maintain and improve the open space quality within the Precinct

To achieve this:

- Quantify existing open space provision in the Precinct
- Assess quality of existing open space in the Precinct
- Determine the future quantity and quality required based on the forecast growth and demographics
- Acknowledge the relationship between increased density and increased need for open space
- Apply a “maintain and improve” approach aligned with the existing landscape character
- Improve, upgrade and embellish existing open spaces including Wooroona Reserve, Arncliffe Park and Gardiner Park
- Investigate opportunities to create new open spaces at Allen Street, Eden Street, Burrows Street, Kyle Street, the RMS site and the LaHC site

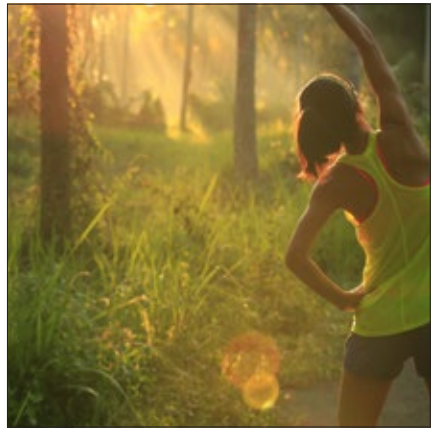
**PRINCIPLE 6
RESILIENCE**

Demonstrate leadership in resilience to align with Council’s aspirations

To achieve this:

- Address NSW Government priorities including health, climate resilience, biodiversity loss, rapid population growth, changing lifestyles and demographics, infrastructure and urban renewal
- Respond to climate change through action and adaptation
- Preserve, protect and promote the Precinct’s natural resources
- Minimise natural area fragmentation and promote corridor and habitat linkages
- Prioritise tree canopy above overhead wires in the long term
- Improve air and water quality throughout the Precinct
- Investigate opportunities to mitigate climate change and urban heat island effect
- Contribute to the community’s environmental awareness

HEALTH 



**PRINCIPLE 7
EQUITY**

Ensure equitable access to open space to increase its usage and functionality

To achieve this:

- Mitigate the existing physical barriers of the elevated railway line, Princes Highway, West Botany Street, Marsh Street, Forest Street and the M5 Motorway to improve connectivity to open space
- Incorporate universal access principles into open space design for people of all ages and abilities
- Facilitate inclusive design and accessibility to all active transport and public transport facilities
- Improve connectivity and accessibility to open space by increasing signalised crossings through green and blue links
- Deliver accessible open space within 200-400m walking distance for all residents and workers in the Precinct
- Provide active open space or an active recreational facility within 1km for all residents and workers in the Precinct

**PRINCIPLE 8
SAFETY**

Provide a safe, comfortable environment to encourage activation and vibrancy

To achieve this:

- Integrate Crime Prevention Through Environmental Design (CPTED)
- Design open spaces that allow for passive surveillance
- Encourage day and night time, weekday and weekend activation of public domain
- Ensure walking and cycling networks that are safe and well lit at all times
- Provide safe pedestrian and cycle crossing points across major infrastructure barriers such as the elevated railway line and busy roads within the Precinct
- Reinforce pedestrian and cycle connections with the general future streetscape improvements identified for Princes Highway and adjacent sections of Arncliffe and Banksia train stations

**PRINCIPLE 9
WELLNESS**

Promote active and healthy living to contribute to well being of the community

To achieve this:

- Adopt a “maintain and improve” approach for the provision of sport and recreation facilities for the existing and future community of Arncliffe and Banksia
- Deliver continuous, user-friendly networks for on-road and off-road local and regional cycling
- Improve footpath quality, width and continuity
- Maintain and improve street trees to provide a high amenity environment for walking and cycling particularly on the Princes Highway and identified green / blue links
- Reduce car dependency especially for short trips within the Precinct
- Integrate end-of-trip facilities into commercial buildings
- Facilitate and enhance access to foreshore, natural and bushland areas

ECONOMY



PRINCIPLE 10 FLEXIBILITY

Design for flexibility and adaptability to cater for the future population

To achieve this:

- Optimise open space provision, design and delivery through flexible design
- Deliver robust open spaces that are flexible in their programming and capable of responding to change
- Expand the diversity of open space and recreation facilities available
- Increase the provision of multi-purpose, multifunctional, shared and co-located sports and recreation facilities including shared school grounds and re-purposed golf courses
- Reassess the community's needs on a regular basis and respond accordingly



PRINCIPLE 11 DELIVERY

Facilitate a coordinated, strategic delivery and provision of open space

To achieve this:

- Identify land for short term and long term acquisition to assist in the provision of additional open space for the Precinct
- Provide facilities, services and open space in an efficient manner to support future changes in development
- Make the most of limited resources through designing facilities and open space as multi-purpose, co-located and capable of accommodating shared or multiple use arrangements
- Investigate partnership opportunities with other public or private organisations to identify shared delivery models
- Prepare a long term open space and recreation master plan for the Precinct to streamline delivery



PRINCIPLE 12 FUNDING

Optimise funding of open space through innovative financing models

To achieve this:

- Build in efficient measures that send the right price signals and avoid significant dead-weight loss
- Maximise effectiveness by raising funds when needed and growing funds as the economy grows
- Ensure horizontal equity where levy payers with similar characteristics are treated equally and costs are allocated to those that both generate the demand and receive the benefit
- Provide a mechanism that is reconciled with the full funding spectrum and appropriate in infill situations where infrastructure provided supports a regional catchment

4.0

DEFINING THE PLACE

This section of the report prepares a design response for Arncliffe and Banksia that communicates the vision for the open space and tree canopy in the Precinct. The purpose of this is to allow the community to understand what the open space and streets will look and feel like in addition to how the open spaces and streets can be used.

4.1 OPEN SPACE PLAN

The Open Space Plan responds to the vision and guiding principles articulated in the previous section of the Green Plan. It also addresses the need to integrate the current open space provision when considering the proposed growth in the Precinct. It includes the new re-zoning proposal developed by DPE and identifies infrastructure initiatives, which are classified into one of two categories (in line with regional NSW policy). The categories are as follows:

Committed Initiative (0-10 year timeframe)	●
Investigation Initiative (Up to 20 years timeframe)	●

The Open Space Plan identifies opportunities to enhance and activate existing open spaces and better connecting these open spaces to the community living and visiting the precinct. Below are the key infrastructure initiatives and their respective classification:

Committed Initiatives

- The Department is delivering a new park next to Arncliffe Station on the corner of Arncliffe Street and Burrows Street. This park will be at least 7,000 square metres in size and includes recreation space, childrens play areas, an off-leash dog area and opportunities for community facilities. The park will be masterplanned in collaboration with Bayside Council and the local community to ensure it meets local needs.
- The Department has contributed \$3 million to Bayside Council through the Precinct Support Scheme funding to develop a Public Domain Plan and Technical Manual that will deliver street works and guide any future development applications in Arncliffe town centre and along the Princes Highway.
- The Department has committed to upgrading two parks through the Precinct Support Scheme funding. The funding will see a \$4.5 million upgrade to Arncliffe Park and \$2.5 million allocated for Gardiner Park improvements, these include the installation of synthetic playing fields which are much needed by the local sporting community and lighting and safety upgrades.
- Wooroona Reserve, Marinea Reserve and Marsh Street Reserve have been identified as parks to be improved.
- The Department (through the Draft SIC) will provide funding towards the integration of the heritage Southern

and Western Suburbs Ocean Outfall Sewer (SWSOOS) into the pedestrian network which could include the creation of a linear park.

