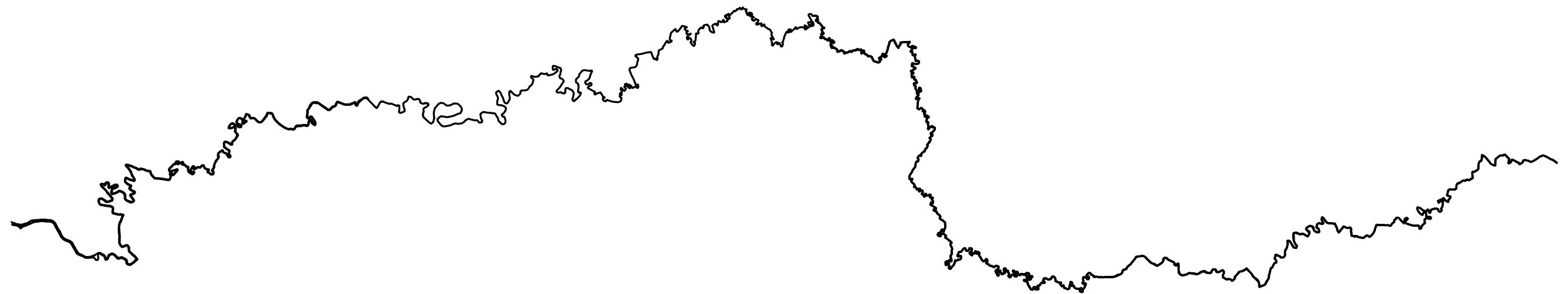


Rethinking Birrarung

Regenerating a dynamic Yarra River corridor



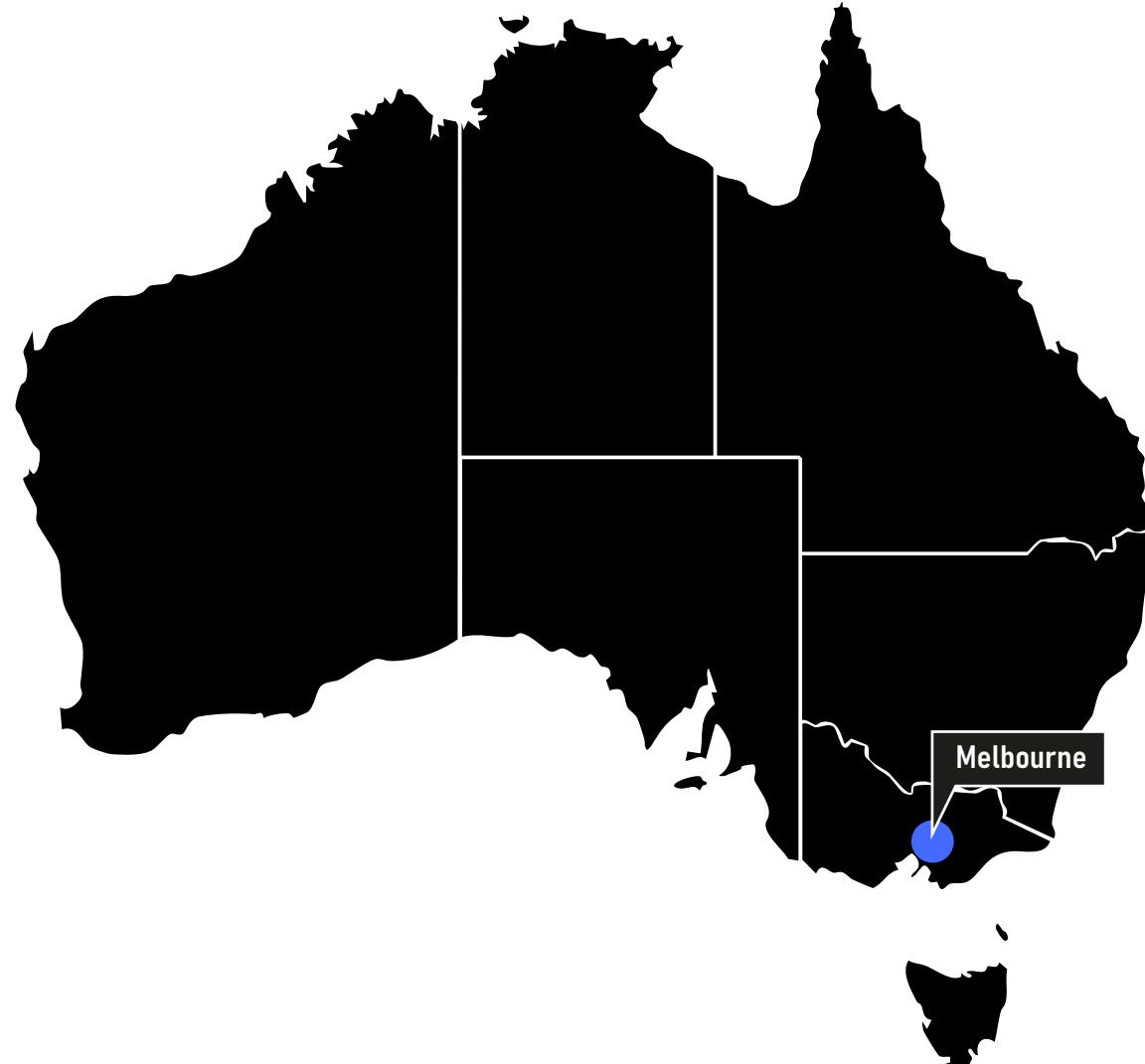
Lotte van Elst

P5 Graduation Presentation
MSc Architecture, Urbanism and Building Sciences
Delft University of Technology

1st mentor: Steffen Nijhuis
2nd mentor: Kristel Aalbers

Rethinking Birrarung

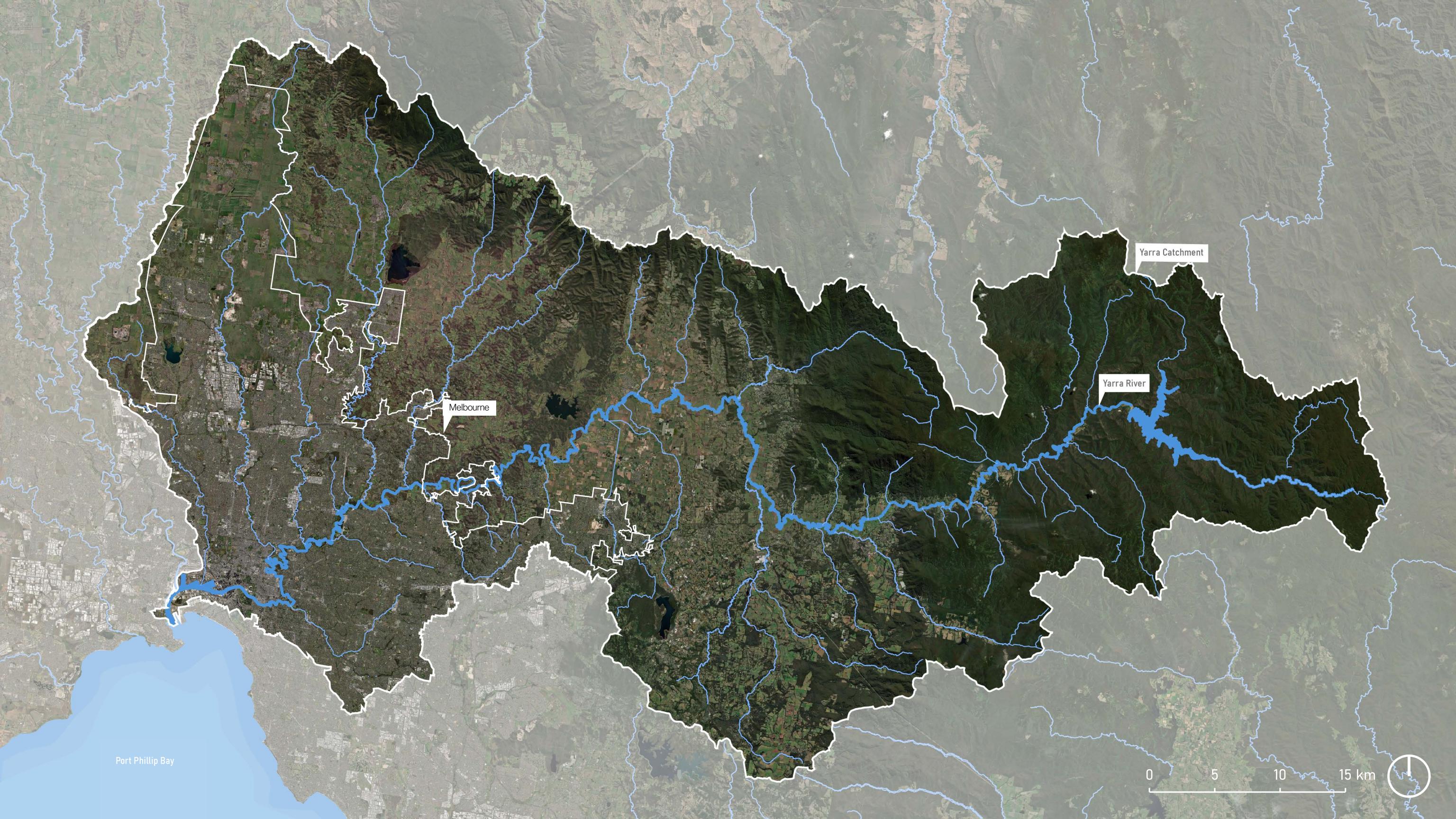
Regenerating a dynamic Yarra River corridor



Research supported by:

STICHTING NH-BOS
ter bevordering van de landschapsarchitectuur





Fascination



Main Yarra Trail cycling route

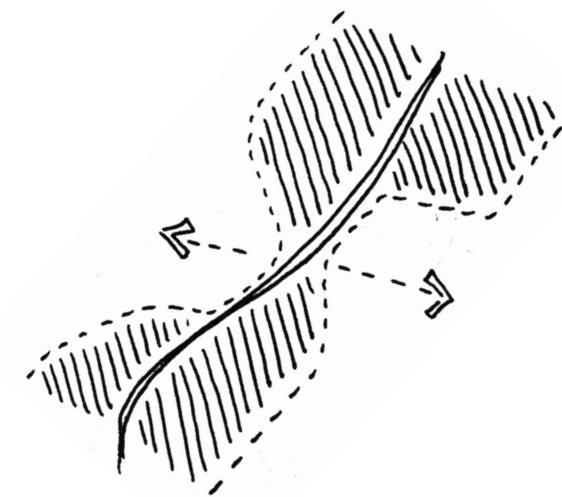


Rethinking Birrarung

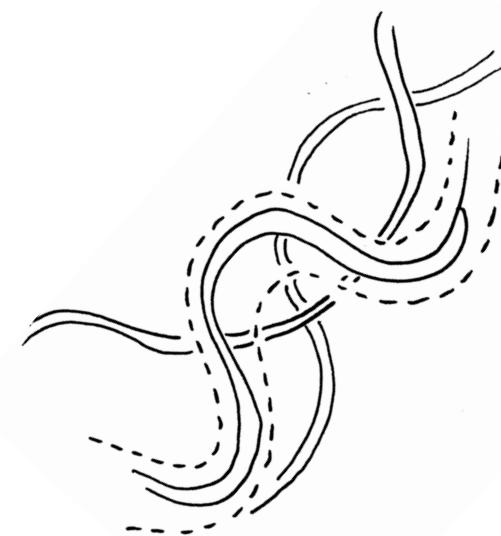


Recreational use of river in Munich

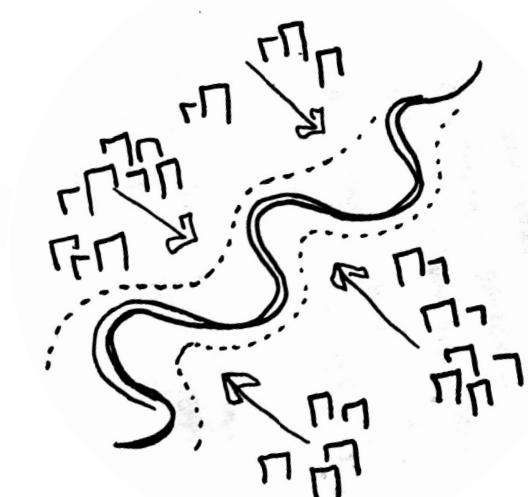
Problem field



1. Fragmentation of ecological corridor



2. Reduced water retention capacity



3. Urban and social disconnect from river

Birrarung / Yarra River

Pre-colonisation river (<1835)

