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\*drawings that have been updated to show latest masterplan layout

#updated with green infrastructure strategy, September 2021



## Site Analysis

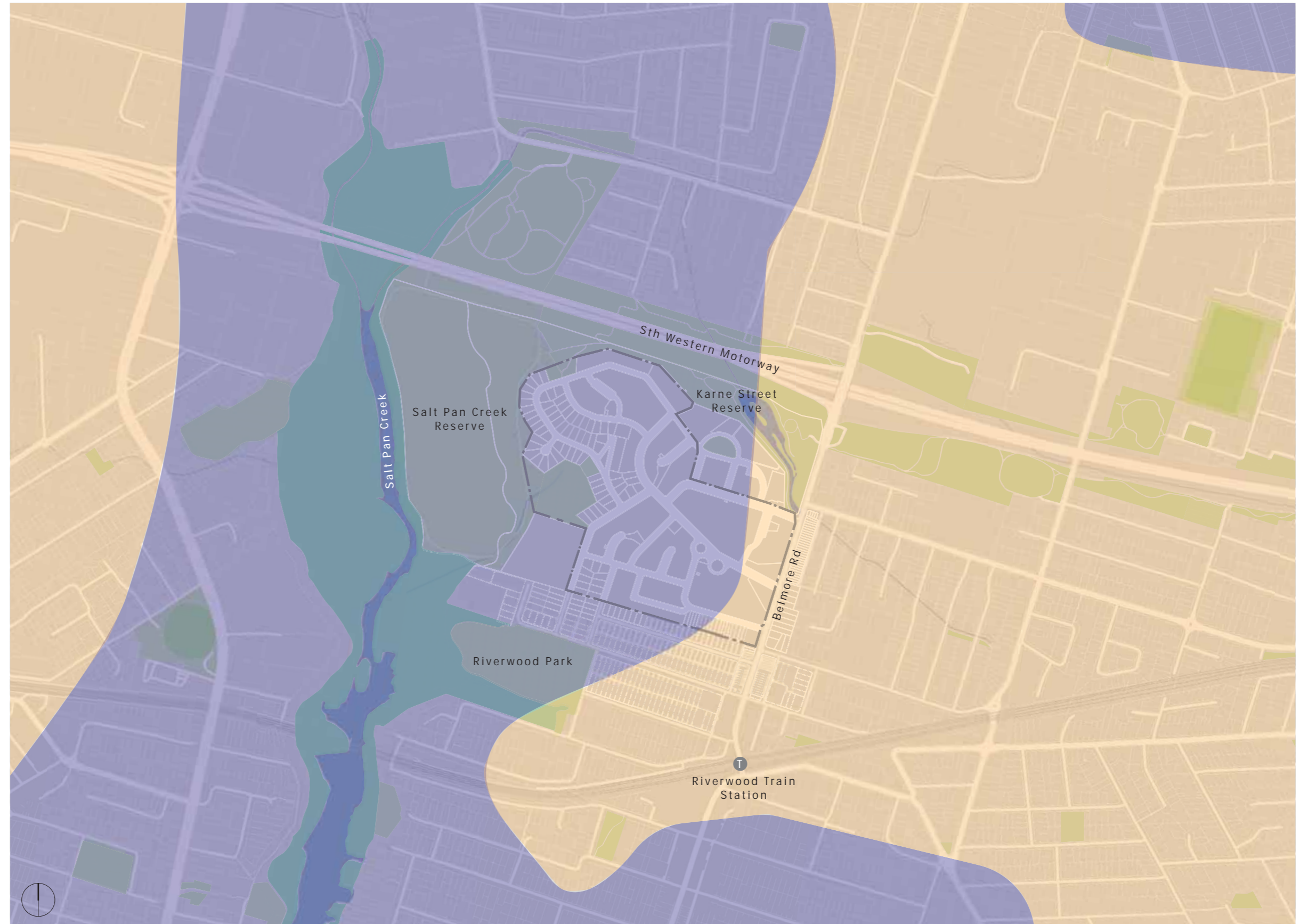
## Indigenous Vegetation Communities

### Vegetation Communities

#### Turpentine-Ironbark Forest

This vegetation community is diverse in response to localised conditions including aspect, drainage and slope. The low phosphorous, combined with poor quality soils has led to the development of a variety of vegetation structures. Around Riverwood this would have been in the form of open forest.

Key trees found in the area include *Angophora floribunda* (Rough-barked Apple), *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark).



### Legend

To inform landscape planting palette.

- Turpentine-ironbark forest
- Sandstone heaths, woodlands and forests

\* Source:  
Benson & Howell 1995, Taken for Granted: The Bushland of Sydney and its suburbs, Kangaroo Press, The Royal Botanic Gardens Sydney.

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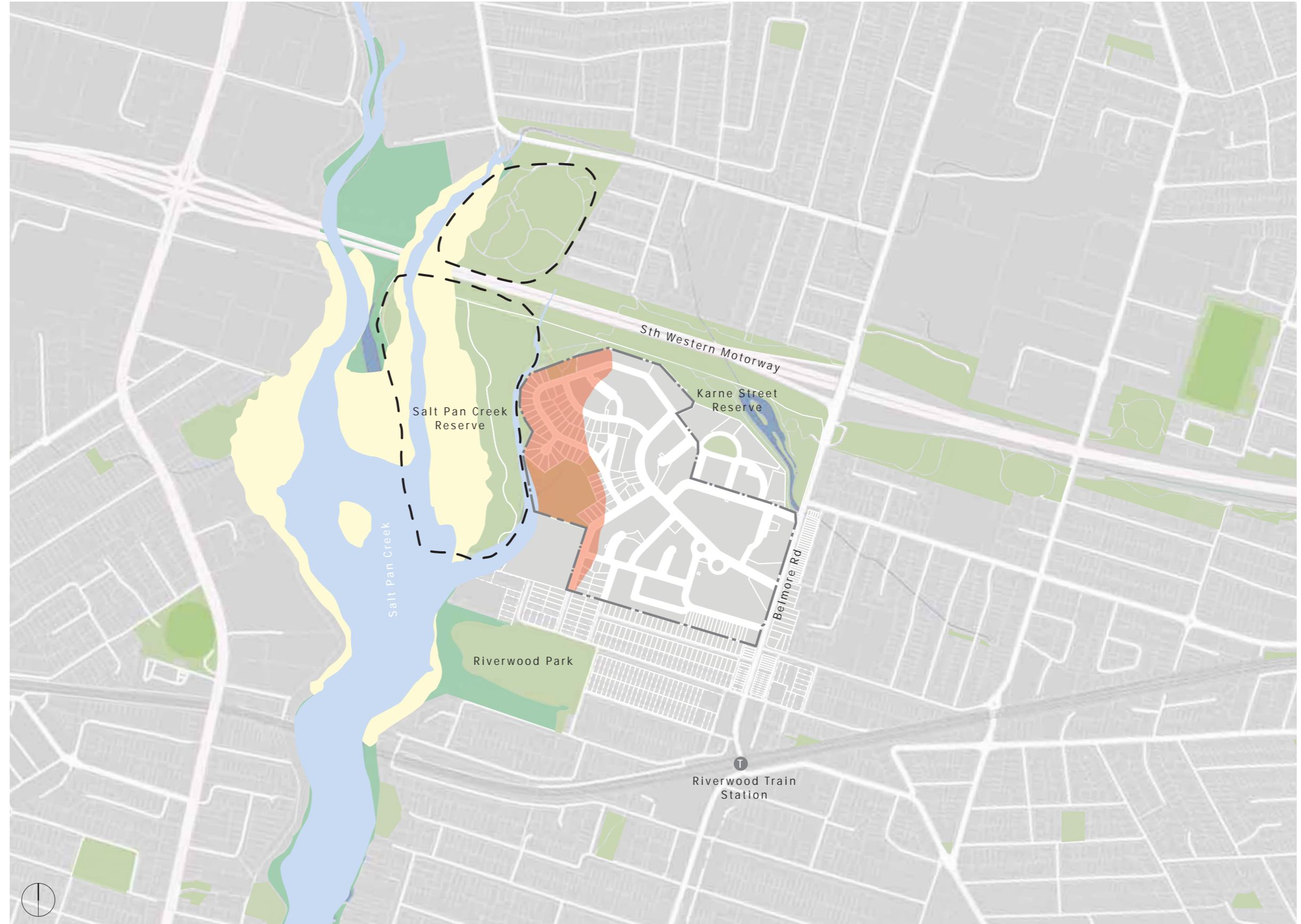
## Site Analysis

## Salt Pan Creek Historical Footprint

The location of the Riverwood site is within country of the Bediagal clan of the Dharug people.

The site and landform has been highly modified as a result of urban settlement. The Riverwood site was developed as a US Military Hospital base with much of the site cleared for roads and buildings. Following the departure of the military, the site was developed for public housing. West of the site, Salt Pan Creek was utilised as a landfill site, dramatically altering the site's landform and hydrology. The eastern arm of Salt Pan Creek was filled forming a large mounded landform where the creek once flowed.

The proximity of the western edge of the Riverwood site being 200m from the original creek edge, raises the potential for Aboriginal archaeology sites in this location as described in the Aboriginal Cultural Heritage Assessment report prepared by Artefact.



### Legend

- Historical Salt Pan Creek footprint (1943)
- Historical extent of salt marsh area (1943)
- Aboriginal Archeological Sensitivity - land 200m from original creek alignment (Artefact 2017)
- Extent of land reclamation since 1943

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## Site Analysis


## 1943 Aerial Map

### US Military Hospital - Herne Bay (original area name)

The 1943 aerial photo shows the original Salt Pan Creek formation prior to its modification through landfill. The photo, taken at the time of the site's occupation as the US military hospital, was known as Herne Bay. The aerial shows the alignment of roads that later became Roosevelt Avenue and Minnesota Avenue. Scattered trees are shown near the hospital building but the vegetation on the site is highly modified.



#### Legend

 Streets visible in current built form pattern

nts



## Site Analysis

## Current Aerial

The aerial photo shows the present day site. Washington Park, outside the current Riverwood site, in the north east corner of the image is an area of the site that was completed in 2018.

Canterbury Bankstown Council's Salt Pan Reserve, west of the site is an area of landfill. The site is subject to a Council developed Master Plan and requires substantial remediation works to address its lack of trees and other vegetation.

The Riverwood site is well vegetated. There is a substantial existing tree canopy throughout the site, much of which are in private gardens and open space.