- Funding towards a new shared pedestrian and cycle path following the Cooks River, through the Cooks Cove area. This link will provide the missing link to the Botany Bay to Homebush Bay regional cycle network. The location for this path will be subject to detailed design as part of future investigations.
- Funding towards improved pedestrian and cycling crossings across Marsh Street and Princes Highway to provide better access between Cooks Cove and the Wolli Creek railway station.
- Footpath connections throughout the Precincts so that they are safe, well-lit and have pedestrian crossings at key locations.
- New on-road cycleways connecting the railway stations to the Eve Street Cycleway and Wolli Creek to form part of a new east-west cross regional route.
- Funding towards the construction of a new pedestrian and cycling connection across the Cooks River between Cahill Park and Tempe Recreation Reserve.
- Improving the existing north-south on-road cycleway between Banksia and Arncliffe stations.

Initiatives for Investigation

In addition, the redevelopment of areas within the Precincts provides an opportunity to open up private sites for public open space as large sites redevelop. The following potential sites have been identified and are subject to further investigation through the development assessment process:

- Eden Street Park – a new park (up to 0.4ha) could be provided close to the Arncliffe town centre, to the east of the railway station, between Eden Street and the Princes Highway as part of any future redevelopment of the social housing estate.
- Allen Street Park – a new park (up to 0.5ha) could be located adjoining the boundary with Wolli Creek incorporating the heritage listed SWSOOS as part of any future development of the Ford Service Centre. This park could provide playground facilities and passive recreation opportunities.

The Open Space Plan proposes an enhanced interlinked network of green infrastructures composed by a mix of new open spaces and embellished existing parks better connected through a system of linear parks and green and blue links. It balances the future developments and answers to the current demand for recreational spaces and green pockets.

The Open Space Plan defines a preferred network of green and blue links. This network of selected roads will connect each open space within a continuous walkable network of footpaths, laneways, pedestrian bridges and undercrossing. These links will define the major routes for bikes, pedestrians and biodiversity, therefore, possible further enhancement of streetscape amenity, verge vegetation and setback treatment should be encouraged.

Adding approximately 2.12 hectares of open space guarantees 9.5 sqm of open space per person in the scenario of 25,000 future population.

Note: All additional new open spaces proposed are subject to future investigation and feasibility testing with stakeholders.

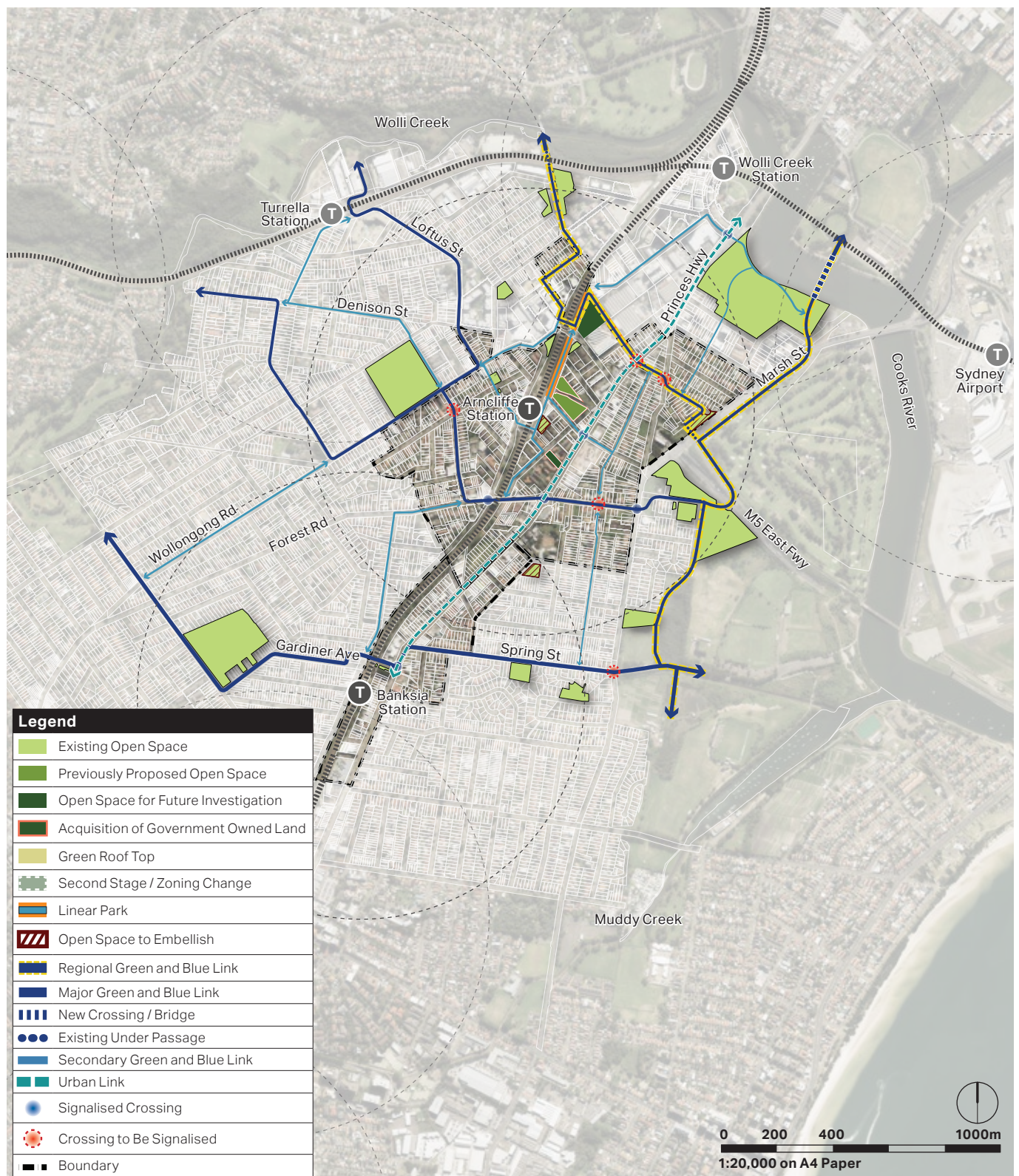
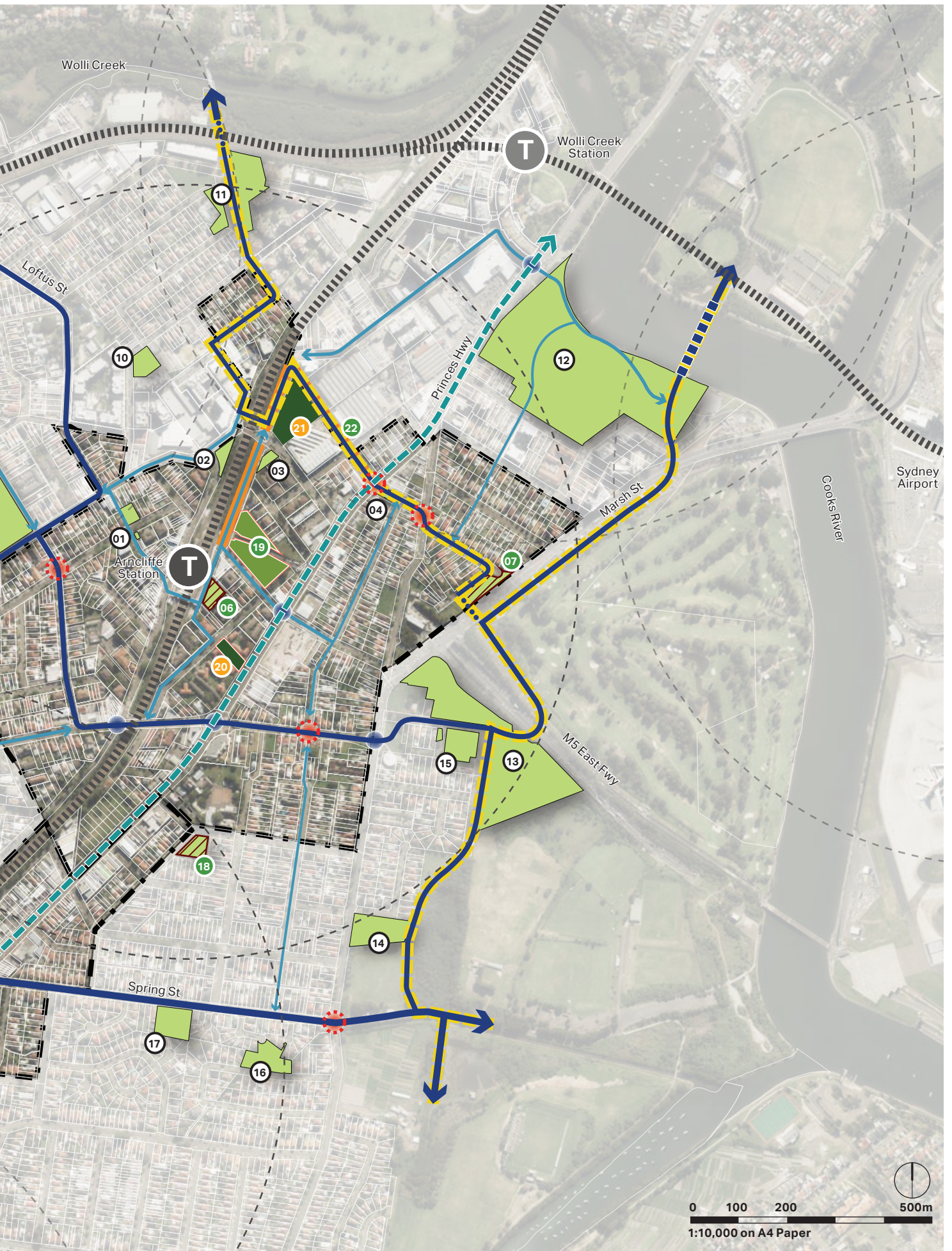