Traditional Owners of the land
camped and lived alongside the river

Birrarung

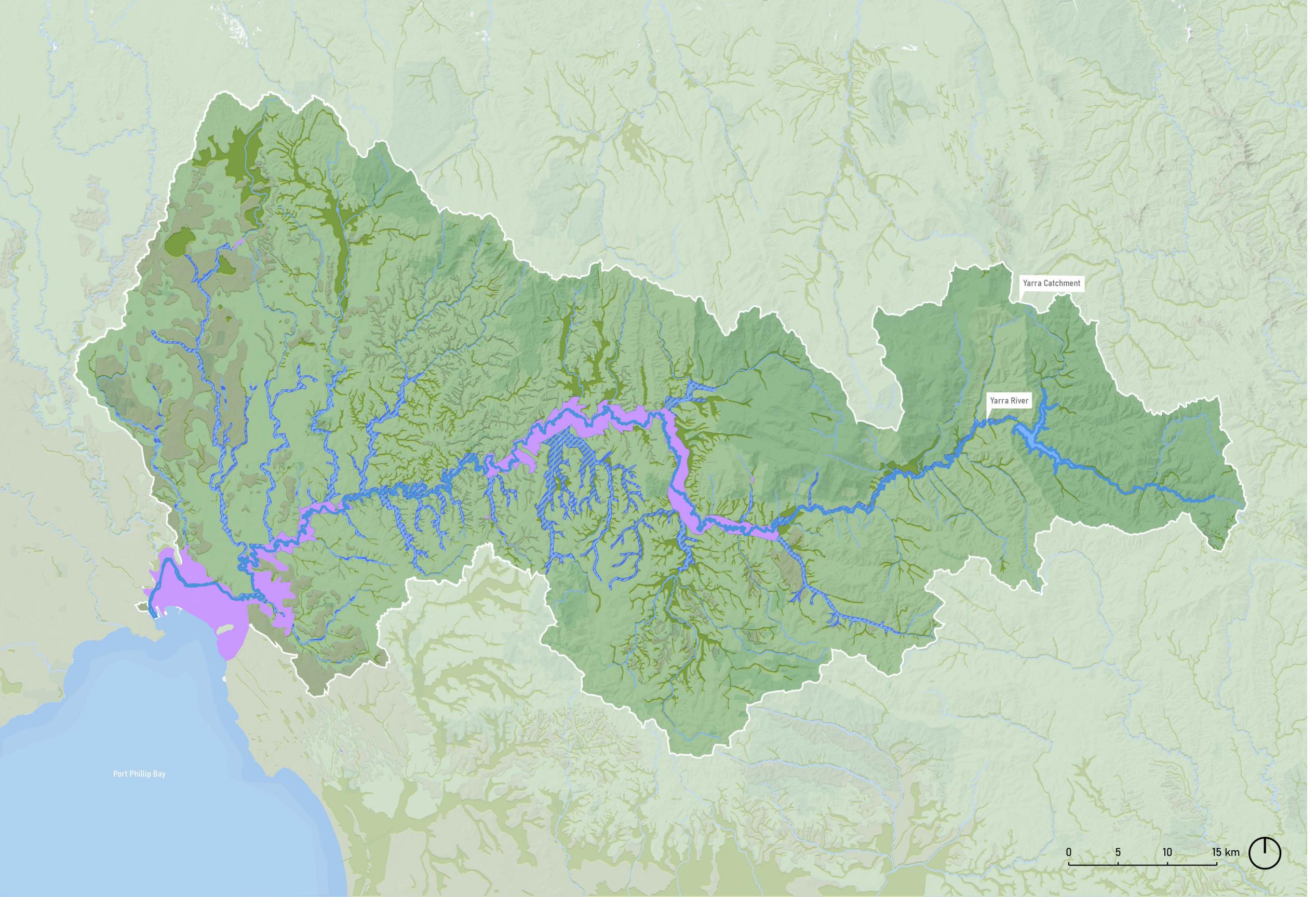
River of mists and shadows





Pre-colonisation catchment

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



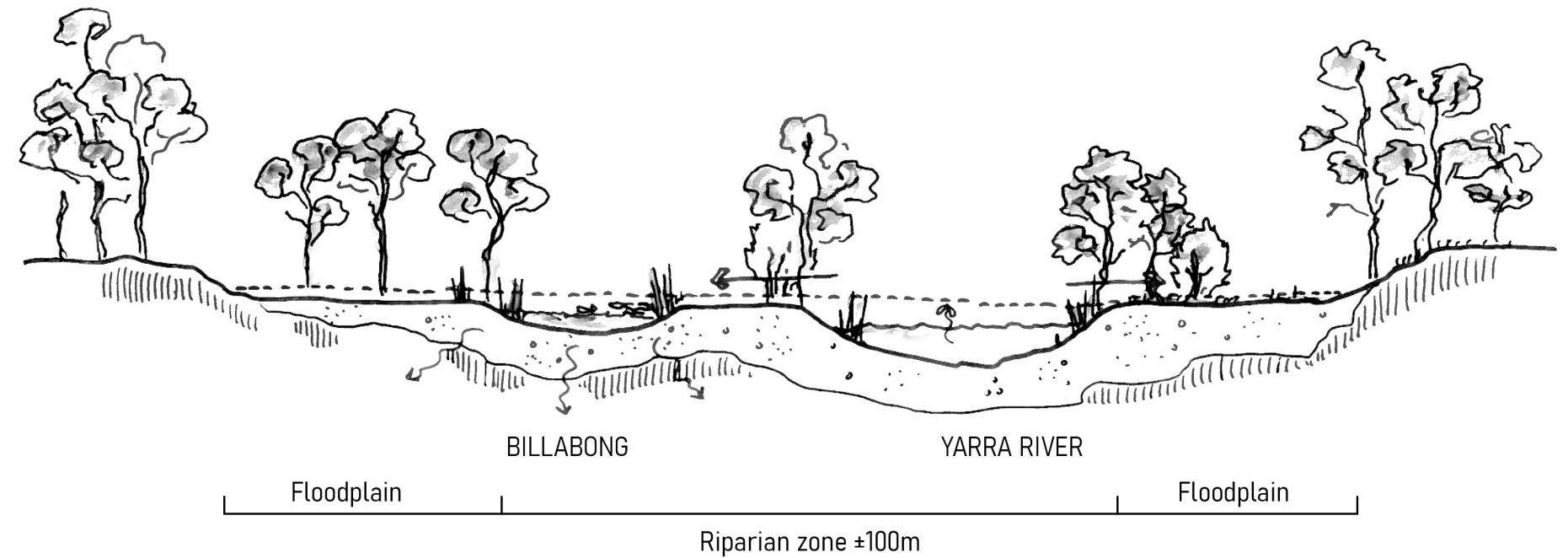
Floodplains of the Yarra River

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

Riparian zone

Ecological corridor
Riparian habitats

Large water retention capacity
Filtering and buffering water



River Red Gum
Eucalyptus camaldulensis



Swamp Paperbark
Melaleuca ericifolia



Common Reed
Phragmites australis



Water Ribbons
Cyanogeton procerum



Nankeen Night Heron
Nycticorax caledonicus



Platypus
Ornithorhynchus anatinus



Growling Grass Frog
Ranoidea raniformis



Macquarie perch
Macquaria australasica



Australian Grayling
Prototroctes maraena

Birrarung / Yarra River

Post-colonisation river (1854)

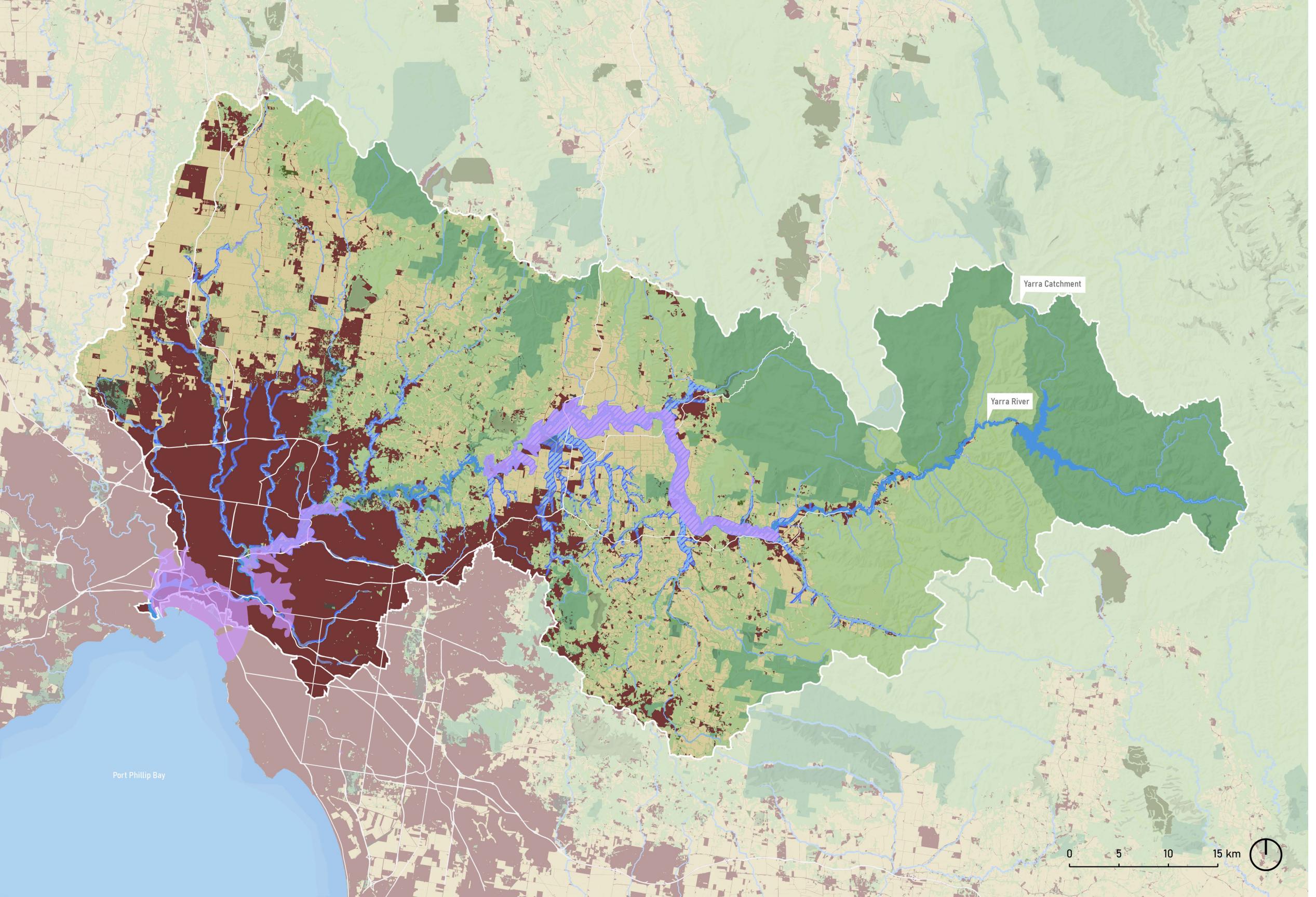
Melbourne was founded in 1835 and built on the riverbanks on the lower floodplain



Lotte van Elst

Rethinking Birrarung

10



Legend

- Urban zone
- Forested land
- Parks and Reserves
- Agricultural land
- Yarra River
- Creeks
- 1/100 year flood overlay
- Floodplains