### Legend

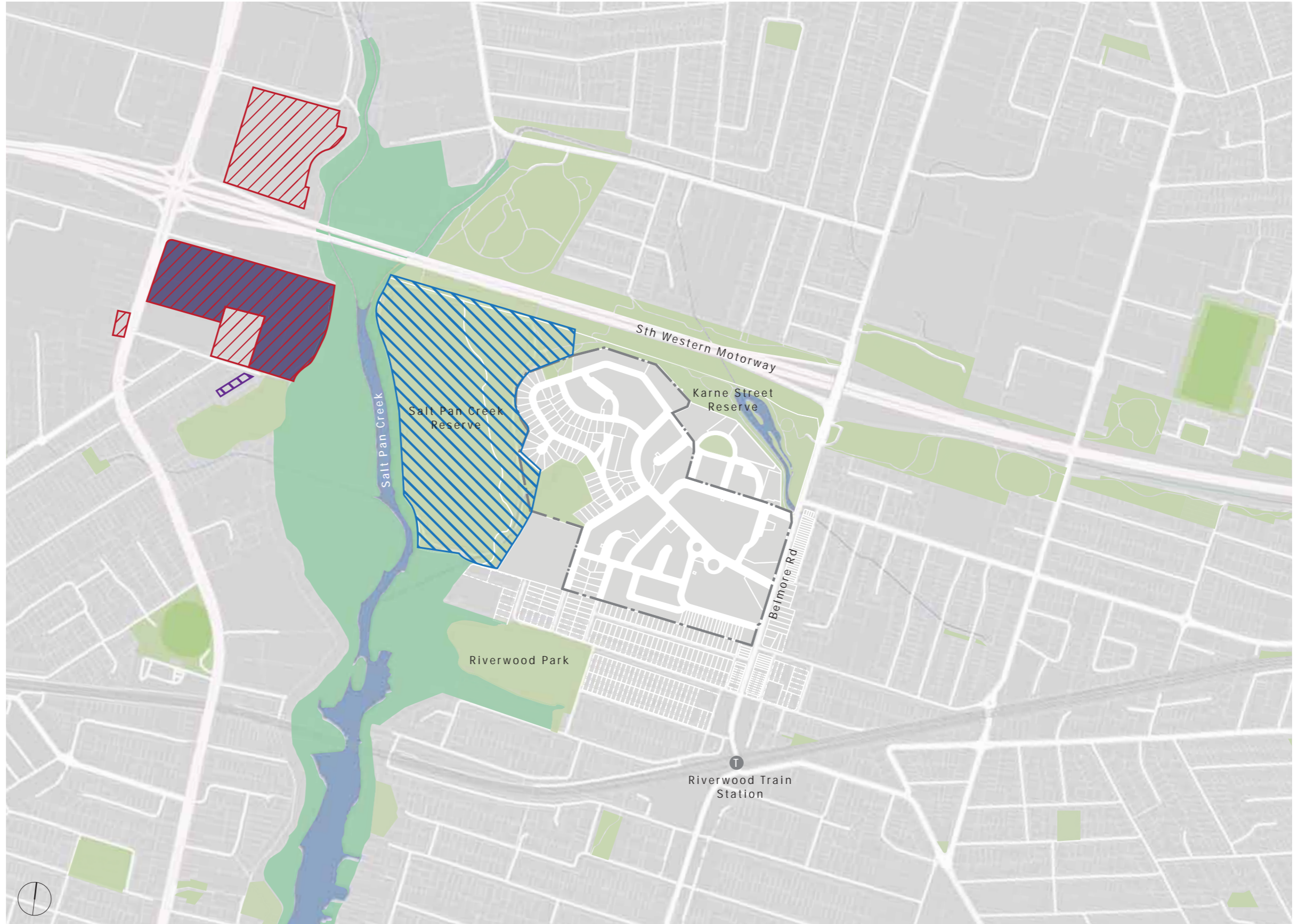
 Streets visible in current built form pattern



## Site Analysis

## Contamination Plan

The Contamination Plan identifies sites listed as contaminated land or waste management facilities and shows their proximity to the site. The former landfill site at Salt Pan Reserve straddles the western edge of the Riverwood site.



### Legend

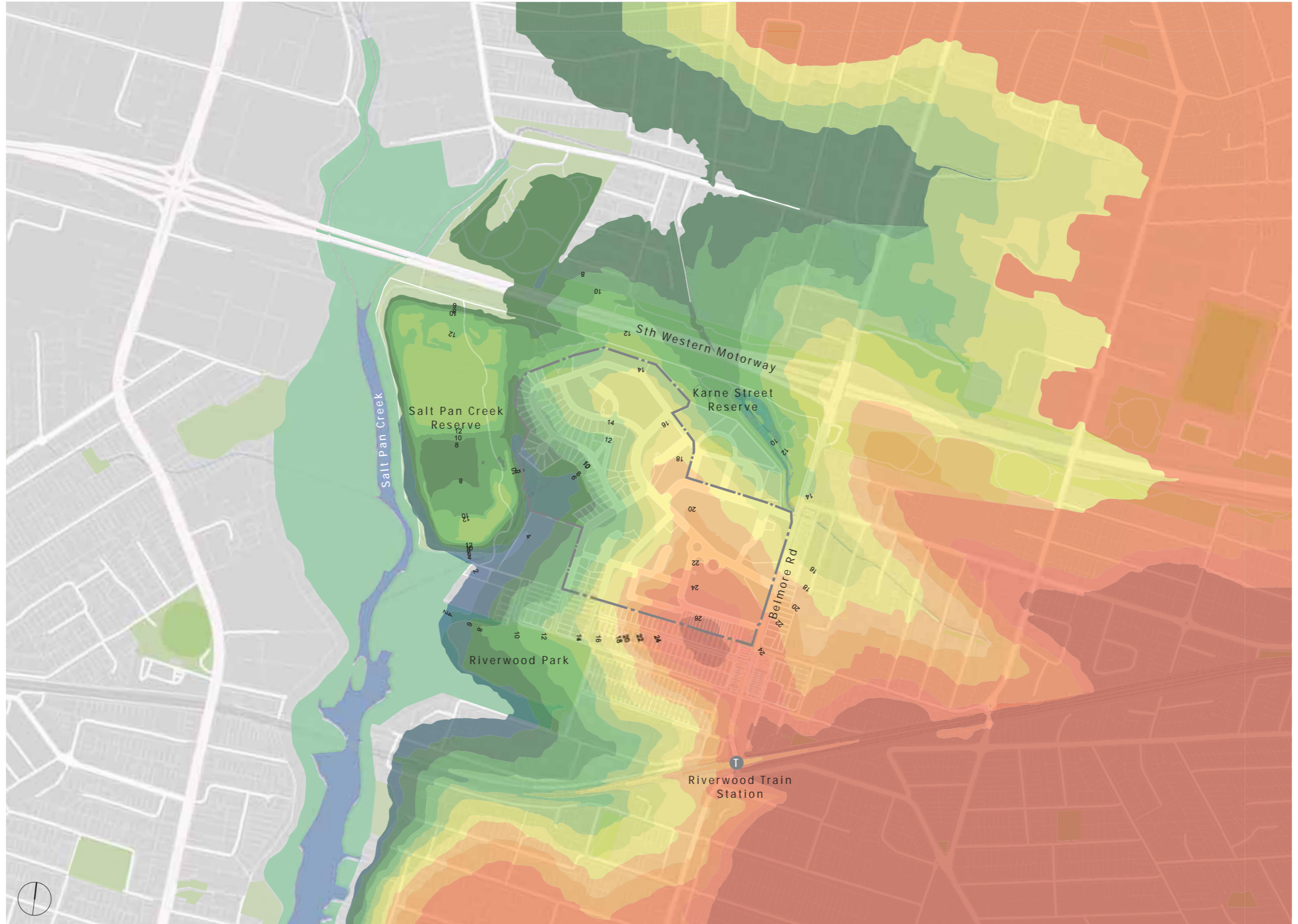
- Contaminated land list
- Former gasworks
- Waste management facilities
- Contaminated land record of notice

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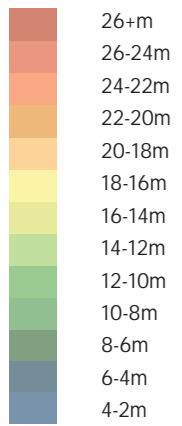
# Site Analysis

## Landform

The landform diagram shows the level change across the site. Lower areas are shown as blue and green, graduating to higher areas shown in orange and red. Contours are shown in 2m increments. The landform plan shows a high point in the south east corner of the site, with low points through Karne Street Reserve to the north and along the western boundary that was once the east arm of Salt Pan Creek. Grades across the site are gently undulating and do not present a constraint for development. Salt Pan Reserve is shown grading from dark green to light green, reflecting its elevated landform.



### Legend



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Site Analysis

Existing Visual Connections

The current street pattern and nature of urban development in Riverwood does not promote sight lines or views of landmarks, so there is no strong visual connection through and from the site to the surrounding landscape. Regardless, there are some important potential vistas through the site that are noted on the Existing Visual Connection diagram. These views facilitate wayfinding and how people navigate the site, also revealing site character and increasing peoples' experience within the site.