Figure 11 Overview of open space plan (Source: AECOM, 2018)

Existing Open Space	Ha	CIV
Within Precinct		
1 Belmore St Reserve	0.11	
2 Almond St Reserve	0.13	
3 Empress Reserve	0.08	
4 46 Princes Highway	0.07	
5 Hattersley St Reserve	0.06	
6 Woorona Reserve	0.15	●
7 Marsh St Reserve	0.23	●
Total within Precinct	0.83	
Within 200 metre walking from Boundaries		
8 Gardiner Park	4.27	
9 Arncliffe Park	3.79	
10 45 Bonar St	0.24	
11 Walker St Reserve & Lusty St Open Space	0.67	
12 Cahill Park	4.99	
13 Barton Park - Wetlands	3.95	
14 Riverine Park	0.90	
15 Eve St Reserve	0.51	
16 Lynwen Crescent	0.45	
17 Beehag Reserve	0.44	
18 Marinea St Reserve	0.19	●
Total within 200 metre walking from Bdy	19.87	
Total Existing Open Space	21.25	
Proposed Open Space	Ha	
19 RMS Site on Arncliffe St / Burrows St	0.70	●
Total Previously Proposed Open Space	0.70	
Open Space for Future Investigation	Ha	
20 Eden St Park	0.40	●
21 Allen St Park - Currently Rockdale Mazda	0.50	●
22 SWSOOS Linear Park	0.52	●
Total Open Space for Future Investigation	1.42	
Total Open Space	23.65	
Open Space Plan Summary		
Existing Open Space	21.25	
Proposed Open Space	0.70	
Open Space for Future Investigation	1.42	
Total	23.65	
Committed Initiative		●
Investigation Initiative		●

Legend	
	Existing Open Space
	Proposed Open Space
	Open Space for Future Investigation
	Acquisition of Government Owned Land
	Green Roof Top
	Second Stage / Zoning Change
	Linear Park
	Open Space to Embellish
	Regional Green and Blue Link
	Major Green and Blue Link
	New Crossing / Bridge
	Existing Under Passage
	Secondary Green and Blue Link
	Urban Link
	Signalised Crossing
	Crossing to Be Signalised
	Precinct Boundary





4.2 TREE CANOPY PLAN

The Tree Canopy Plan responds to the current shortfall of tree canopy cover in the Precinct. It is intended as a long term framework to identify where and how investment should be prioritised to achieve the tree canopy targets identified for urban (25%) and suburban (40%) land uses. While the Tree Canopy Plan focuses on tree canopy in the public domain, it must be noted that the private domain also plays a significant role in contributing to the overall tree canopy in the Precinct, whether it be the backyards of detached dwellings or shared private open space in apartment developments. The Tree Canopy Plan takes into account the land rezoning proposed changes and therefore it shows an updated zoning between the urban and suburban areas substituting the existing suburban portion into urban.

The Tree Canopy Plan, in order to propose a feasible number of additional plantings, makes the following assumptions:

- All new trees assume a 4 metres radius tree canopy, resulting in a canopy cover of 50 sqm per tree and a planting distance of 15 metres between one tree and the next.
- No additional trees within roads with a *right of way* less than 5.5 metres wide.
- One row of trees within all the roads with a *right of way* included between 5.5 and 8.5 metres wide.
- Two rows of trees within all the roads with a *right of way* greater than 8.5 metres wide.
- Three rows of trees within the proposed linear parks with the exception of the one on the SWSOOS site because of a lack of soil available and operational infrastructure restrictions.
- All proposed new open spaces will be counted with an average tree canopy coverage of 45%, as per the average

tree canopy coverage over previous case studies.