Post-colonisation catchment

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

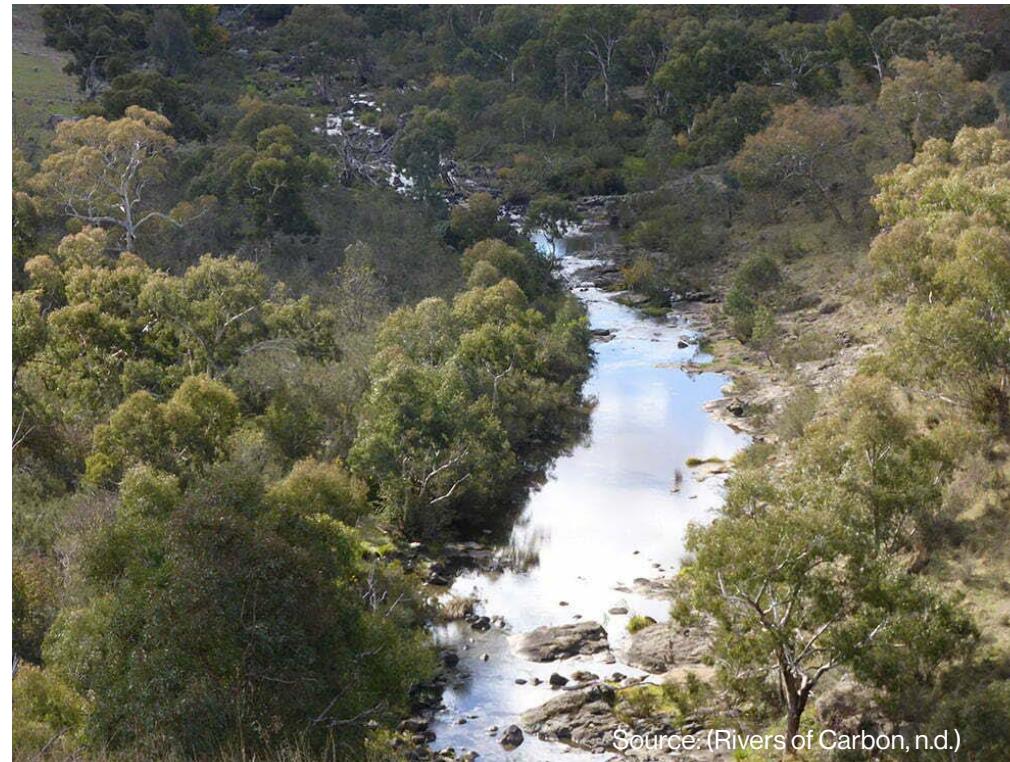
Change in riparian land use

Agriculture on riparian zone

Riparian zone holds fertile soil and is a desired location for agriculture

Low water retention capacity

Low ecological value



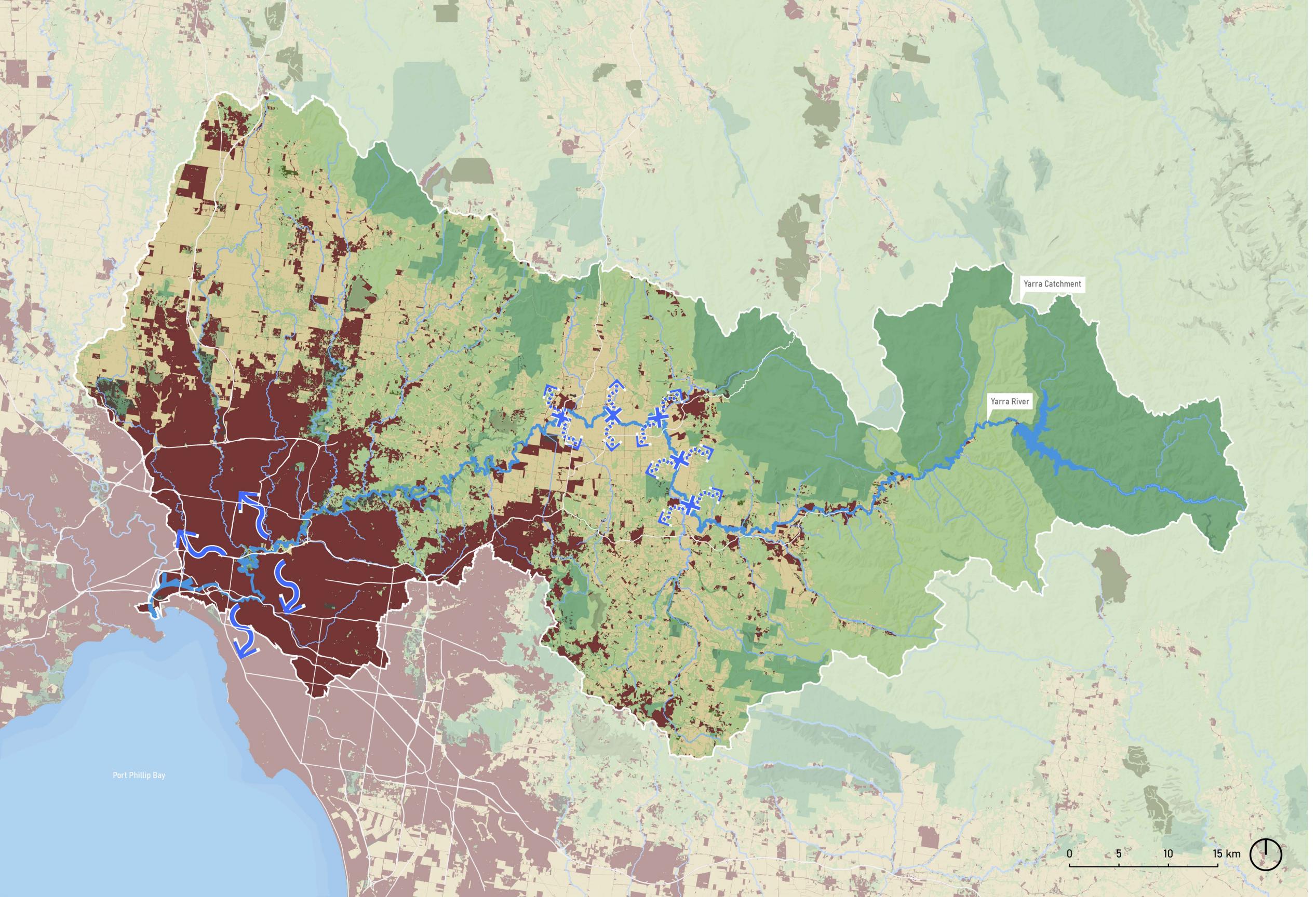
Intact riparian zone

Source: (Rivers of Carbon, n.d.)



Compromised riparian zone

Source: (FlyHigh Visuals, 2022)



Legend

- Urban zone
- Forested land
- Parks and Reserves
- Agricultural land
- Yarra River
- Creeks
- 1/100 year flood overlay

Compromised water buffering capacity

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



Source: Bowler (1972)

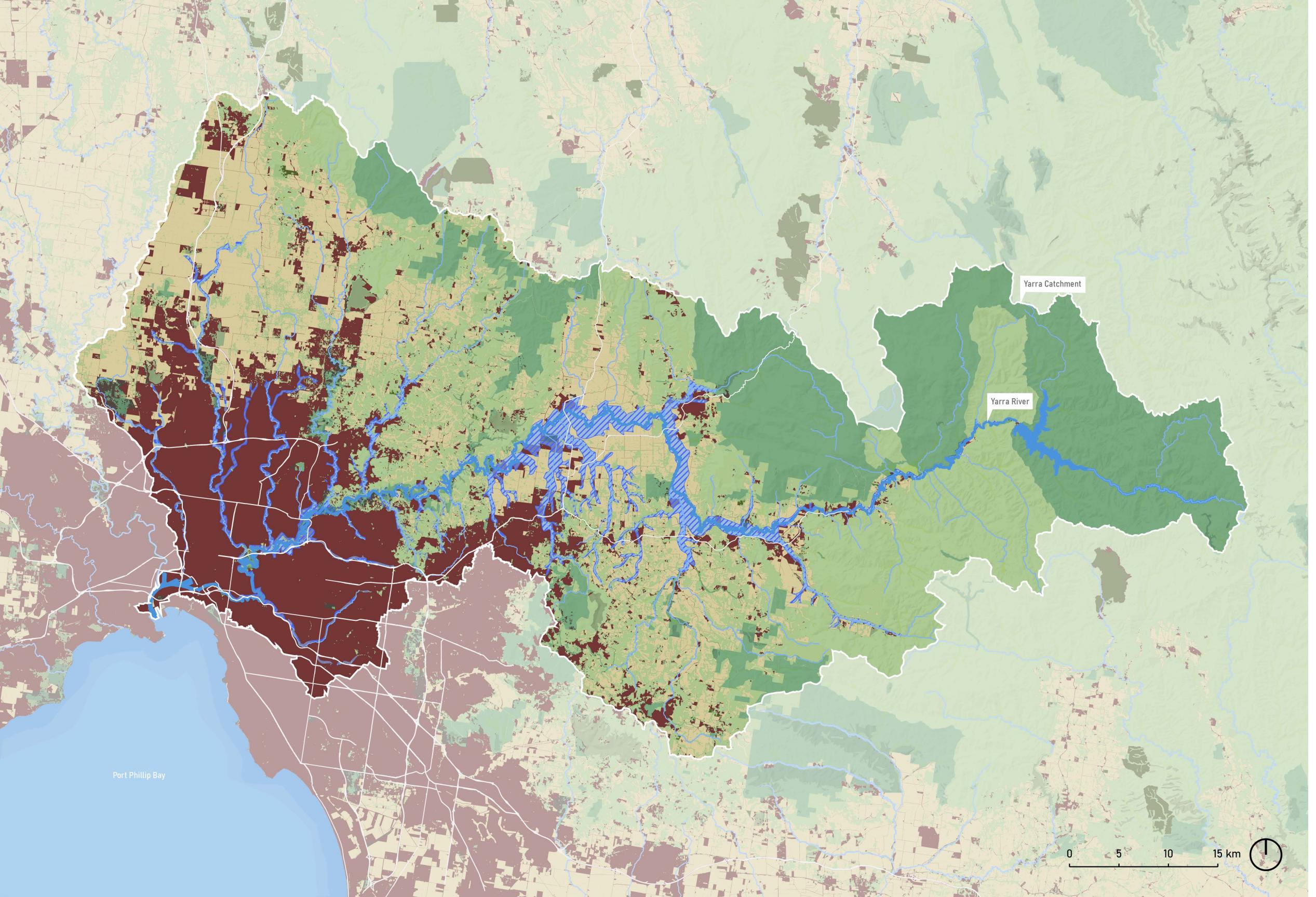
River flooding in urban context



Road flooding in outer Melbourne suburb



Flooding in Melbourne CBD - October 2022

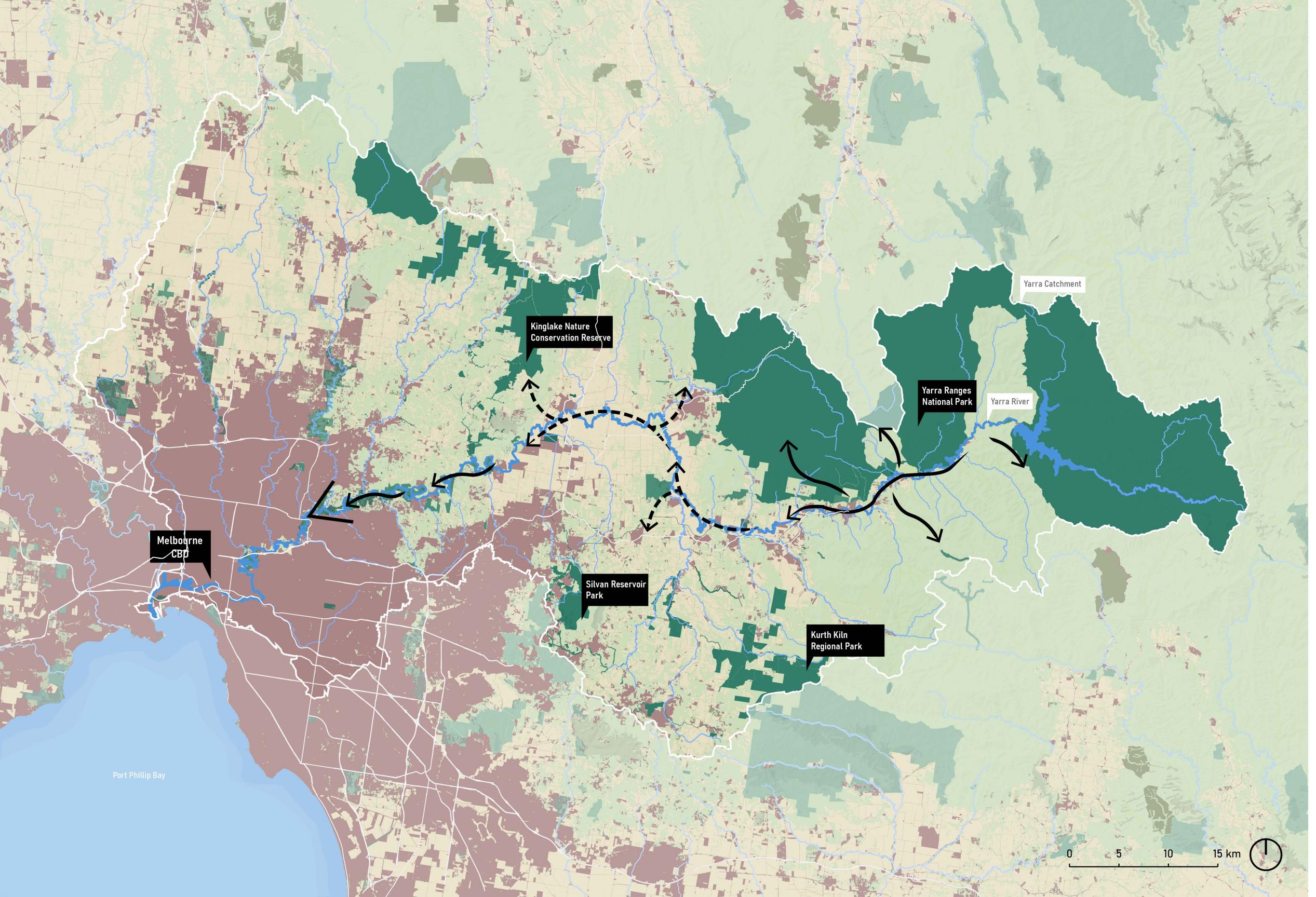


Legend

- Urban zone
- Forested land
- Parks and Reserves
- Agricultural land
- Yarra River
- Creeks
- 1/100 year flood overlay