A Michigan Avenue view to Salt Pan Reserve



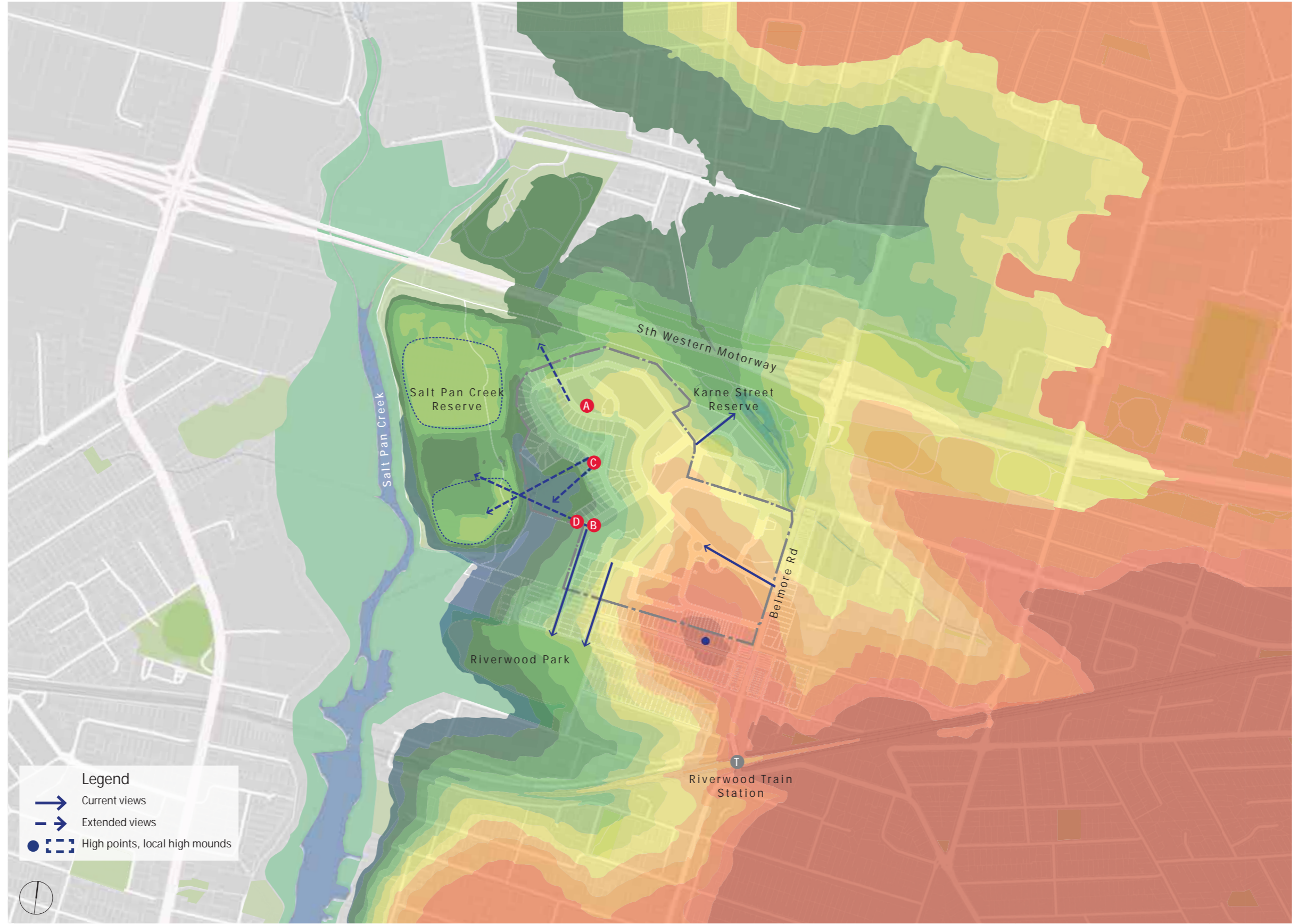
B Union Street view to Riverwood Park



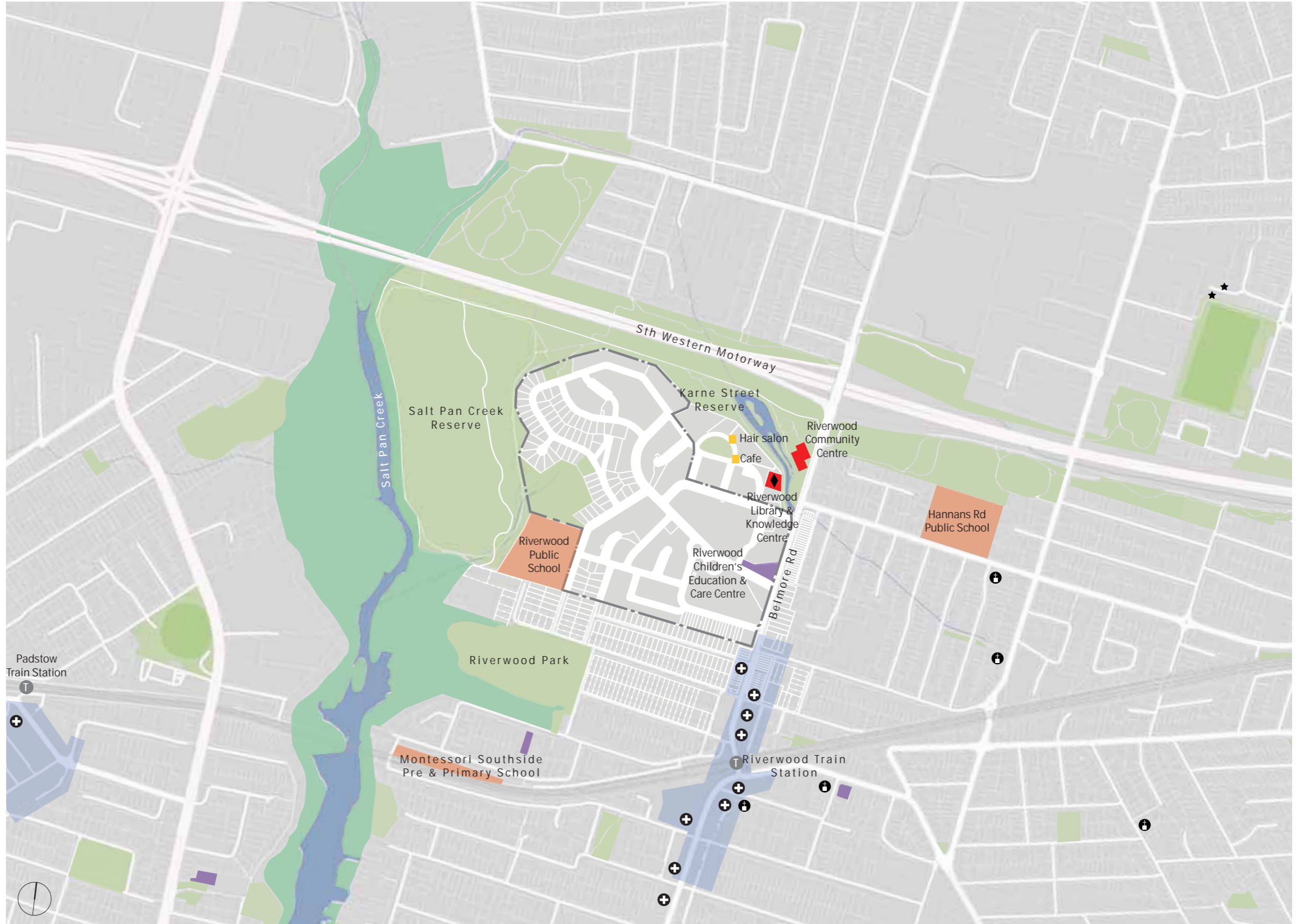
C View from Kentucky Rd to Salt Pan Reserve



D View from Union St to Salt Pan Reserve



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- Legend
- Childcare
  - Primary schools
  - Community facilities
  - Local businesses
  - Urban centres
  - Doctors/Medical centres
  - Aged care
  - Library
  - Place of worship

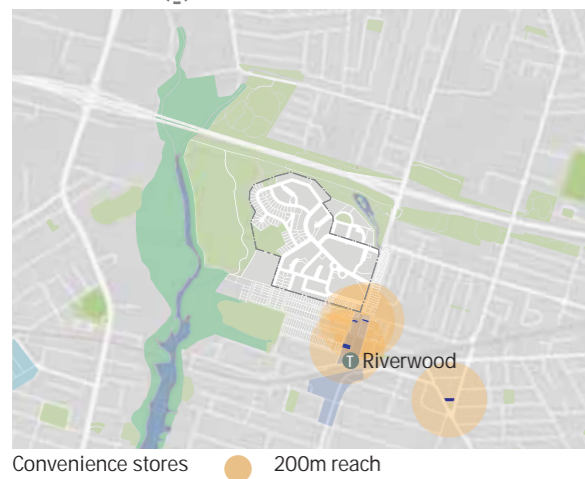
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## Site Analysis

## Existing Urban Centres and Shopping Facilities Reach

The majority of the Riverwood site is well serviced by an existing local centre on Belmore Road around Riverwood Train Station.

Most areas of the estate are within 800m (10 min walk) reach of convenience stores and the local centre.



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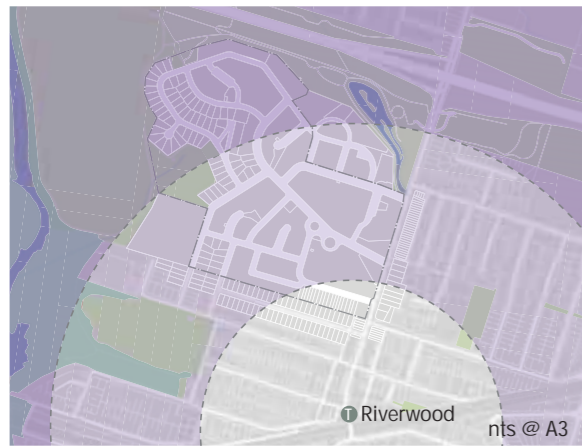