- 15 metres planting distance will not necessary reflect the actual planting distance. This number has been adopted as a conservative average distance able to accommodate possible site-specific issues such as private lot driveway entrance, bus stop, facilities box and others factors.

Street trees need to be considered in the context of the other existing or proposed grey infrastructure within the Precinct. This includes consideration of the underground infrastructure, surface infrastructure and aerial infrastructure. In order to realise an effective canopy strategy the aesthetic and wider benefits need to be considered in the context with the existing infrastructure.

The following information would assist in informing a further detailed stage for street tree planning:

- Sydney Water infrastructure (potable, non-potable, sewerage and storm water).
- RMS roads and council roads (different standards for clearances apply) and the curb to curb dimensions and driveways and setbacks.
- Councils footpath and cycle paths (existing and proposed cycle paths).
- Storm water drainage layer.
- Electricity infrastructure.
- Gas infrastructure (mains, and distribution).
- Communications infrastructure (Telstra, Optus and NBN).
- TfNSW bus infrastructure (bus stops, bus shelter and proposed bus stops / shelters).
- Street signage and appropriate sight lines.
- Street lights and appropriate light spill.

	URBAN
Land Area (ha)	96.9 ha
Existing Tree Canopy over Private Land (ha)	13.6 ha
Existing Tree Canopy on Roads (ha)	4.3ha
Maximum Tree Canopy on Roads (ha)	8.3 ha
Additional Tree Canopy on Roads (ha)	4 ha
Trees added on Roads	800 trees
Tree Canopy on Existing Open Spaces (ha)	0.4 ha
Tree Canopy on New Open Space (ha)	0.98 ha
Trees added on New Open Spaces	196 trees
Total Additional Tree Canopy (ha)	4.98 ha
Total Trees added	996 trees
Overall Tree Canopy (ha)	23.28 ha
Overall Tree Canopy (%)	24%
Tree Canopy Target (%)	25%
Tree Canopy Shortfall (%)	1%

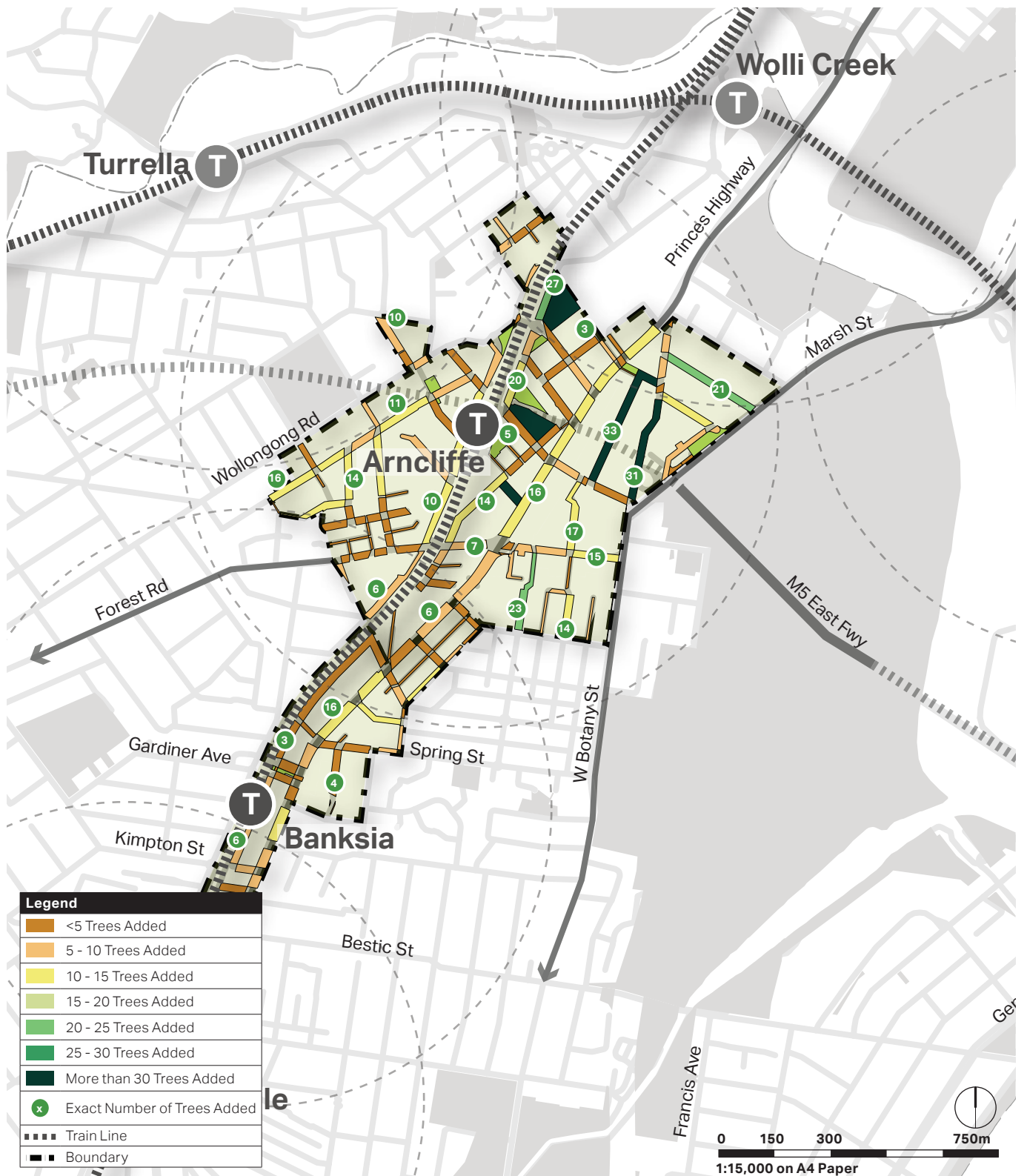


Figure 12 Overview of tree canopy plan (Source: AECOM, 2018)

4.3 CONCEPT PLANS

The Open Space Plan proposes an enhanced, interlinked network of green infrastructure by identifying embellishments to existing open space and suggesting additional open space throughout the Precinct. It addresses future demand and enhances the quality of living for the projected growth in the Precinct.

The Open Space Plan comprises a series of links and interconnected open spaces. In addition, the Plan identifies new medium to large parks and linear parks. The proposed open space provides an opportunity for multifunctional, passive and active recreation that caters for the projected population growth in the Precinct. In addition, according to the social infrastructure study undertaken by Elton Consulting, in order to meet the increasing population, existing facilities need to be upgraded.