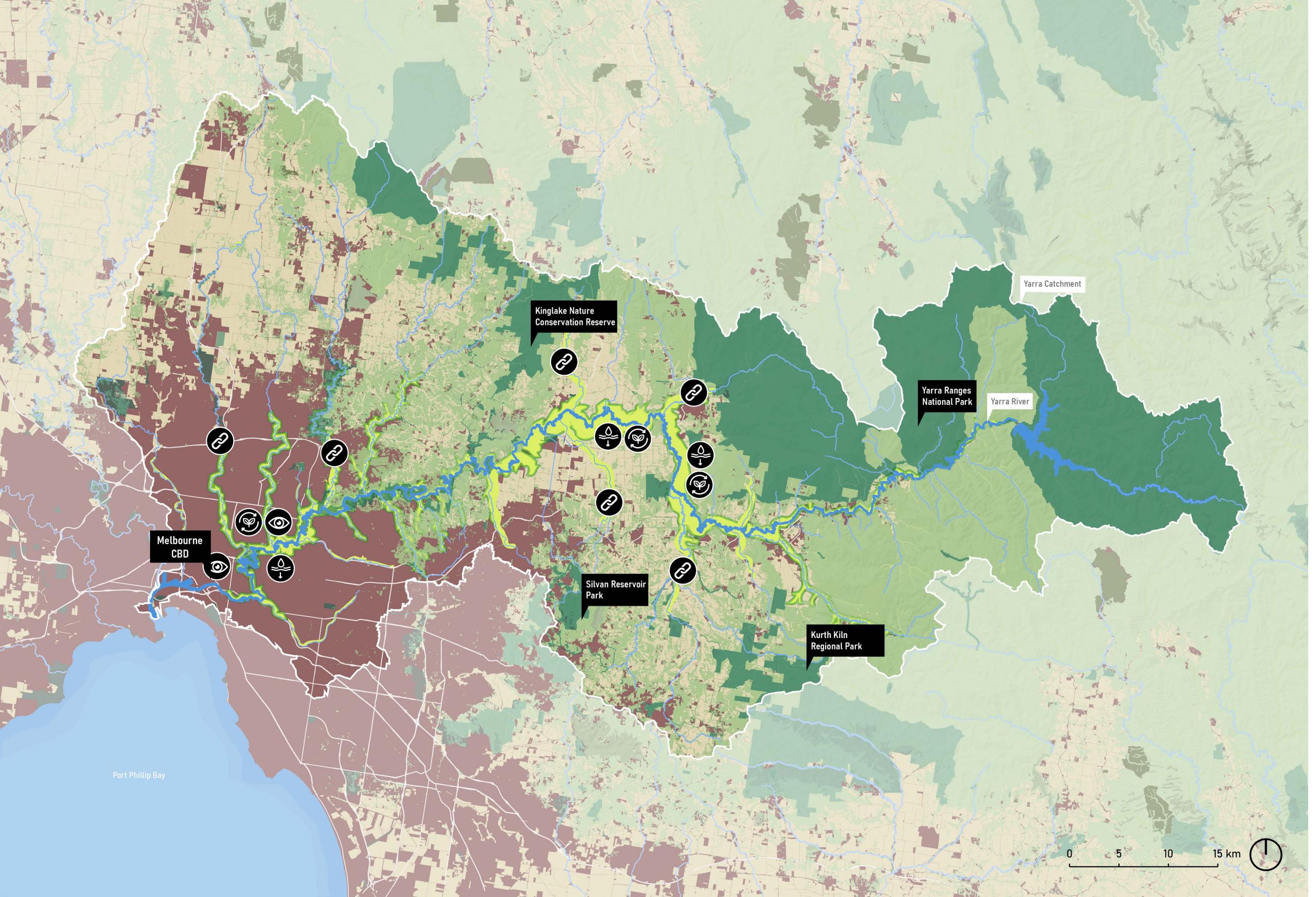
1/100 year flood prediction

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



Fragmented ecological network

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

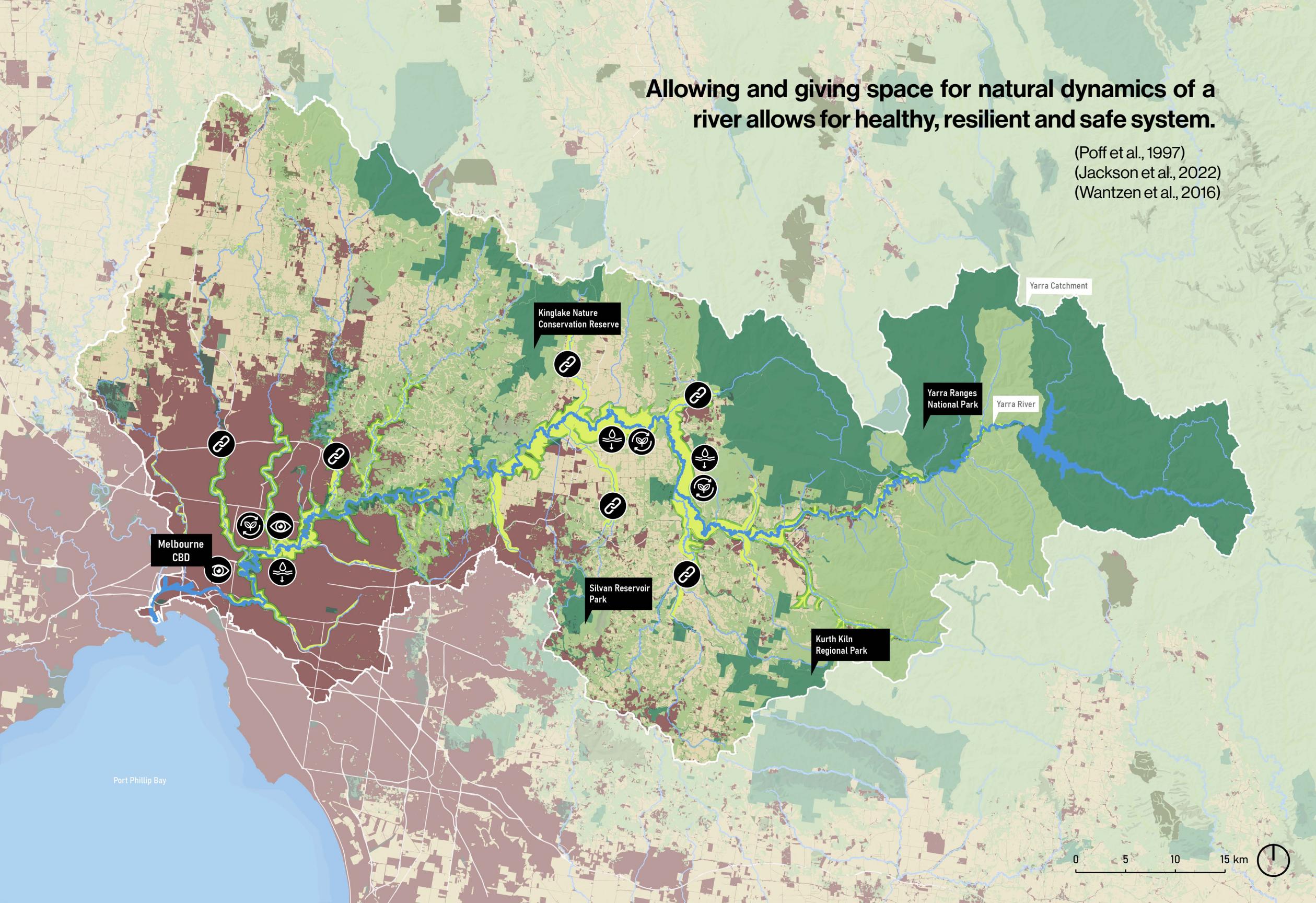


Legend

- Urban zone
- Forested land
- Parks and Reserves
- Agricultural land
- Yarra River
- Creeks
- 1/100 year flood overlay
- Opportunity for habitat connection
- Opportunity for riparian regeneration
- Opportunity for water buffering
- Opportunity for urban-river connection