Site Analysis

Existing Public Transport



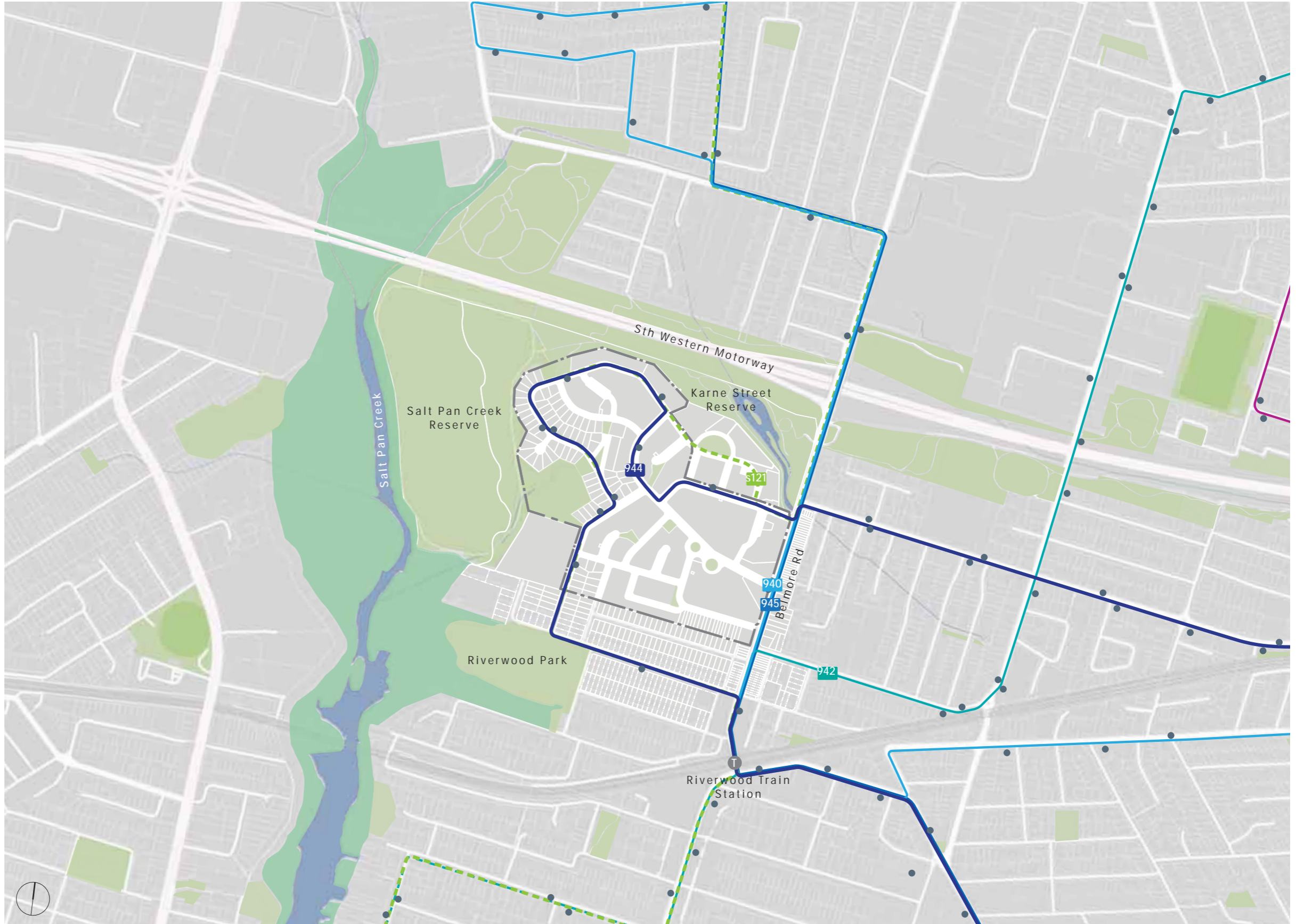
All areas serviced by 200m bus stop reach



Areas not serviced by 400m (5min walk) train station reach  
 Areas not serviced by 800m (10min walk) train station reach

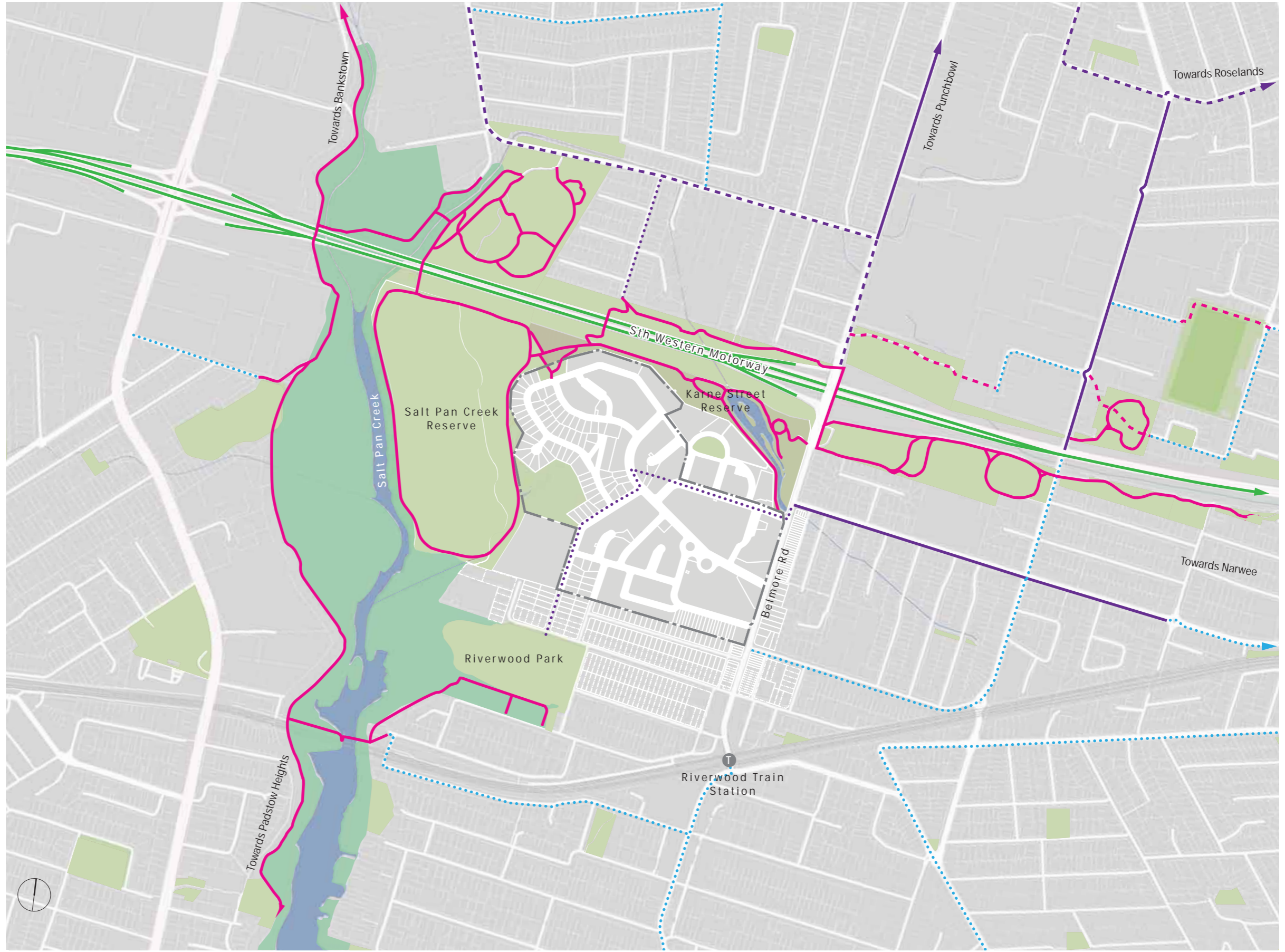
- Legend**
- Bus stop
  - Bus routes:
  - 940 (Hurstville - Bankstown)
  - 942 (Lugarno - Campsie)
  - 944 (Hurstville - Bankstown)
  - 945 (Hurstville - Bankstown)
  - s121 School Bus (Punchbowl - Mortdale)

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Site Analysis

Existing Cycle Network



Legend

- Existing cycle path (on road)
- Planned cycle path (on road)
- Existing cycle route (on road)
- Planned cycle route (on road)
- Existing Shared cycle path (off road)
- Planned shared cycle path (off road)
- M5 cycle path

Sources:

- Draft Canterbury Bike Plan 2016
- Canterbury Strategic Recreation Plan 2012
- Canterbury Cycleway Plan
- Sydneycycleways.net

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## Site Analysis

Recreation & Open Space Guidelines for Local Government, NSW Department of Planning, 2012 (*R & OS Guide, NSW DPE*) set goals, objectives & standard for open space.

Provision of open space should be related to the best practice.

- Hierarchy of open space being local / district / regional,
- Differentiated by size / recreation provision and
- Distance to dwellings.

### Hierarchy of local open space

**Local Parks** being 0.5-2ha should service dwelling within a 400m catchment. Local parks can be civic spaces or plazas, local pocket parks and/or may be part of Regional Parks.

**District parks** being 2-5ha serving dwelling within a catchment of 2km.

Regional parks being 5+ha in 5-10km.

In all, **totaling 15% non-industrial land in LGA / District** (*R & OS Guide, NSW DPE, p.29*)

Alternatively, **default standard 2.83ha / 1000 people** (*R & OS Guide, NSW DPE, p.27*)

Recreation facilities should provide a broad range of recreational opportunities - natural & cultural, active & passive catering for a range of ages and abilities.

Planning provision of open space needs to consider existing provision - type and distribution. The anticipated community profile and site capacity to provide facilities.