For the purpose of this report we have illustrated two future typologies of the possible function of proposed open spaces. The two Concept Plans are:

- **Concept Plan 1: Burrows Street Park**
 Located on the corner of Burrows Street and Arncliffe Street with the M5 tunnel cutting the site in half. The park's location celebrates high accessibility from both local residents and visitors via nearby Arncliffe station. The park is bounded by future mixed use and residential development on one side, on road carpark spaces and a mosque to the south. The primary purpose of the park is to provide a multifunctional open space and activate street for both the surrounding and wider community.
- **Concept Plan 2: SWSOOS Linear Park**
 The park is located on the heritage listed pipe and adjacent to the previously proposed park on Allen Street. The park provides a link from the proposed urban link on Princes Highway (south) and the northern portion of Arncliffe Precinct through the underpass for the railway line. In addition, it provides a continuation of Allen Street Park. The primary purpose of the park is to enhance and utilise the currently neglected space. The concept highlights the unique character this site provides.
- **Concept Plan 3: Bridge to Tempe Reserve**
 The proposed new bridge investigates the opportunity to link Cahill Park with Tempe Recreation Reserve. This new connection will enhance Arncliffe and Banksia relationship with Cooks River and will allow a better connectivity for bikes and people leveraging on the existing landscape infrastructure.

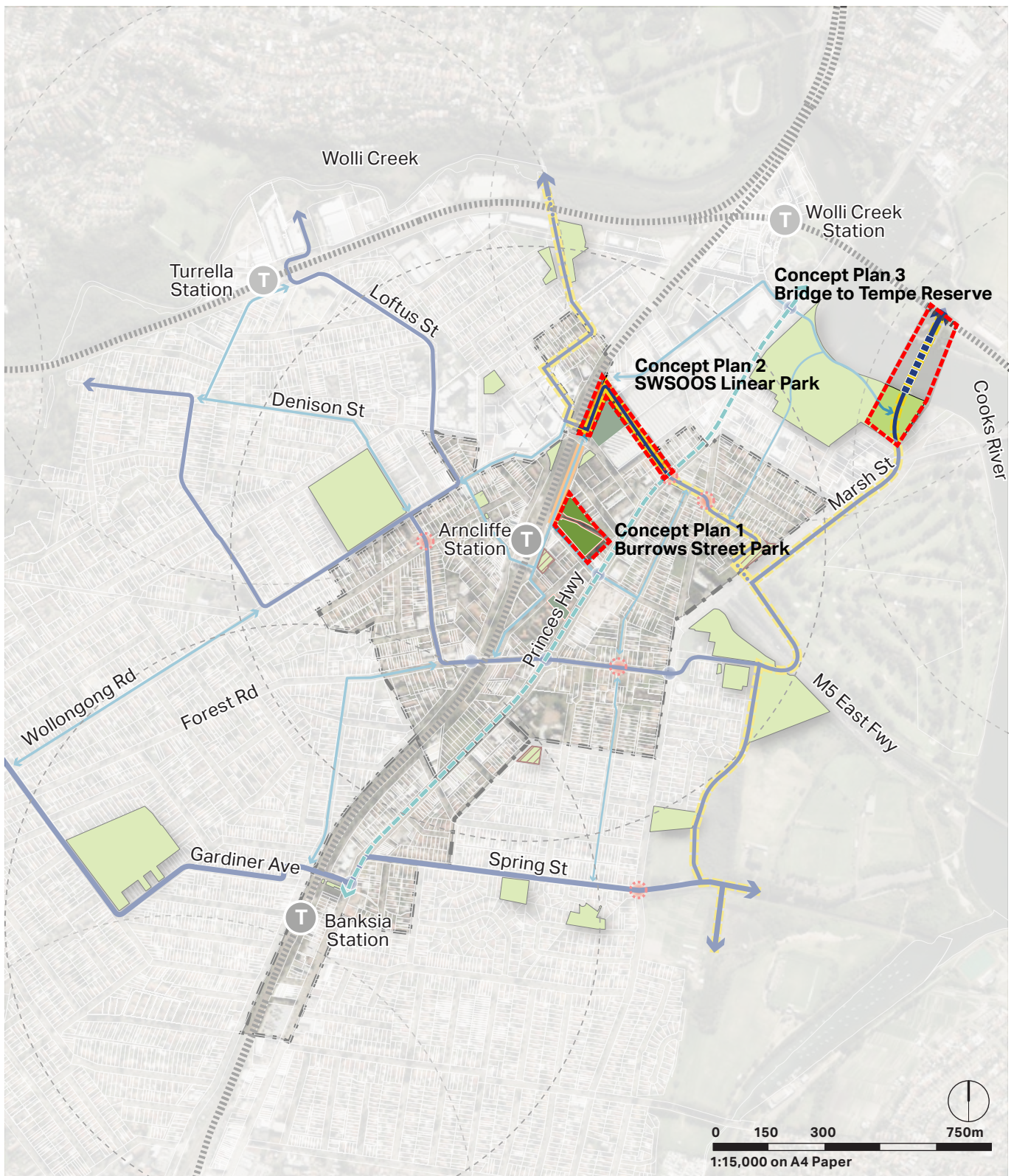


Figure 13 Overview of open space plan (Source: AECOM, 2018)

CONCEPT PLAN 1 – BURROWS STREET PARK

The Open Space Plan highlights the importance of providing open space that meets the community needs for recreational and gathering space that is accessible and safe. Burrows Street Park, is located within a 2 minute walk from Arncliffe station and is aligned with the existing open space network.

The overall design builds on existing facilities and relatively flat topography that equips the park with various future uses and opportunities. The existing adjacent mosque to the south has strong community benefits. Therefore, the park includes a large flexible kick about space adjacent to the mosque to highlight its significance to the surrounding community. The large kick about space can be used for sporting and other active uses for the community such as various festivities and gatherings. In addition, the park provides a large children’s play area and an adjacent barbecue space. Previous social infrastructure studies highlighted the need for more community facilities such as a library, therefore a community centre addresses this need.

The concept design also highlights the importance of future surrounding developments facing the park with active frontage and cafes spilling onto Burrows Street.

Burrows Street Park is composed of the following main components:

- Community facility (e.g. library)
- Connection to Wooroona Reserve
- Large kick about space
- Large children play area
- Medium / small kids bike racing track / skate park
- Barbecue facilities

Note: All additional new open spaces proposed are subject to future investigation and feasibility testing with stakeholders. All Concept Plans are indicative only and are subject to community and stakeholder feedback and detailed design.





Figure 14 Burrows Street Park Concept Plan (Source: AECOM, 2018)

PERSPECTIVE 1 – BURROWS STREET PARK (BIRD-EYE VIEW)



Figure 15 Burrows street park perspective 1 (Source: AECOM, 2018)



PERSPECTIVE 2 – BURROWS STREET PARK (VIEW)



Figure 16 Burrows street park perspective 2 (Source: AECOM, 2018)



CONCEPT PLAN 2 – SWSOOS LINEAR PARK

The Open Space Plan highlights the importance of providing open space linkages to encourage walkability by enhancing open space connectivity. Therefore, the primary purpose of the park is to provide a connection from the proposed urban link on Princes Highway (south) and the northern portion of Arncliffe Precinct through the railway underpass. In addition, the park provides a continuation of Allen Street Park; a park previously proposed to address the shortage of recreation within the Precinct. The primary purpose of the park is to enhance and utilise the currently neglected linear space. In addition, improved access by providing connections to the wider neighbourhood. The concept highlights the unique character this site provides and provides a distinctive character for Allen Park.