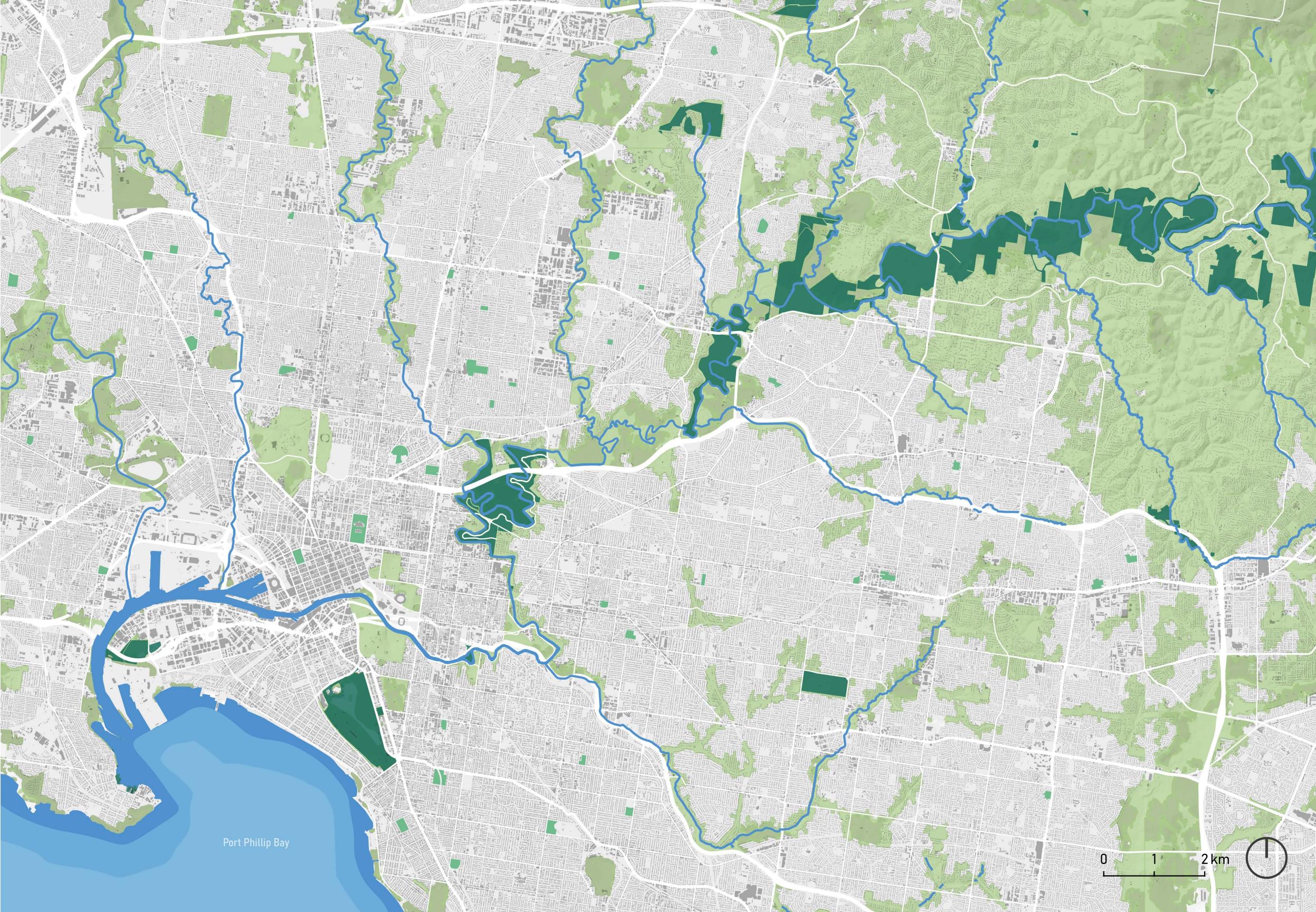
Opportunities within the catchment

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



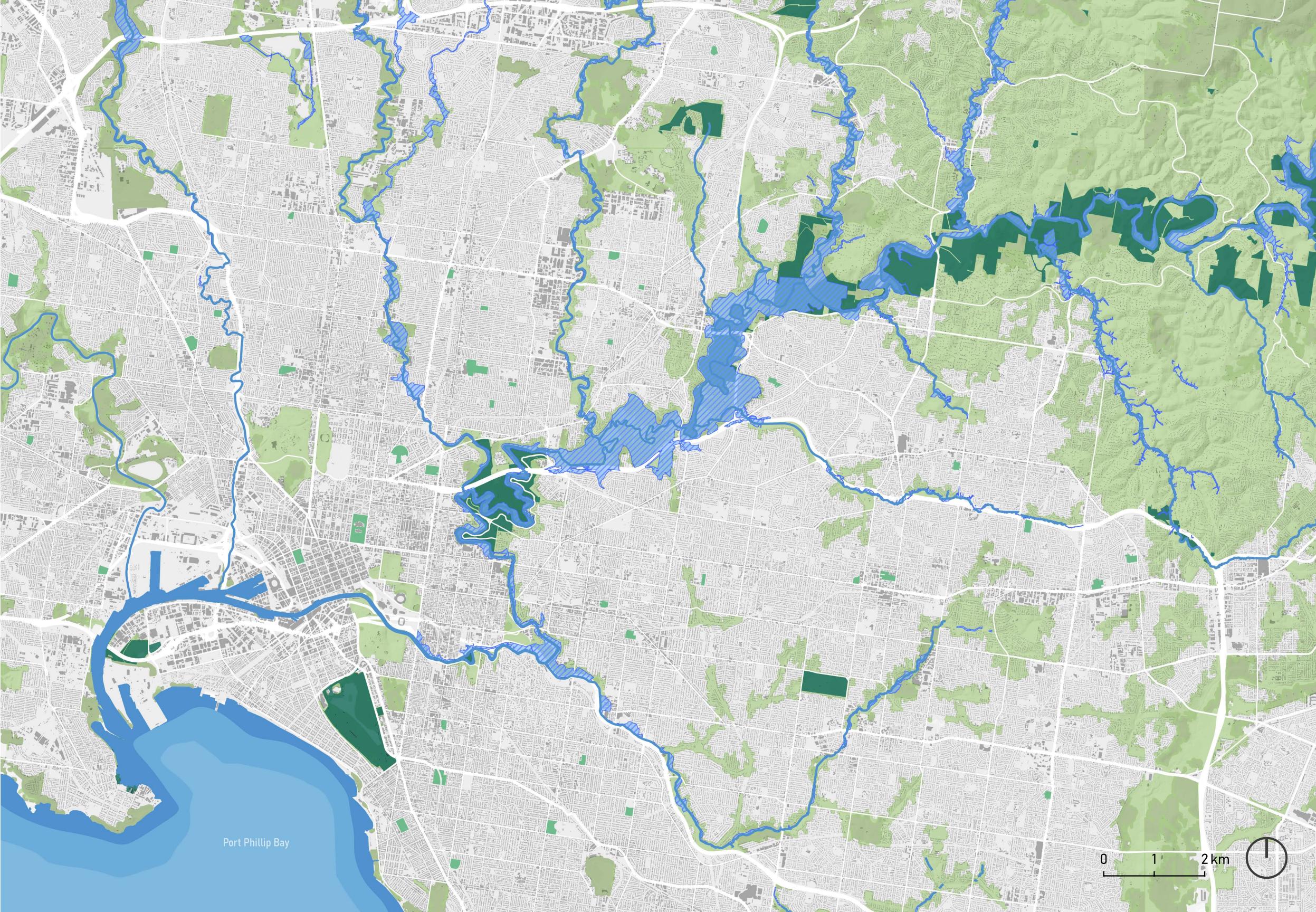
Opportunities within the catchment

Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap



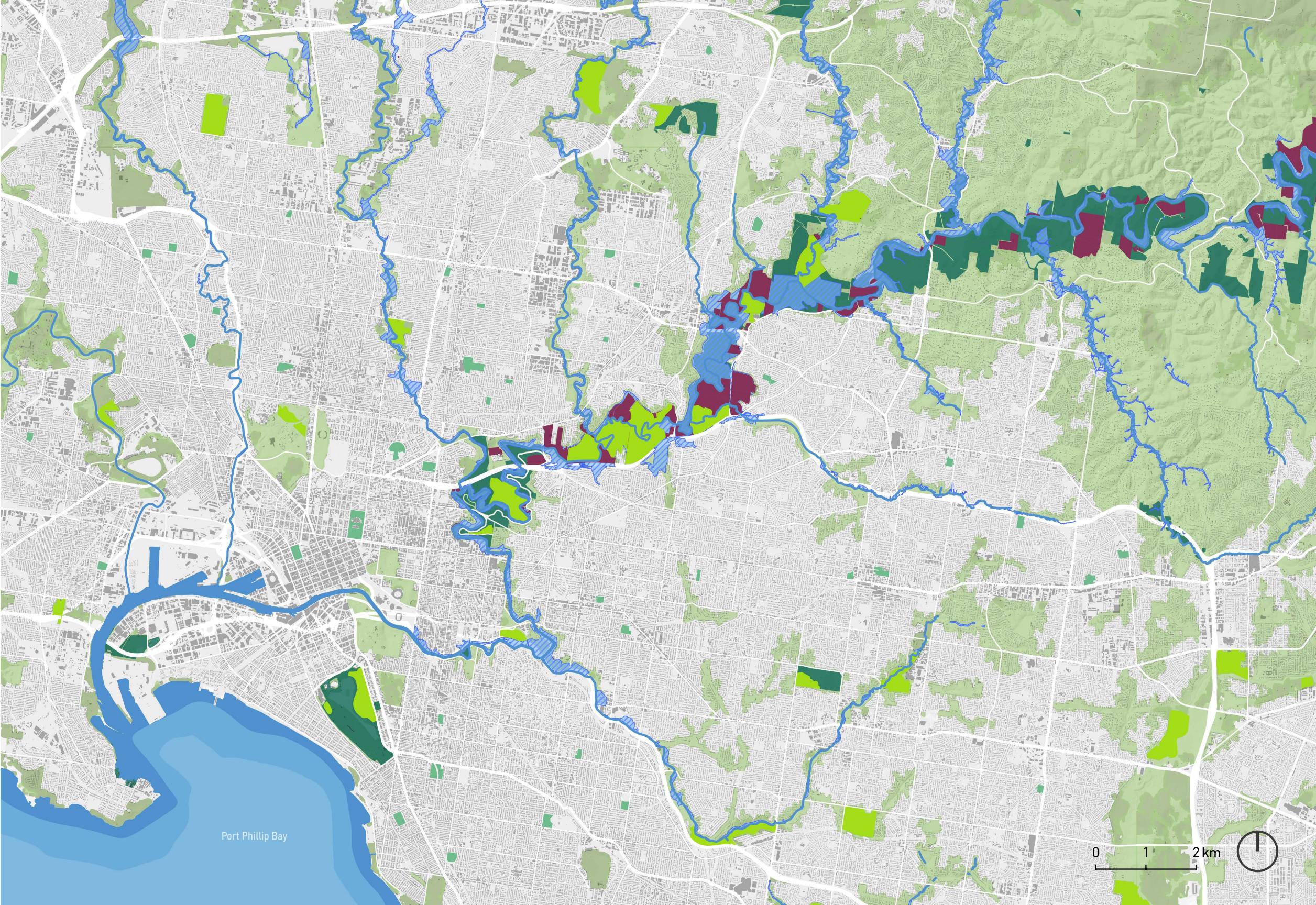
Downstream urban context

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

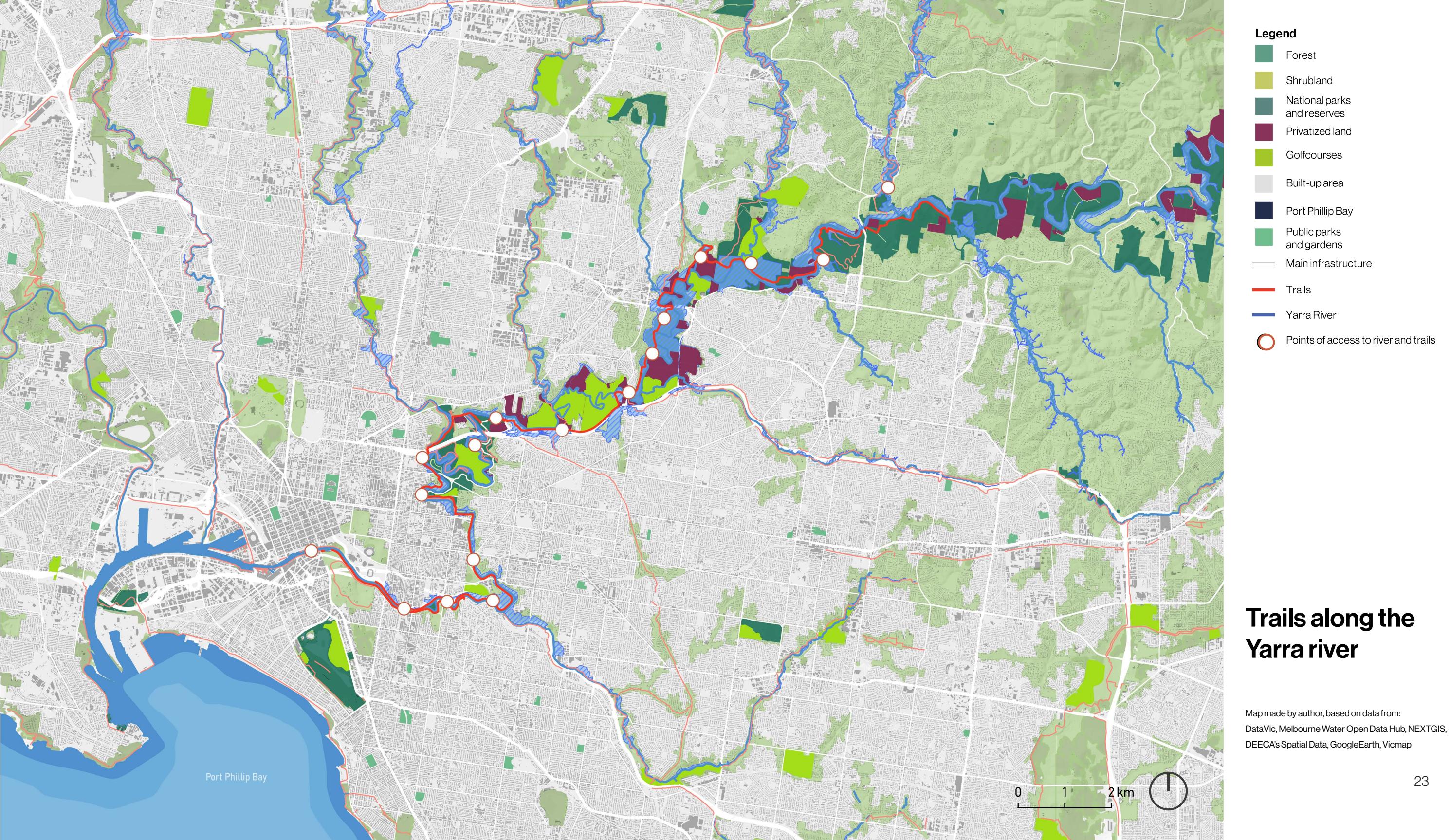


Downstream floodplain

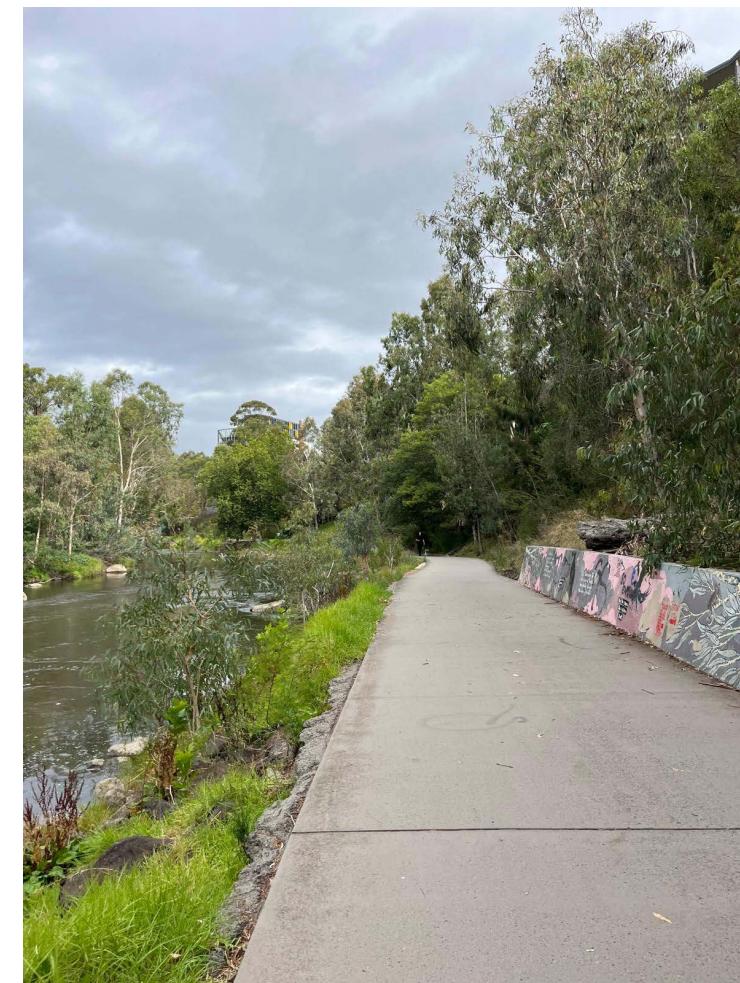