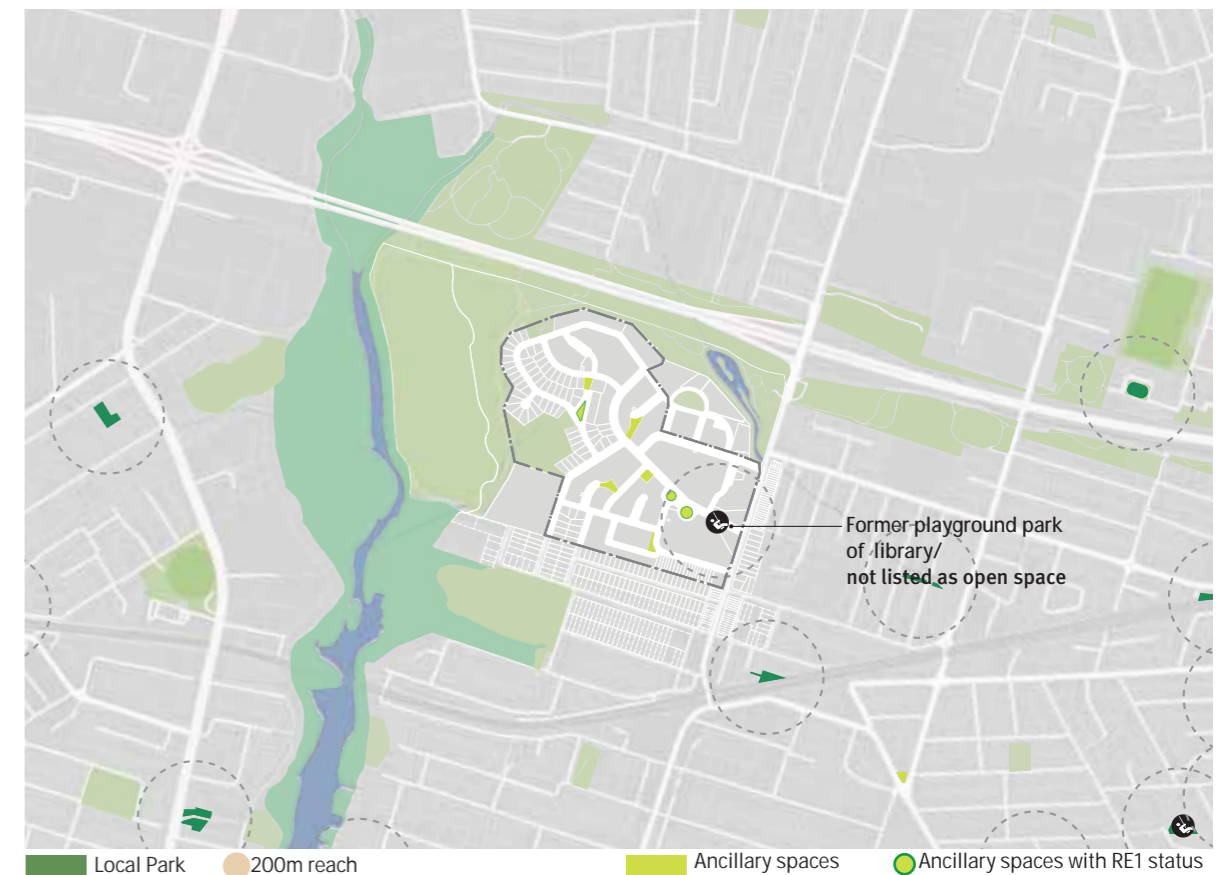
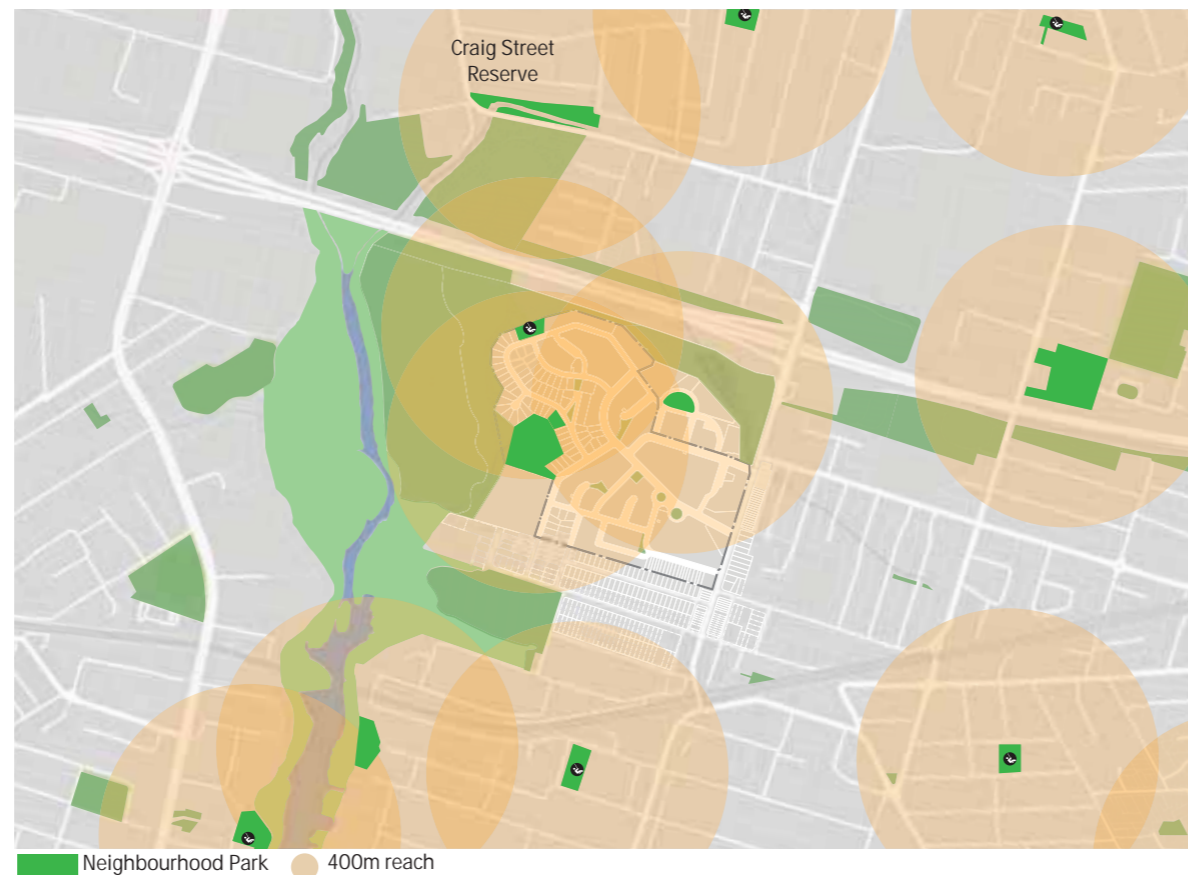
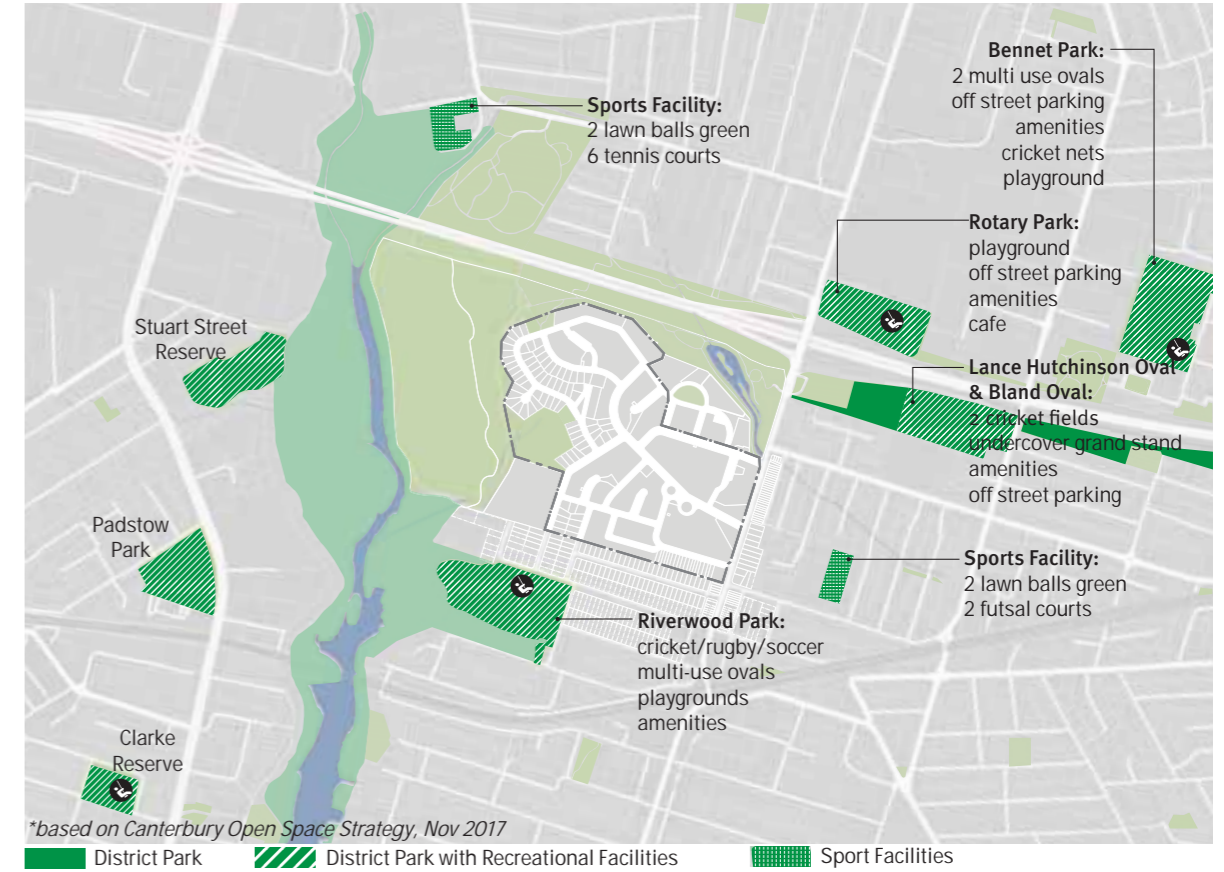
### Legend

- Open space
- Salt Pan Creek Wetland
- Playground
- Dog Park



Open space hierarchy based on *Canterbury Open Space Strategy, Nov 2017*

## Existing Open Space





## Site Analysis

Parks surrounding Riverwood site cater predominantly for active recreation (playing fields). Apart from Karne St Reserve, opportunities for passive recreation are limited to a local park in the north west area of the site, including a small playground and seating. A soccer field is located to the south west with parking and an amenities building. Other zoned open space in the LEP is ancillary and offers no real recreation opportunities or benefit to residents.

There is a gap in the provision of open space in the centre of Riverwood near the station and directly north east. The open space strategy needs to be reconsidered to provide a more equal and accessible distribution of open space across the region and to meet population change in the area.



**Public Recreation and Open Space as per LEP**

- RE1 Public recreation
- W1 Natural Waterways
- Unzoned Open Space

**Existing Open Space On Site:**

A	23000 m <sup>2</sup>
B	2800 m <sup>2</sup>
D1+D2+D3	1770 m <sup>2</sup>
<b>Total:</b>	<b>27570 m<sup>2</sup></b>

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## Existing Open Space - Local



■ Areas not serviced by local parks

■ Areas outside site boundary not serviced by local parks

  Neighbourhood park 400m reach

  Local park 200m reach

## Site Analysis

### A Plan for Growing Sydney

Released in March 2018, the Greater Sydney Regional Plan 'A Metropolis of Three Cities', is the NSW Government's plan for the future of the Sydney Metropolitan Area over the next 20 years. The report identifies Bankstown as one of Sydney's strategic centres in which to focus future employment and housing growth. The primary aim of strategic centres is to:

*'Provide more jobs closer to home, ...to invest in strategic centres across Sydney to grow jobs and housing and create vibrant hubs of activity'.*

## Strategic Connections - The Broader Planning Context for Riverwood

### The Green Grid

The Green Grid is a strategic program that will lead to the linking of a network of open spaces, parks, bushland and waterways with tree-lined walkways and cycleways across the city creating green connections from homes to workplaces and leisure facilities. The programme is supported and included within goals outlined for 'A Plan for Growing Sydney'.

In 2015 the New South Wales Government Architect's office published a document titled 'The Green Grid: Creating Sydney's Open Space Network' establishing the following aims:

AIM 1 - Conserve, improve and expand Sydney's strategic network of open spaces. Connecting town centres and integrating public transport.