SWSOOS Linear Park is composed of the following main components:

- Two major gateways (north and south)
- Three secondary access points to perpendicular streets and Allen Park
- Amphitheatre and other passive seating opportunities
- Linear corridor with varying width and minimal width of 2.5 metres

Note: All additional new open spaces proposed are subject to future investigation and feasibility testing with stakeholders. All Concept Plans are indicative only and are subject to community and stakeholder feedback and detailed design.



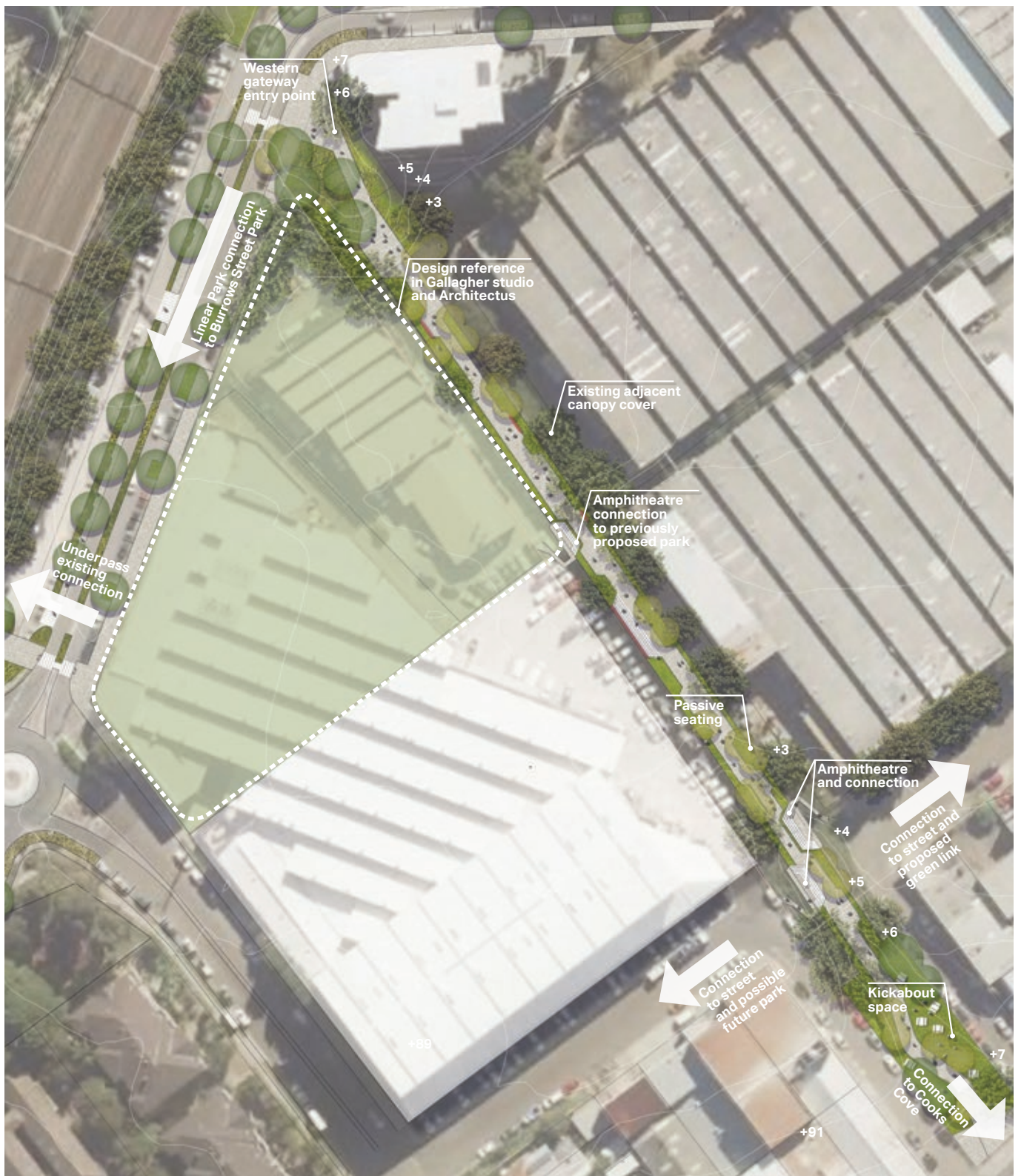


Figure 17 SWSOOS Linear Park Concept Plan (Source: AECOM, 2018)

CONCEPT PLAN 3 – TEMPE RESERVE BRIDGE

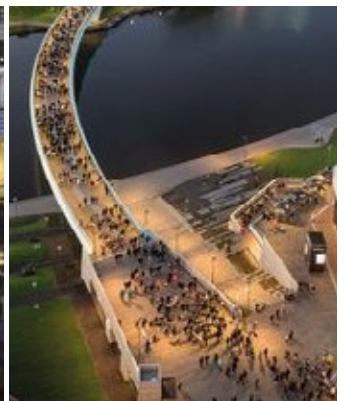
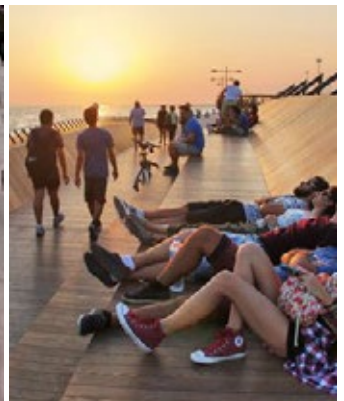
The Open Space Plan highlights the importance of providing linkages and connections that encourage walkability between open spaces. Currently, Cooks River performs as a barrier disconnecting adjacent open spaces. This results in underutilising the adjacent large parks and restraining locals from using them to the full potential.

Therefore, the primary purpose of the bridge is to provide a pedestrian and cycle connection from the existing northern open space (Tempe Recreation Reserve) and the southern open space (Cahill Park). In addition, the bridge provides a connection to the proposed green and blue links and eventually to the wider network of open space to the south. By introducing the bridge and providing a connection, the wider community will celebrate access to a broader range of recreation. The curvature of the bridge allows for desired viewing corridors to be reinforced as well as reflecting the curved form of the river. In addition, the geometry; by introducing viewing platforms and nodal points along the bridge to encourage meeting and lingering, the bridge becomes a destination in itself inviting visitors to explore and enjoy.

Tempe Reserve Bridge is composed of the following main components:

- Viewing platforms facing east (views to airport) and west (views to Wollli Creek)
- Refuge / resting area for cyclists and pedestrians; this includes water fountain seats and shelter
- River front picnic / barbecue area

Note: All additional new open spaces proposed are subject to future investigation and feasibility testing with stakeholders. All Concept Plans are indicative only and are subject to community and stakeholder feedback and detailed design.