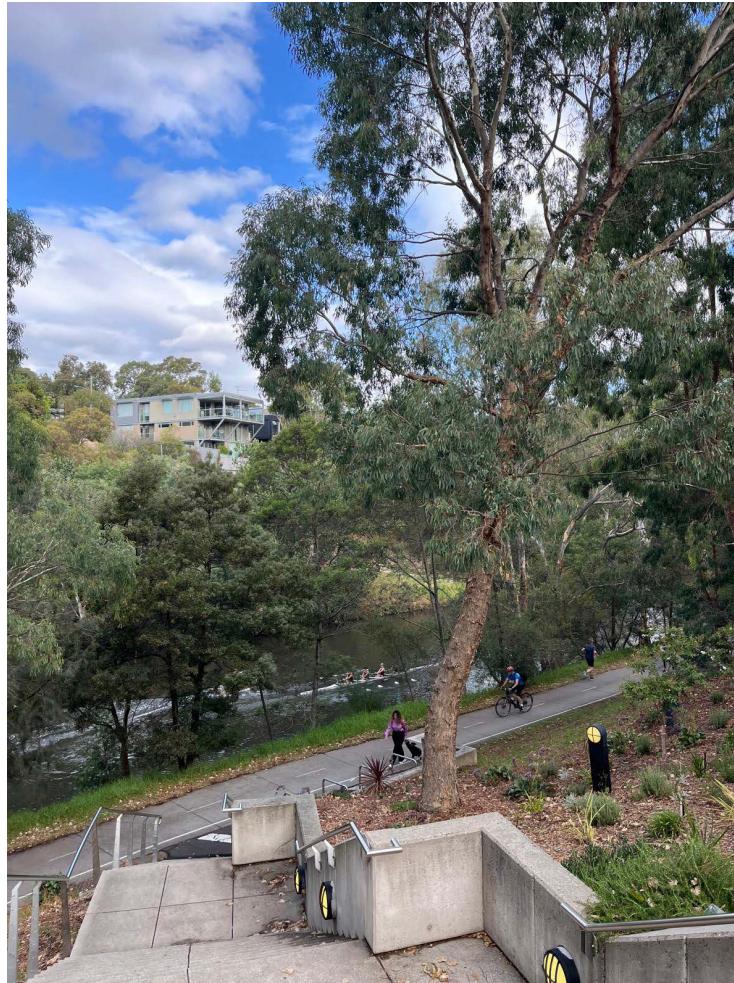
Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

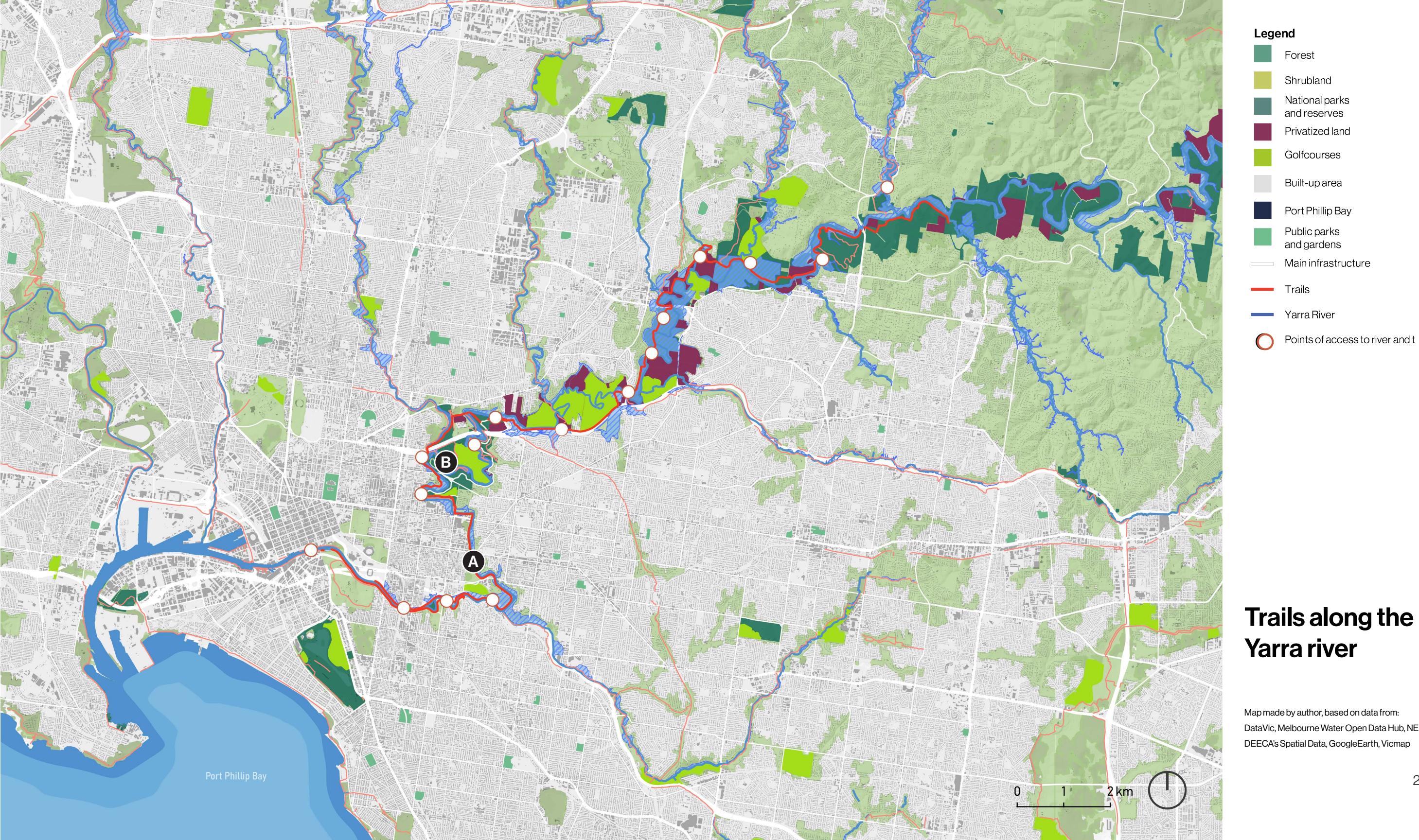


Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



Topographic constraints and restricted access

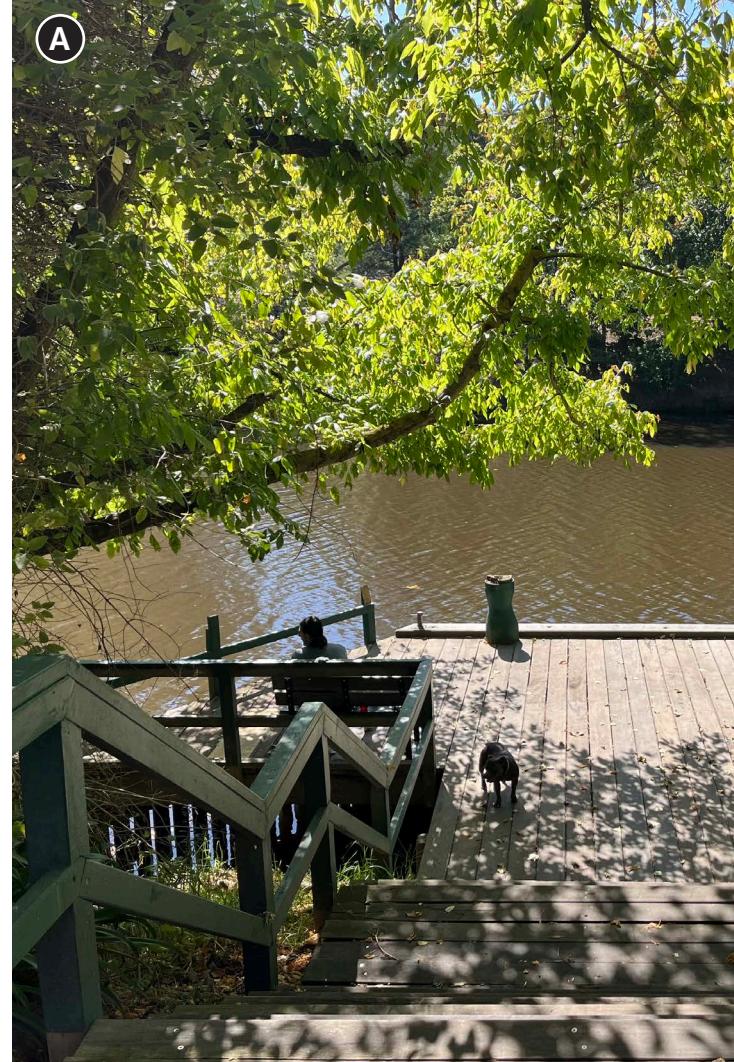




Appreciation of the river

"I love coming down here with my little girl [dog], it's my escape from the city. I work night shifts in a bakery. **You come down here and it's like you're in a different world**"