AIM 2 - Reinforce a sense of place within Sydney's subregions through enhancing open space quality and advocating an appreciation for Sydney's diverse natural and cultural environment.

AIM 3 - Safeguard and plan the green infrastructure of Sydney in parallel with the strategic planning of the City's other infrastructure.

### Connecting with Country

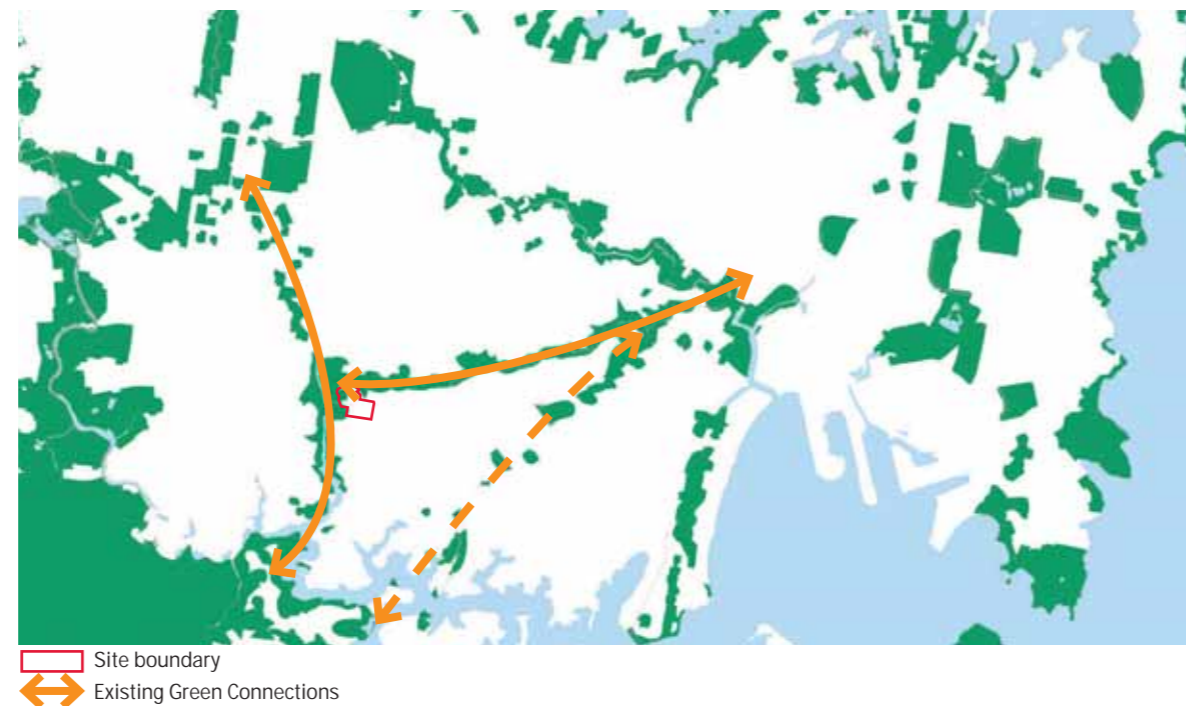
In 2020, the New South Wales Government Architect's office published a document titled 'Draft Connecting with Country', the Riverwood Estate being a State Significant Site is required to apply this framework to engage with the local First Nations People and embed Connecting with Country principles into the design process. In anticipation of this process, commencing the landscape master plan seeks to provide opportunities for :

- A country centric approach
- Enabling tangible and intangible pathways for connection within the public domain components of the site.

### Design Implications:

- By adopting a systems network design focus to the public domain of the site that connects and extends the green infrastructure beyond the aims of the green grid and connecting with country can be embedded.
- As a regional park, Salt Pan Creek Reserve has a role in linking broader public open spaces as well as being part of a finer grain network of connected green spaces at the local level; linking site public domain with this framework element allows better connectivity, creates capacity and diversity of recreation opportunity.
- Focus on high amenity north/south Salt Pan Creek corridor links
- Connect remnants of existing vegetation and strengthen network of existing green infrastructure through connections of urban tree canopy, framework of estate neighbourhood and local open space, site water cycle elements, and continuous soils zones thereby extending the systems network into the site.

Major Green Links surrounding Riverwood



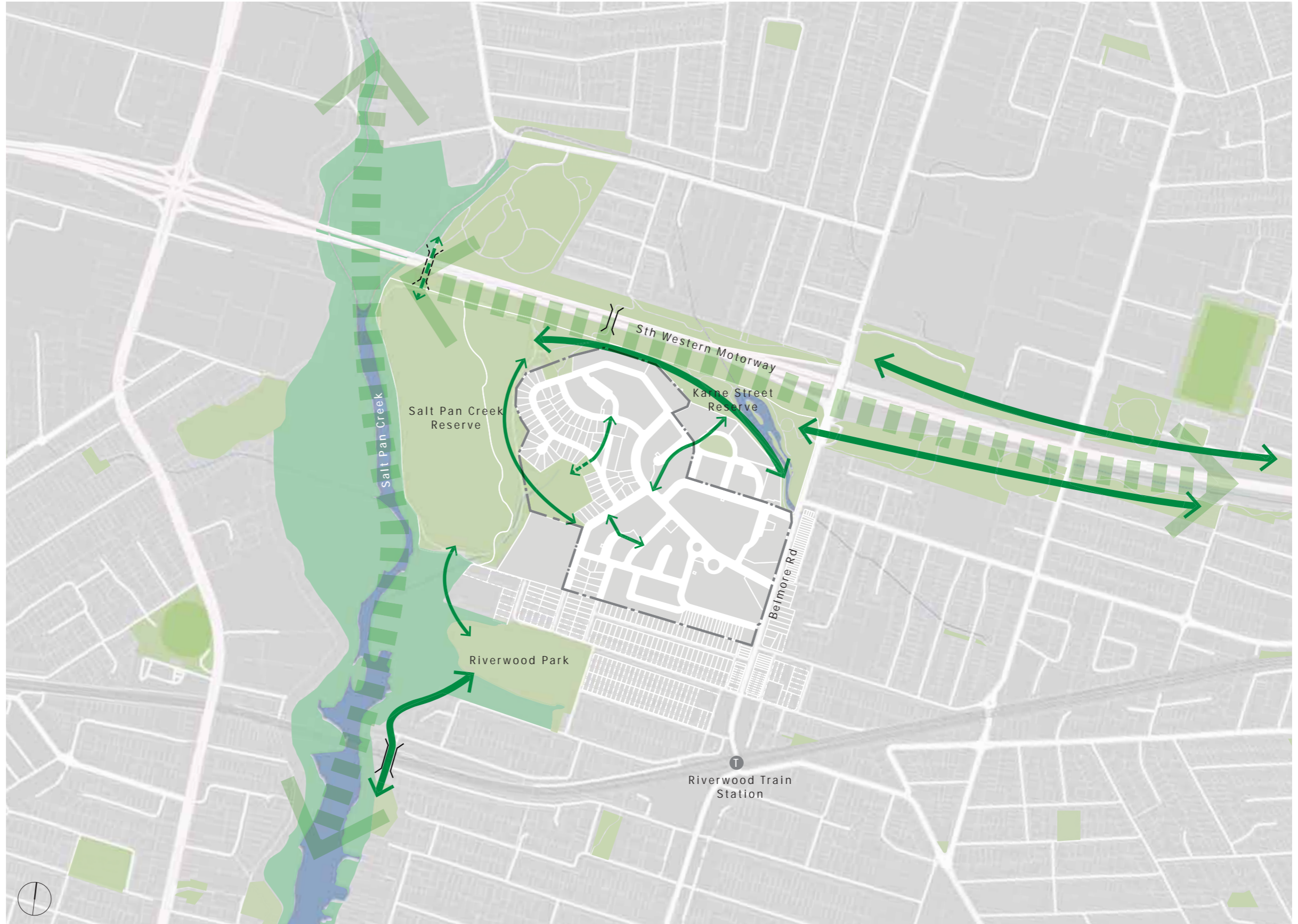
Identifying gaps and establishing green connections to Riverwood



## Site Analysis

## Existing Green Connections

Existing green links in Riverwood facilitate pedestrian connections, provide opportunities for trees and create habitat links within the site. Some of these links are parkland connections around the site and some are internal connections between green spaces or through pocket parks. They build on the regional green links identified in The Green Grid and build on the regional aims of conserving and reinforcing greenspace.



### Legend

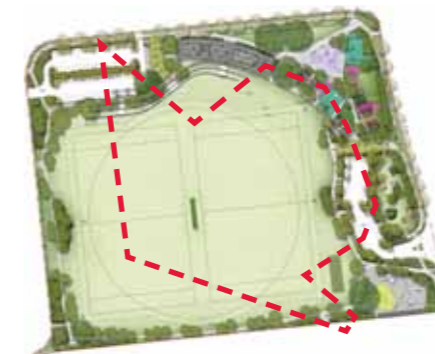
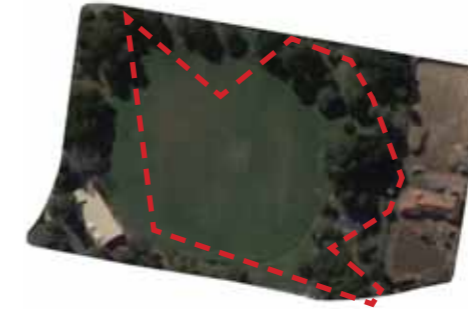
- Sydney Green Grid connections
- Major connections
- Minor connections
- Underpass connections

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## Site Analysis

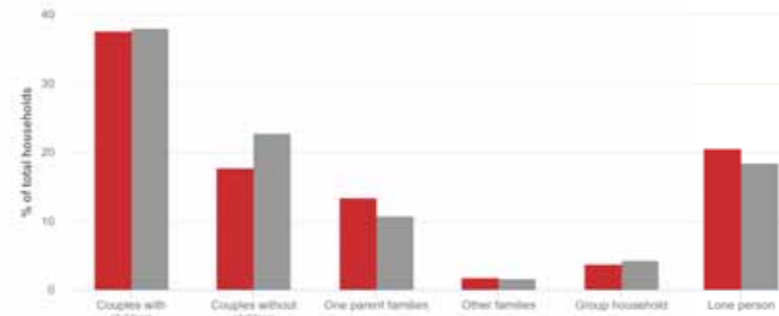
## Park Comparison

Park	LGA	Size	Facilities
<b>Kentucky Road Reserve</b> (Neighbourhood level park)	Canterbury LGA	2ha	Soccer field Playground (swing) Amenities Sports field lighting Off-street parking
<b>Kensington Park</b> (District Level Park)	Randwick LGA	4.2ha	Cricket and rugby union field, cricket nets Fenced playground with shade Toilets Sports field lighting Off-street parking
<b>Coogee Oval</b>	Randwick LGA	2.3ha	Fenced oval for cricket and rugby union Score boards, sheltered and unsheltered grandstand Canteen, toilets and change room facilities Playground Off street parking Sports field lighting
<b>Marsden Park</b>	Blacktown LGA	4.98ha	Multi-purpose fields: Soccer, Rugby, AFL and Cricket Cricket Practice nets Off-street parking Amenities: change rooms, toilets and canteen Sports field Lighting Playground, Skate Park and Half court Dog-off Leash Area