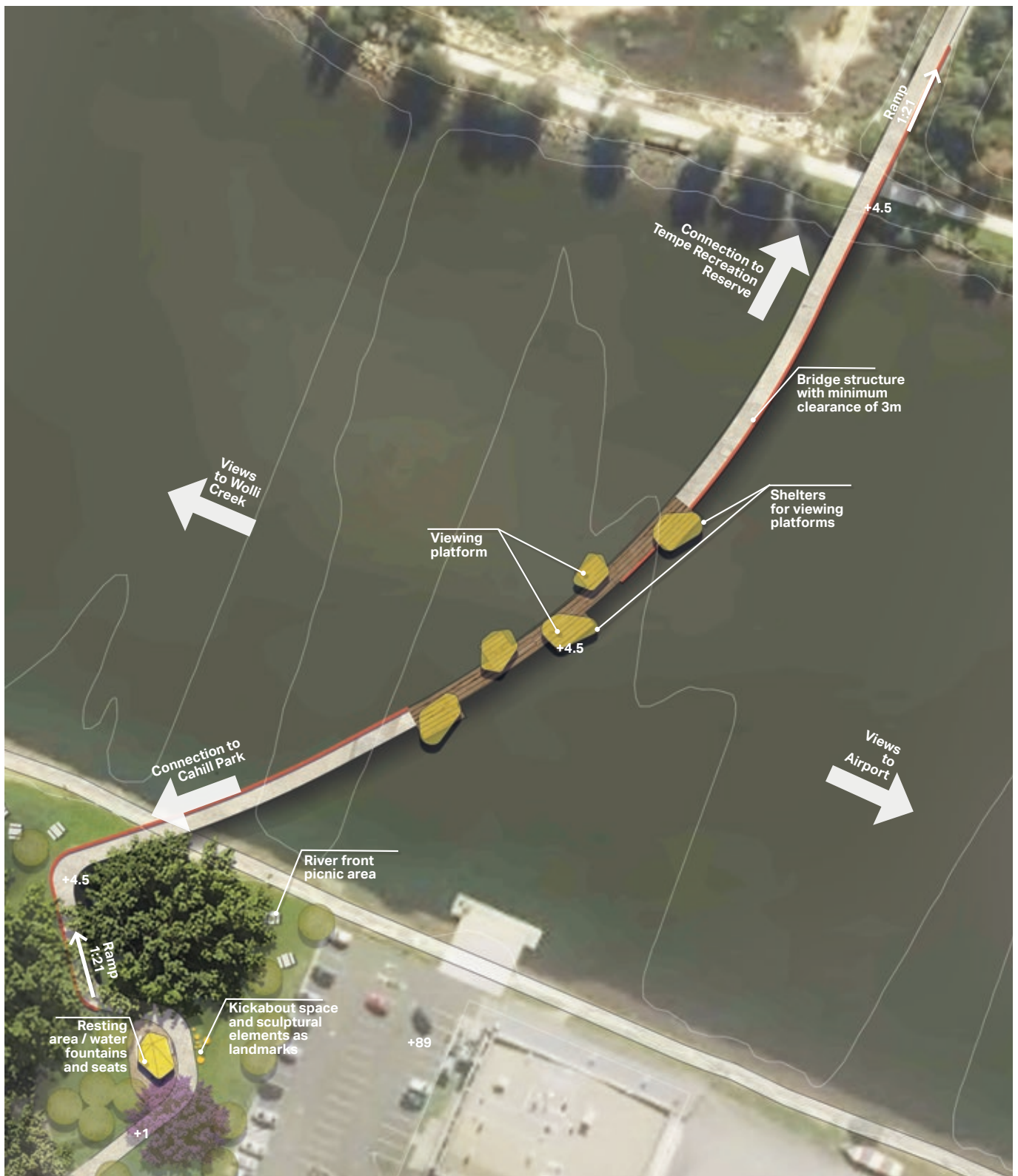


Figure 18 Tempe Reserve Bridge Concept Plan (Source: AECOM, 2018)

5.0

CONCLUSION AND NEXT STEPS



This section of the report summarises the outcomes of the Green Plan for the Arncliffe and Banksia Planned Precinct. It also outlines implementation of the outcomes identified in the Green Plan.

5.1 CONCLUSION AND NEXT STEPS

OPEN SPACE

During the study process for the definition of the Green Plan we have determined that the existing public open space provision serving the current Precinct population equates to 19.8 sqm per person.

The Open Space Plan proposes a total of 2.12 hectares of new open spaces to be added to the 21.25 hectares existing open space, achieving **23.65 hectares of overall open space** within the Precinct of Arncliffe and Banksia and within 200 metres walking distance from its boundary.

Assuming a future population growth of 25,000 people, this new provision of open space will equate to 9.5 sqm of open space per person.

TREE CANOPY

The following assumptions have been considered to develop the Tree Canopy Plan:

- The Precinct has been subdivided within two areas: urban and suburban; and within each area has been targeted a minimum tree canopy of 25% and 40% respectively.
- The Tree Canopy Plan suggests possible interventions on public land only under the control of public agencies but measures tree canopy in private domain as well.

The current tree canopy covers:

- 18.2% of the urban area.
- 20.6% of the suburban area.

The Tree Canopy Plan takes into account the land rezoning proposed changes and therefore it shows an updated zoning between the urban and suburban areas substituting the existing suburban portion into urban.

The Tree Canopy Plan **proposes a total of 996 new trees** to be added to public areas within the Precinct in order to achieve:

- 24% tree canopy in public and private areas in the urban area

CONCEPT PLANS

The concept plans provide an aspirational platform for implementing strategies outlined in the Green Plan report. General consensus require further development into more detail design to accommodate recommended function and park attributes.

The general approach to the design of the concept plans is underpinned by celebrating the existing landscape character, such as:

- Topographic constraints as opportunities;
- Designing around existing trees;
- Provide deep soil areas to allow for large canopy;
- Incorporate flexible open spaces that evolve overtime to community needs.

It is recommended that further developed concept plans adopt the above to meet Green Plan's vision.

NEXT STEPS

Suggested next steps to be taken by the Department are:

- Undertake detailed analysis of viability for the areas selected as future parks and green and blue links including acquisition, public ownership and right of ways/access, costing, detailed planning and design and method for delivery.
- Public agency engagement for whole of government problem solving to facilitate delivery.
- Long term strategic planning by agencies, e.g. services to enable tree canopy delivery or to open up public land for open space and access.
- Investigating mechanism for upgrading existing open space.
- Apply for funding for 5 million trees towards the implementation of increased tree canopy to fast track delivery.
- Review DCPs to coordinate control of tree canopy in the private domain to ensure existing tree canopy is retained and enhanced especially when land use change is proposed e.g. suburban to urban land use.
- Review of Council's street tree policy to enable canopy planting.
- Undertake a review of the planning controls (LEP and DCP), civil works standards, development contributions (Section 94 plans) and voluntary planning agreement (VPA) policies to encourage creation of public open space and tree canopy within the study area.