- Oscar (47)
Melbourne citizen

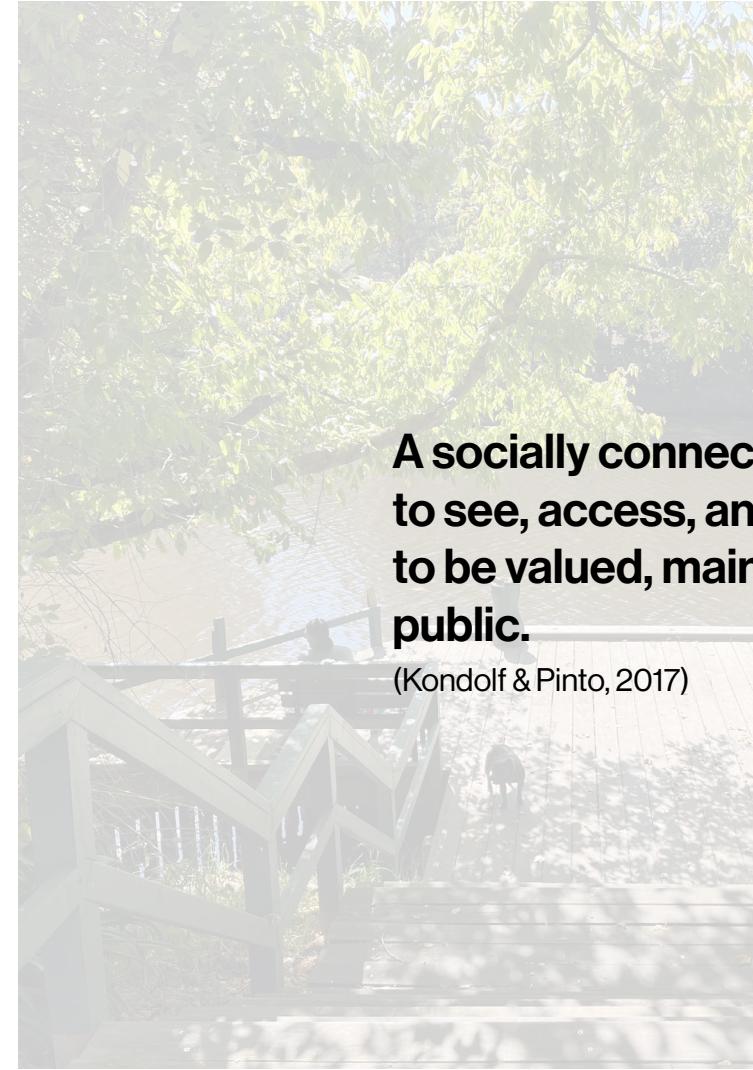


Rethinking Birrarung



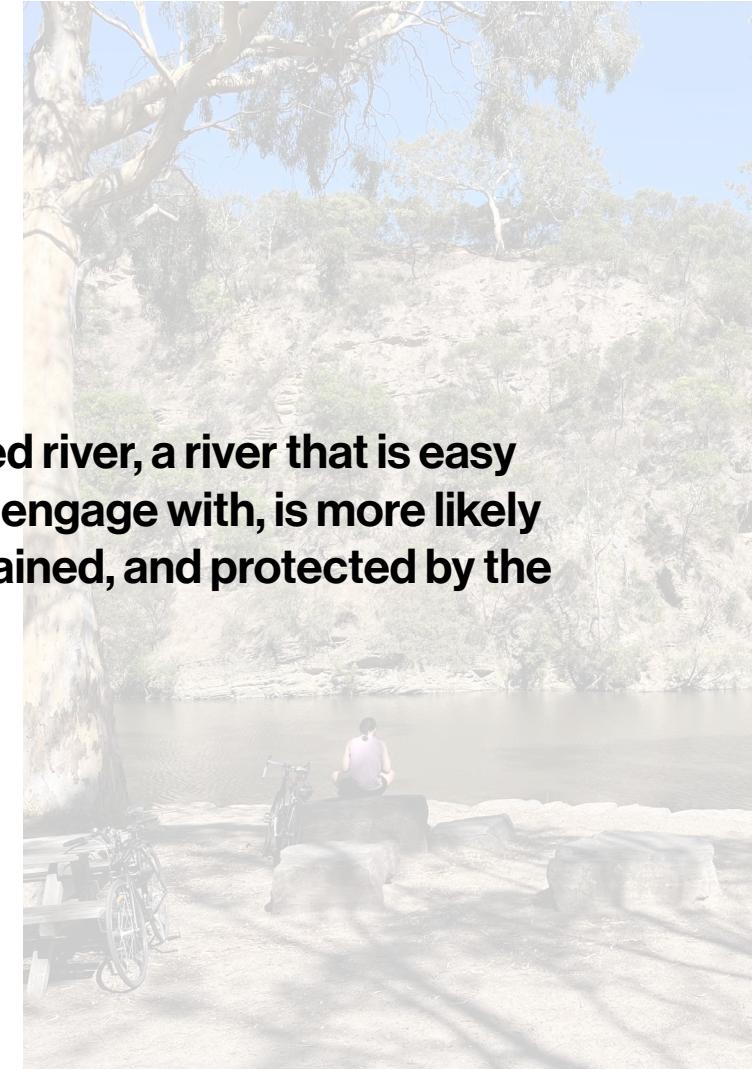
"I grew up in the country, always very close to nature. In the city, I feel like there are definitely not enough places close to nature. ... **I would love more places like this along the river.**"

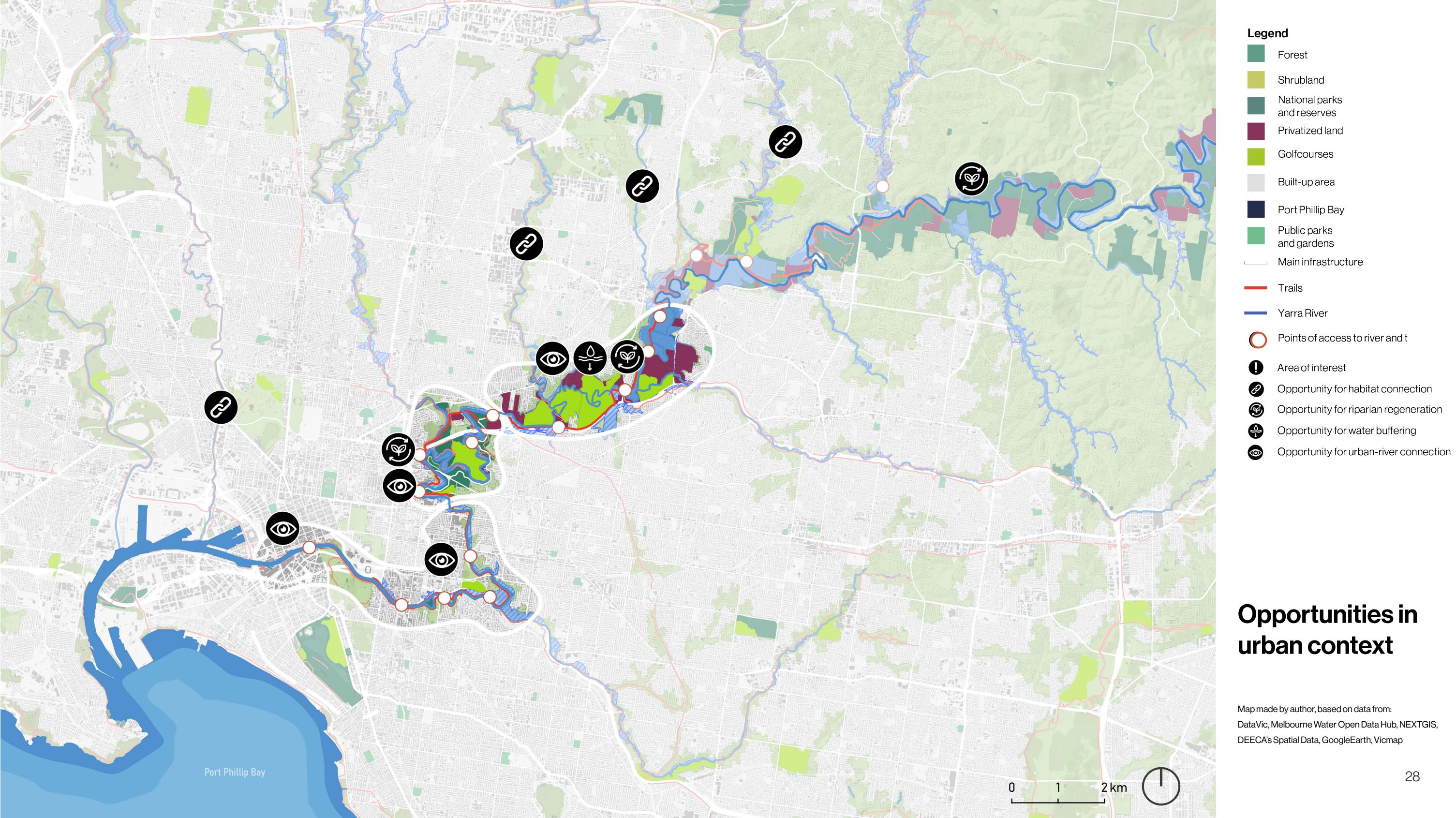
- Sarah (35)
Melbourne citizen



A socially connected river, a river that is easy to see, access, and engage with, is more likely to be valued, maintained, and protected by the public.

(Kondolf & Pinto, 2017)





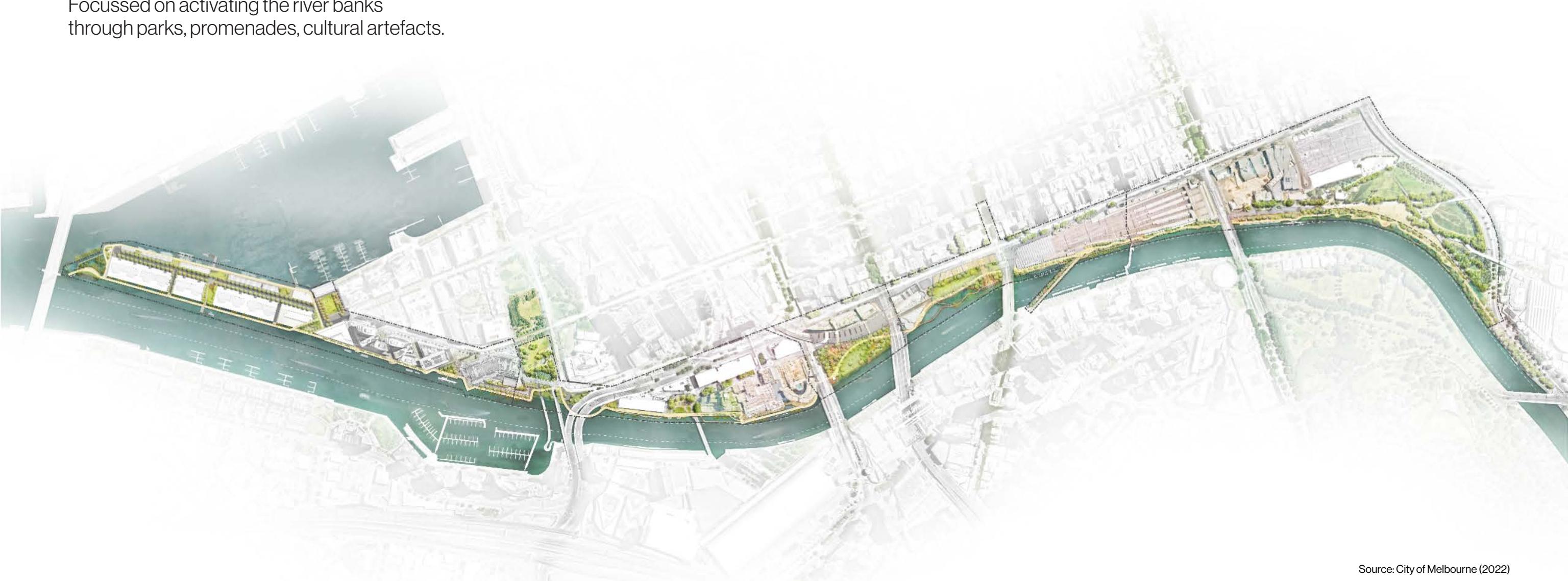
Opportunities in urban context

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap

Greenline project

A vision for the north bank of the Yarra River within the City of Melbourne.