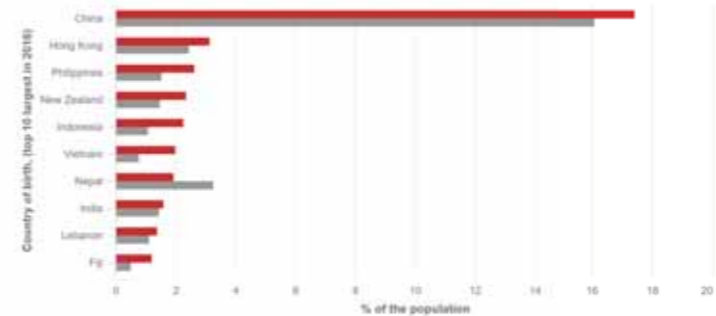


Site Analysis

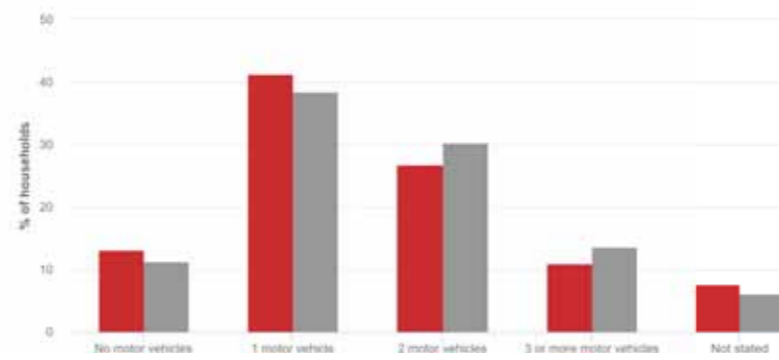
Georges River Council & Riverwood Demographics



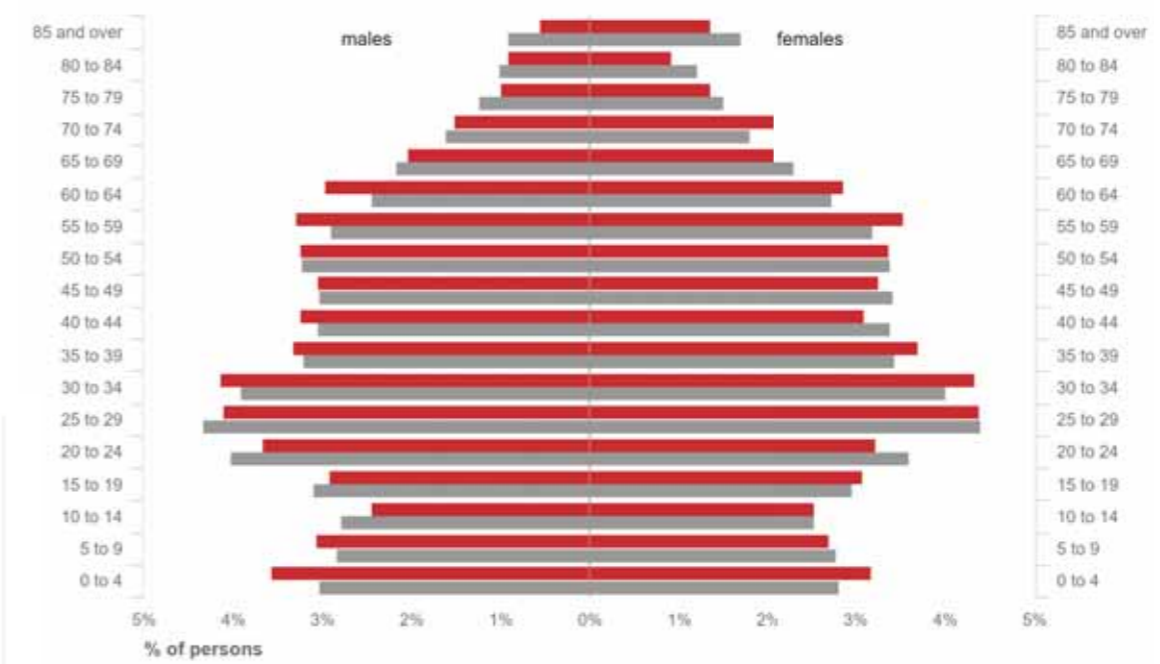
Riverwood residents household types (Source: 2016 Census)



Percentage of Riverwood residents born overseas vs. in Australia (Source: 2016 Census)  
Around 70% of the Australian population was born in Australia



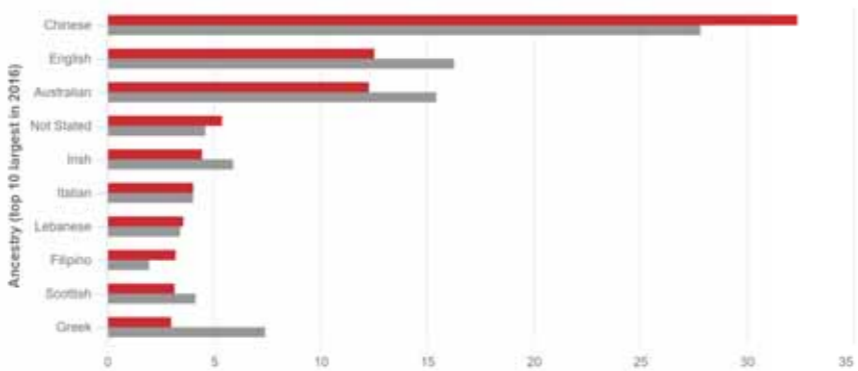
Riverwood residents number of cars per household (Source: 2016 Census)



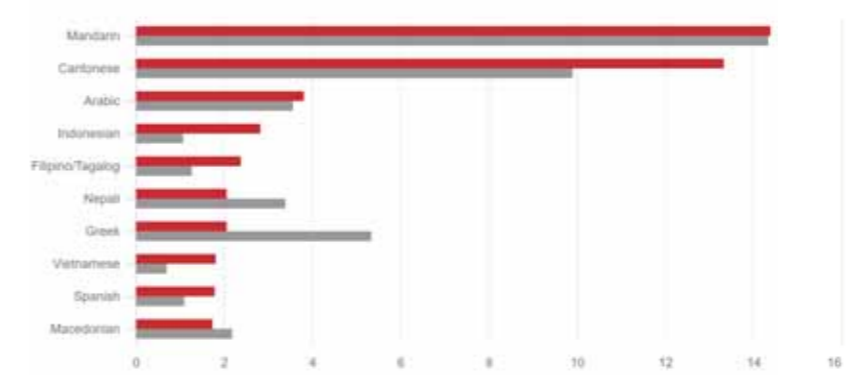
Riverwood residents age by year (Source: 2016 Census)  
Australian mean age = 37



Riverwood residents top 10 religions [% of the population] (Source: 2016 Census)  
Most common religion in Australia is Roman Catholic



Riverwood residents ancestry top 10 [% of the population] (Source: 2016 Census)  
Most common ancestry in Australia is Chinese



Riverwood residents top 10 languages other than English [% of the population] (Source: 2016 Census)  
Most common language in Australia = Mandarin

- A summary of key findings:
- Chinese ancestry is the highest % of the population in Riverwood
  - A large majority of the population were born overseas
  - There is a high percentage of households which have lone inhabitants
  - Apart from Western Catholic and Anglican churches, high % of the population is of Islam, Greek orthodox and Buddhist religious domination.
  - Due to the large percentage of people of Chinese origin, anticipated age, gender and origin of future residents and existing lack of opportunities for passive recreation, improve the spatial provision for passive recreation and popular Chinese leisure pursuits, including walking, dancing, badminton, table tennis, yoga and tai chi, and similar activities with increasing popularity.
  - Though not mentioned in Census data and Strategic Recreation Plan, gardening has been observed as a highly popular leisure time activity during site visits in Riverwood.



- Popular leisure activities among Chinese ancestry population:
- Males:
- 1/2 court basketball
  - futsal
  - table tennis
  - badminton (indoors)
- Females:
- walking
  - jogging
  - yoga/tai-chi
- Elderly:
- line dancing (incl. seating)
  - walking
  - tai-chi

(Source: Australian Bureau of Statistics, 2016 Census)

## Site Analysis

Analysis of the City of Canterbury Strategic Recreation Plan (SRP) enhance an understanding of the recreational needs and make up of the city, and the suburbs within.

### Benefits and importance of recreation recognised by the SRP:

- **Personal and individual benefits:** improve health and psychological wellbeing, reduced stress, increased self-confidence and skills
- **Social and community benefits:** strengthen social community bonds, strengthen family and cultural relationships, promote appreciation and understanding of people with disabilities and reduce incidents of crime, vandalism and anti-social behavior
- **Environmental benefits:** offer protected natural environments for community pleasure, provide visual relief from urban development, increase environmental awareness and appreciation, encourage people to walk and cycle, and are considered a benefit when people look at where to live
- **Economical benefits:** create revenue through the development of facilities and the sale of goods & services, increase employment, attract participants from outside the area, increase property values near recreation space, attract new residents to the area and increase productivity and work performance

(Source: Strategic Recreation Plan, p7-8)

The reasons given by Australians who participated in sports and physical recreation activities 13 times or more in the year before interview (Australian Bureau of Statistics, 2007):

**Table 4.6 Reasons for participating in sport and physical recreation activities**

Motivator	% of Australians	Gender	Age group
Health / fitness	82%	Females	25 years and over
Enjoyment	54%	Males	15 to 24 years
Wellbeing	41%	Females	35 years and over
Social / family	34%	Males	15 to 34 years
Weight loss	17%	Females	25 to 64 years
Competition / challenge	12%	Males	15 to 34 years
Walk the dog	8%	Females	35 years and over
Transport	4%	Males, females	All ages

Note: Total does not add up to 100% because each person could give more than one answer.