5.8 KM OF PROPOSED NEW LINKS =
4.4KM (GREEN AND BLUE LINKS) +
1.4 KM (URBAN LINKS)

24 HECTARES TOTAL AREA OF
OPEN SPACE

996 PROPOSED NEW TREES

5.2 GLOSSARY

A

Accessibility: ease of access is critical to the community to enjoy and use public open and recreation facilities.

B

Biodiversity: is the foundation of ecosystem services to which human well-being is intimately linked.

Biodiversity corridors: are areas of vegetation that allow animals to travel from one patch of native forest to another.

Built Environment: comprises the extent of our human-made environment, as distinguished from the natural environment. It includes all aspects of our surroundings made by people that provide the place for human activity. The built environment can be understood to include cities and towns, neighbourhoods, parks, roads, buildings and even utilities like water and electricity.

C

Canopy: the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Connectivity: creating an interconnected network of open space.

Context: the physical, social, cultural, economic, environmental and geographic circumstances that form the setting for a place or building.

D

Diversity: the range of open space setting types within a given area will determine the diversity of recreation opportunity for a community.

Distribution: the spread of supply of open space and tree canopy.

E

Equitable: a built environment that is fair and accessible for all citizens.

G

Green Plan: The framework assessing open space and tree canopy proposed in Precinct.

Greater Sydney: is defined as the 33 local government areas of Bayside, Blacktown, Blue Mountains, Burwood, Camden, Campbelltown, Canada Bay, Canterbury, Bankstown, Cumberland, Fairfield, Georges River, Hawkesbury, Hornsby, Hunters Hill, Inner West, Ku-ring-gai, Lane Cove, Liverpool, Mosman, Northern Beaches, North Sydney, Parramatta, Penrith, Randwick, Ryde, Strathfield, Sutherland, and The City of Sydney.

Green and blue link: selected path connecting several open spaces within a continuous walkable network of footpaths, laneways, pedestrian bridges and undercrossing. This link will define a major route for bikes, pedestrians,

water management and biodiversity, therefore, possible further enhancement of streetscape amenity, verge vegetation, water sensitive urban design strategies and setback treatment will be encouraged.

Green Grid: strategic planning document for the greater Sydney region, and a precursor to the Greener Places policy comprising a cohesive map of green assets across metropolitan Sydney.

Green Infrastructure: describes the network of parks, trees and water systems that deliver multiple environmental, economic and social values and benefits to urban communities. Refer to Section 1.1 of this document for entire definition.

Green Space: an area of grass, trees, and other vegetation set apart for recreational or aesthetic purposes in an urban environment.

Grey Infrastructure: refers to the human-engineered infrastructure for water resources such as water and wastewater treatment systems, piped drainage and reservoirs.

H

Healthy: a place or space that promotes positive social, emotional and physical health for its people.

High Performing Green Space / High Quality Green Space: are multifunctional spaces designed to produce concurrent ecological, social, environmental and economic benefits.

I

Integration: combining green space with urban development and grey infrastructure.

L

Liveable: a built environment which supports and responds to people's patterns of living, and is suitable and appropriate for habitation, promoting enjoyment, safety and prosperity.

M

Master Plan: a framework document showing how development will occur in a given place and includes building parameters like height, density, shadowing and environmental concerns. It is a visual document that details a clear strategy or plan for the physical transformation of a place, supported by financial, economic, and social policy documents which outline delivery mechanisms and implementation strategies.

Multifunctionality: the ability of Green Infrastructure to deliver multiple ecosystem services simultaneously, providing added value, and improved health and well-being.

O

Open space: land that has no buildings or other built structures, which is accessible to the public, including green

space.

P

Park - Pocket: defines parks with maximum area 0.4 hectare and with a walking catchment area of 300 metres.

Park - Local: defines parks with areas varying from 0.4 to 1 hectare and with a walking catchment area of 400 metres.

Park - Neighbourhood: defines parks with areas varying from 1 to 5 hectare and a walking catchment area of 800 metres.

Participation: the involvement of stakeholders in the development and implementation of neighbourhood, local, district and regional Green Infrastructure policies and actions.

Place: is a social and a physical concept – a physical setting, point or area in space conceived and designated by people and communities. In this sense, place can describe different scales of the built environment – for example, a town is a place, as well as a building can be a place.

Place Making: proposes a multi-faceted approach to the planning, design and management of public spaces. 'Place Making' looks at understanding the local community with the intention of creating public spaces that promote health and well-being.

Precinct: a designated area within real or perceived boundaries of a specific building or place. A Precinct can be of different scales and usually responds to a study area of a particular place.

Priority Growth Areas: The Priority Growth Areas Greater Sydney are identified by the NSW Government as major greenfield development areas. Information about Priority Growth Areas is available at <http://www.planning.nsw.gov.au/>

Priority Precincts: areas that have a wider social, economic or environmental significance for the community or have redevelopment potential on a scale that is important in implementing the State's planning objectives. Priority Precincts are envisaged as larger areas, usually made up of multiple land holdings, capable of delivering significant additional growth and requiring coordination from State and local governments to realise their potential.

Public Realm: is the collective, communal part of cities and towns, with shared access for all. It is the space of movement, recreation, gathering, events, contemplation and relaxation. The public realm includes streets, pathways, rights of way, parks, accessible open spaces, plazas and waterways that are physically and visually accessible regardless of ownership.

Q

Quality: the standard of something, measured comparatively against things of a similar kind.

Quantity: the amount or number of open space or abstract thing not usually estimated by spatial measurement.

R

Recreation - Active: activities that require physical exertion and considerable expenditure of energy; such as football and soccer.

Recreation - Passive: activities that require minimum physical exertion; such as reading and relaxing.

Resilient: place or space that can withstand or recover from difficult conditions.

S

Scale: the relative size or extent of something – scale is a device used to quantify objects in a sequence by size; for example a city scale, or a building scale. In architecture, scale is also used to describe a ratio of size in a map, model, drawing, or plan.

State Environmental Planning Policy (SEPP): is a statutory plan, typically prepared by the Department of Planning and Environment and endorsed by the Minister for Planning. It can be a spatial plan for particular land in NSW, and/or it can set policy which applies to particular land or all land in NSW.

Strategic Plan: document that guides the implementation of a strategy for a particular area.

Statutory Plan: is part of the planning process that is concerned with the regulation and management of changes to land use and development.

Sustainable: relates to the endurance of systems, buildings, spaces and processes – their ability to be maintained at a certain rate or level, which contributes positively to environmental, economic and social outcomes.

Suburban: Low density residential.

T

Tree Canopy: the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

U

Urban Forest: the layer of trees and tree populations that exist in urban settings.

Urban Zone: High density residential, commercial and mixed use.

W

Water Sensitive Urban Design (WSUD): is the sustainable integration of water cycle management into planning, design and construction of the built environment. It is the term given to the replication of natural processes into treatment of water in an urbanised environment and is relevant to all built environments from highly urbanised to rural settings.

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