(Source: Strategic Recreation Plan; p47)

## Canterbury Strategic Recreation Plan Analysis Findings

### Issues relating to open space within the council include:

- some parks are not 'visible' from surrounding roads and residential areas;
- **not recognised** as public open space;
- some parks are in **poor maintenance condition** and are not attractive to use;
- **limited availability of new open space** through land acquisition;
- increasing cultural and socioeconomic diversity, including new immigrants and emerging communities with **diverse recreational interests**;
- open space is **inequitably distributed** and increasing numbers of residents living in flats in built up areas have no access to outdoor space;
- financial limitations to address increasing recreational demands.

(Source: Strategic Recreation Plan, p1, 23)

National surveys by the Australian Sports Commission (2000-2007) have shown that certain activities are more popular with some age groups rather than others. The following findings are relevant to Canterbury:

### Young people 15-24 years participated most in:

- aerobics / fitness 22%
- soccer (outdoor) 13%
- walking 13%
- swimming 12%
- running 11%
- basketball 11%
- netball 9%
- tennis 8%
- cycling 7%

### Activities most popular among adult males:

- walking 24%
- aerobics / fitness 16%
- swimming 14%
- cycling 12%
- running 10%
- golf 9%
- soccer (outdoor) 9%
- tennis 8%
- surf sports 5%
- touch football 5%

### Activities most popular among adult females:

- walking 39%
- aerobics / fitness 24%
- swimming 14%
- bushwalking 7%
- tennis 6%
- netball 5%
- yoga 5%
- running 5%
- cycling 5%

(Source: Strategic Recreation Plan, p45-47)

### Australians 65 years and over:

- walking 40%
- golf 8%
- swimming 6%
- lawn bowls 5%
- bush walking 4%
- cycling 3%
- tennis 3%
- water aerobics 3%
- dancing 2%

### Activities in which participation increases with age, at least until the age of 65 years, are:

- canoeing / kayaking
- golf
- fishing
- sailing
- walking
- lawn bowls
- carpet bowls

### "Whole of life" activities:

- swimming
- tennis
- tenpin bowling
- dancing
- cycling
- bushwalking
- yoga
- golf
- fishing

(Source: Strategic Recreation Plan, p45-47)

Though not mentioned in Census data and Strategic Recreation Plan, gardening has been observed as a highly popular leisure time activity during site visits in Riverwood.

## Site Analysis

## Existing Road Measurements

Existing road reserves and carriageways have been measured to understand capacity and potential in considering a new master plan.



0 50 100 200m

1:5000 @ A3

Roads shown as green have capacity in the road reserve for increased provision which may involve widening of the carriageway or footpath, addition of street trees, parking etc. Roads shown as dashed orange offer limited capacity and are constrained. These roads may require widening of road reserve boundaries to accommodate future capacity.



Legend

- Adequate Road Reserve for Future Capacity
- - - Constrained Road Reserve

0 50 100 200m

1:5000 @ A3



## Site Analysis

## Inactive Open Space Edges

Edges to open space at the Riverwood site present a number of constraints and opportunities.

Open space with rear or side boundaries as frontage often have solid fences to 1.8m to demarcate between public and private space. This creates a dead zone with poor natural surveillance and no activity along park edges, resulting in potential safety issues.

The opportunity exists to reprogram these edges with active building frontages or streets to introduce activity and surveillance. Inactive parkland edges also reduce interaction with and access to the sites most valuable asset the adjacent open space. More value could be delivered to the community by redesigning edges, street layouts and subdivision pattern to engage directly with open space.



### Legend

----- Inactive open space edges

Summary: limited engagement with the *best* asset of the site

0 50 100 200m

1:5000 @ A3

25

## Site Analysis

## Existing Trees

There are a number of existing trees throughout the site, many of which are in private gardens and open space. Some street trees exist but there appears to have been no history of coordinated program of street tree planting.

In the absence of a detailed survey of individual trees, mapping is based on the current LIDAR data to identify locations of trees. A visual site inspection then nominated the high and medium value trees and further arborist inspection identified high value trees as identified in the legend below. This is augmented with habitat value and identification of Cumberland Plain Woodland according to the Biodiversity Constraints Assessment prepared by EcoLogical Australia.

Photos of key trees are highlighted over the page.

The vegetation of the site, some being locally native species, provide connecting with country opportunities, such as, implementing cultural practices for healing country. This opportunity should be explored after walking country and speaking with local knowledge holders process has been undertaken.



### Legend

- Unclassified trees
- High value trees
- Moderate value trees
- Hollow-bearing tree (high biodiversity constraint)
- Fig (medium biodiversity constraint)
- Cumberland Plain Woodland (high biodiversity constraint - refer Ecological Australia report)
- ▨ Foraging habitat (medium biodiversity constraint - refer Ecological Australia report)

Note:

Updated to Ecological Australia - High Retention Tree Preliminary Arboricultural Assessment v1 - 24 March 2022

Only high retention trees in the public domain have been assess. Detailed location by surveyor and assessment by AQF 5 Arborist of all trees should be undertaken to inform detailed design of all work on site.

0 50 100 200m

1:5000 @ A3

## Site Analysis

## Existing Trees



1 Cumberland Plain Woodland Remnants on Kentucky St



2 Gums on Kentucky St



3 Gums on corner of Michigan Road and Montana Crescent



4 Fig Tree on Kentucky St



5 Gum trees on Montana Crescent



6 Foraging Habitat on Kentucky St



7 Tree Avenue on Washington Street



8 Urban Native and Exotic Cover present throughout site



9 Cumberland Plain Woodland Remnants on Kentucky St



10 Fig Tree on Tennessee Place

Proposed Urban Structure



## Proposed Urban Structure

## Green Infrastructure Strategy

The green infrastructure strategy for the Riverwood site is based on revealing and connecting with the surrounding natural systems :

Revealing the topography of the site through

- marking high points
- providing vistas through and beyond the site to orienting features.
- providing connections along which the context and topography of the site may be appreciated

### Connect Soil Systems

- connect the soil systems (and groundwater) beyond the site with a network within the site
- connect both public domain and private deep (continuous) soil zones as a network

### Water Cycle

- reveal the movement of water through the site
- maximise water infiltration and reuse
- maximise improvement of quality of water leaving the site

### Living Systems

- Maximise urban tree canopy on site
- Link existing urban tree canopy with green grid connectors
- Maximise locally native species on site and species that provide habitat
- Link habitat to greater habitat links

The green infrastructure strategy is intended to provide opportunities for connecting with country.

- Legend**
- ↔ Sydney Green Grid connections
  - ↔ Major connections
  - ↔ Minor connections
  - ↔ Underpass connections
  - ↔ Proposed drainage
  - ↔ WSUD\* measures
  - Local low point
  - Existing trees of moderate to high value to be retained
  - Proposed trees
  - High value trees
  - Hollow-bearing tree (high biodiversity constraint)
  - \* High point
  - Deep soil
  - Cumberland Plain Woodland\*



\*EEC (Endangered Ecological Community)

High biodiversity constraint - refer to Ecological Australia report

\* WSUD Water Sensitive Urban Design

## Proposed Urban Structure

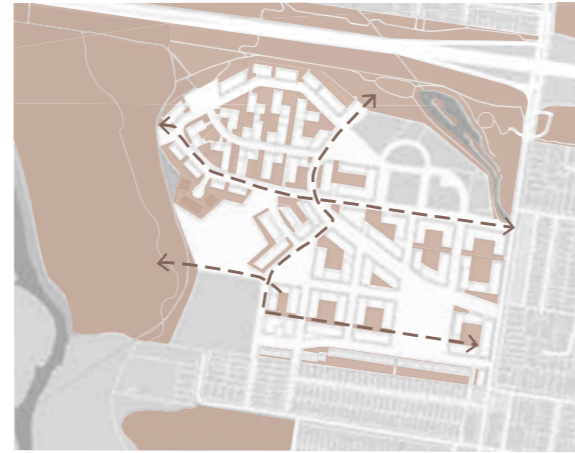
The character of a place is converted in the minds of the community by the way they move through their neighbourhood, what they see and how they remember it (their "mind maps").

By creating a sequence of open spaces, sense of an entry and making the experience easy, attractive and green, the perception of the neighbourhood is established as a positive experience and the character of the place is established.

The following principles define means of achieving this positive character for a place.

## Landscape Urban Design Principles

### Green Infrastructure



Connect both public domain and private deep (continuous) soil within the site as a network. Site **continuous soils** network to connect beyond the site.



Reveal the movement of water through the site. Maximise water infiltration, reuse and the improvement of quality of water leaving the site.



Link existing urban tree canopy and habitat with green grid connectors. Maximise urban tree canopy, locally native species and habitat on site.

### Connecting



**East-west civic street & Community Greenway** connecting Riverwood Public School with open space and Belmore Road.



**East-west park to park streets** provide pedestrian and cycle connections to Salt Pan Creek Reserve.

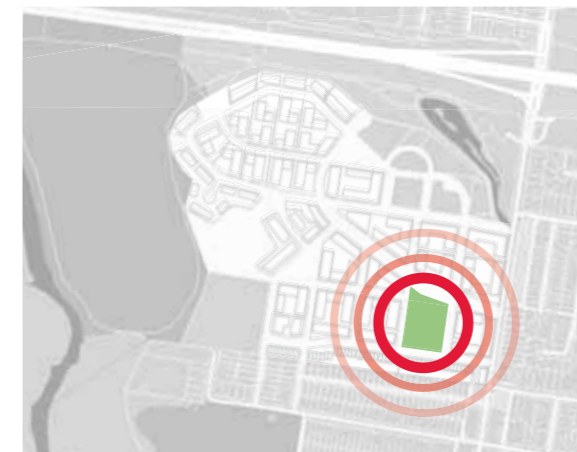


**North South green to green links** provide a focus for pedestrian and cycle links **To Riverwood train station**

### Open Space



**Streets terminating on views of parks, significant deep soil or feature tree planting** aids legibility, connection to amenity and reinforces access to open space. Provide connections to the broader landscape network and vistas through and beyond the site to orienting features reinforcing place context.



**New open space to south east** at site high point revealing place and to address gap in local open space distribution.



**Evenly distribute open space** throughout neighbourhoods to provide access within a short walk for all dwellings.