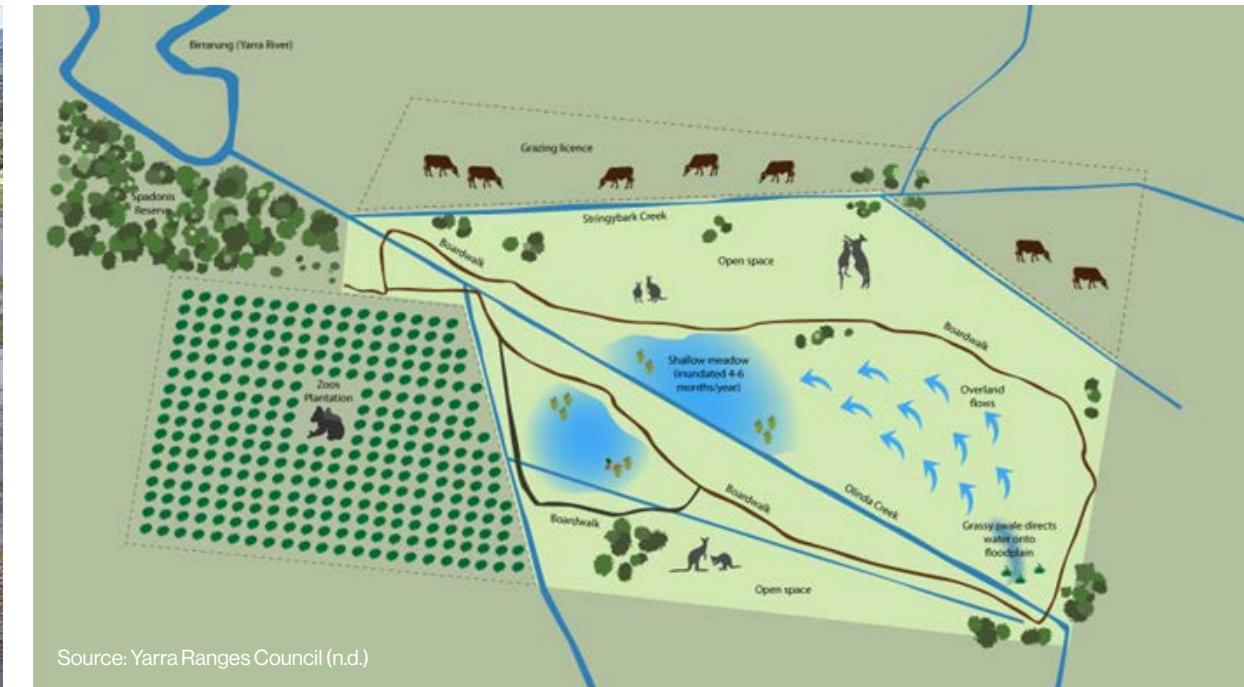
Focussed on activating the river banks through parks, promenades, cultural artefacts.



Source: City of Melbourne (2022)

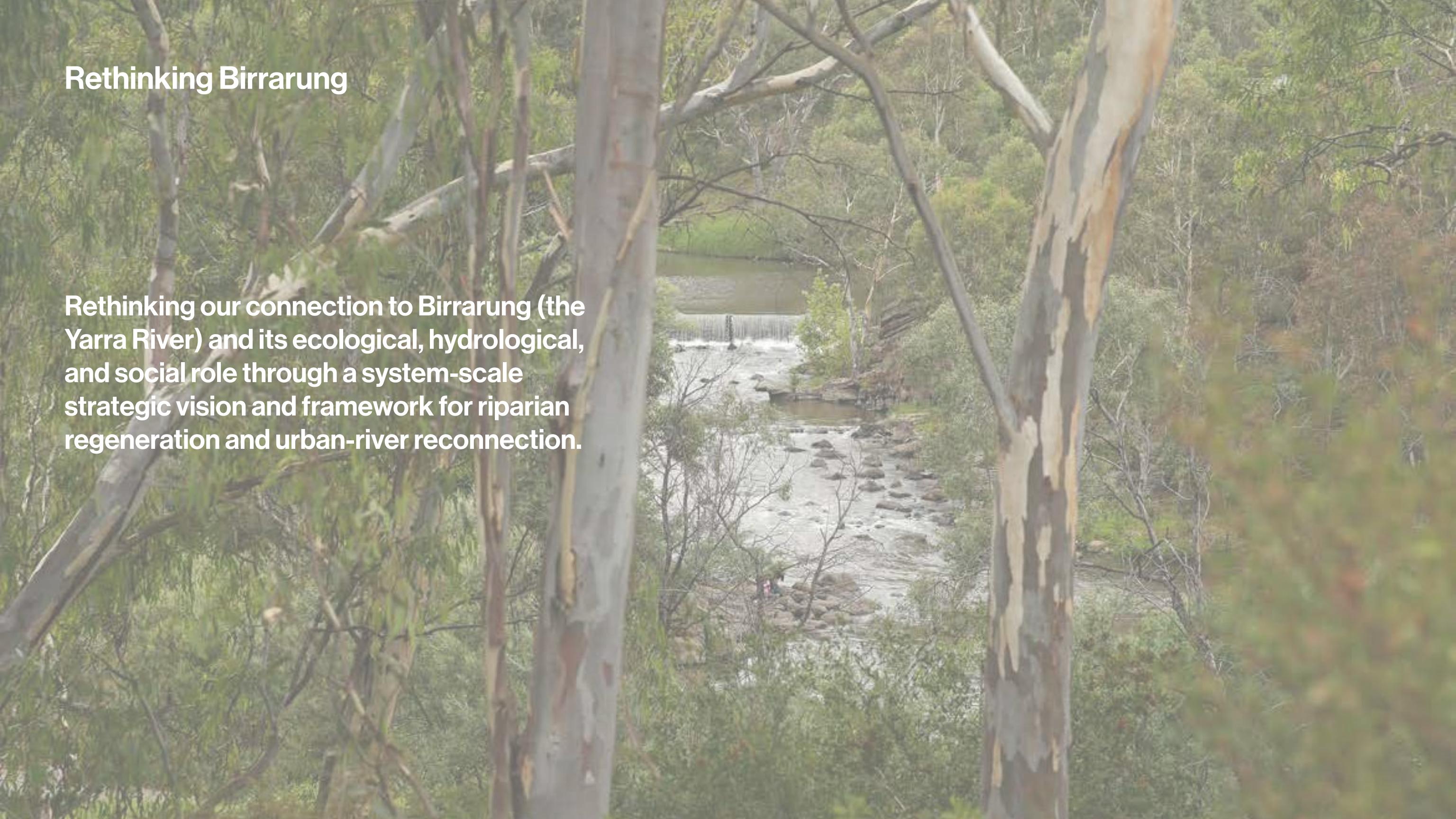
Billabong & Floodplain restoration

Floodplain restoration at Olinda Creek,
rural Victoria



Rethinking Birrarung

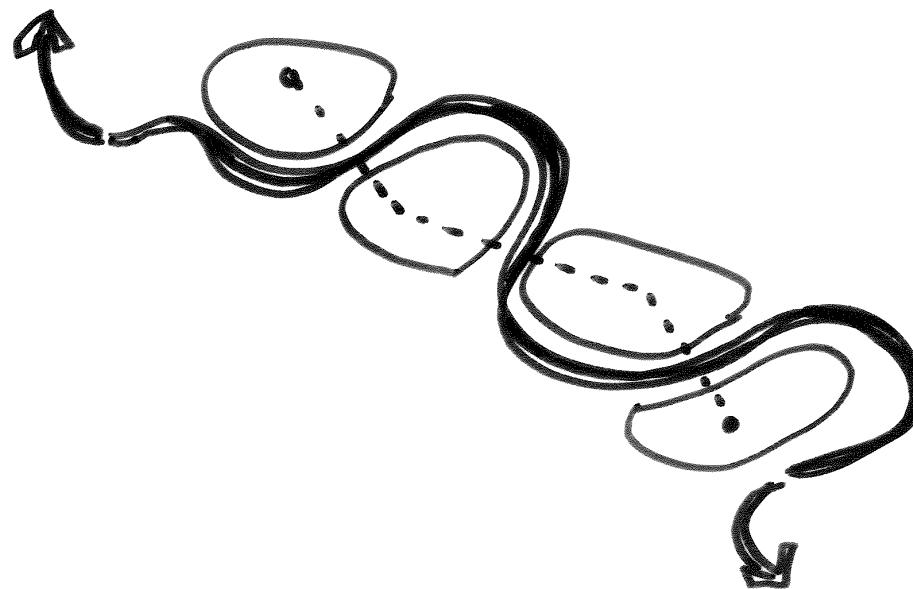
Rethinking our connection to Birrarung (the Yarra River) and its ecological, hydrological, and social role through a system-scale strategic vision and framework for riparian regeneration and urban-river reconnection.



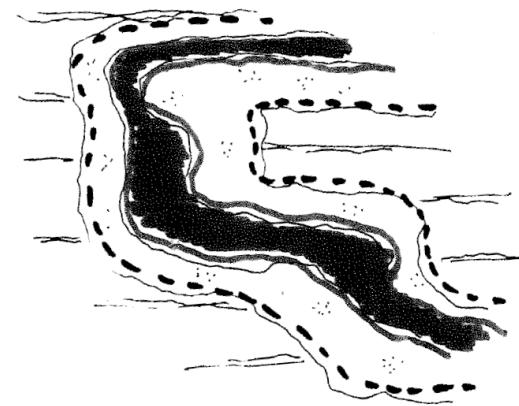
Landscape infrastructure

(Nijhuis & Jaussin, 2015)

River as a linear system of connected and
interdependent spaces



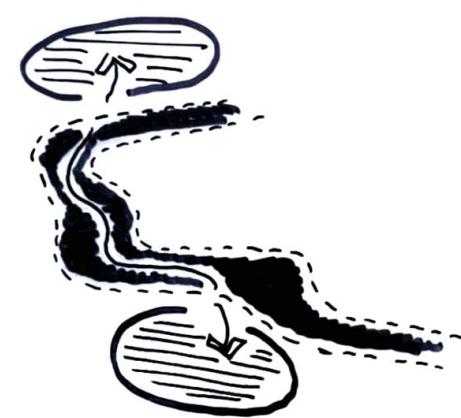
Strategy 1



Riparian regeneration

Reclaiming the riparian zone and creating the conditions for riparian regeneration

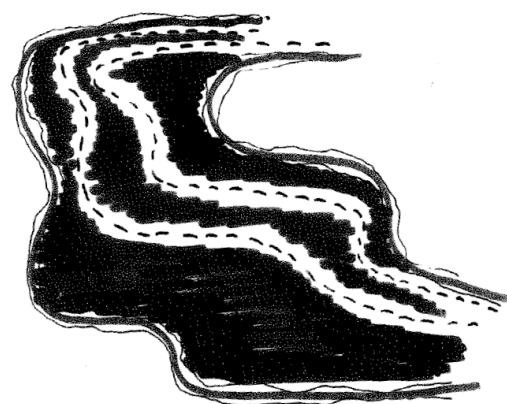
Strategy 2



(Re)connecting habitats

Connecting the riparian zone to surrounding parks and reserves

Strategy 3



Facilitate water dynamics and retention

Increasing the riparian flooding frequency and water retention capacity

Strategy 4

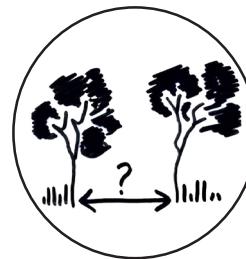


Improve visual and physical connection to river

Creating a visually and physically engaging riparian landscape & river

Design Principles

Riparian regeneration



Target species define (spatial) conditions



Revegetation pattern based on existing vegetation



Hybrid land-use forms on riparian zone

(Re)connecting habitats



Continuous vegetation type and structure



Creek corridors ecological activation

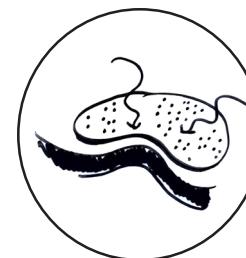


Alternative habitat connectivity routes

Water dynamics and retention



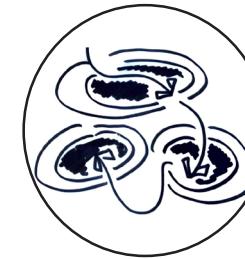
Excavate floodplain and billabong inlets



Direct stormwater runoff onto the floodplain



Reduce river bank gradient



Use the topography for passive flow on floodplain

Visual and physical connection to river



Sightlines and trails encourage slow recreation



Access to riverfront through slow banks



Activated banks through architectural artifacts



Activating public space on riparian zone



Materiality as a tool to indicate transitions

Target species



River Red Gum
Canopy

Bi-annual submersion



Growling Grass Frog
Billabongs

Aquatic vegetation and semi-permanent wetlands



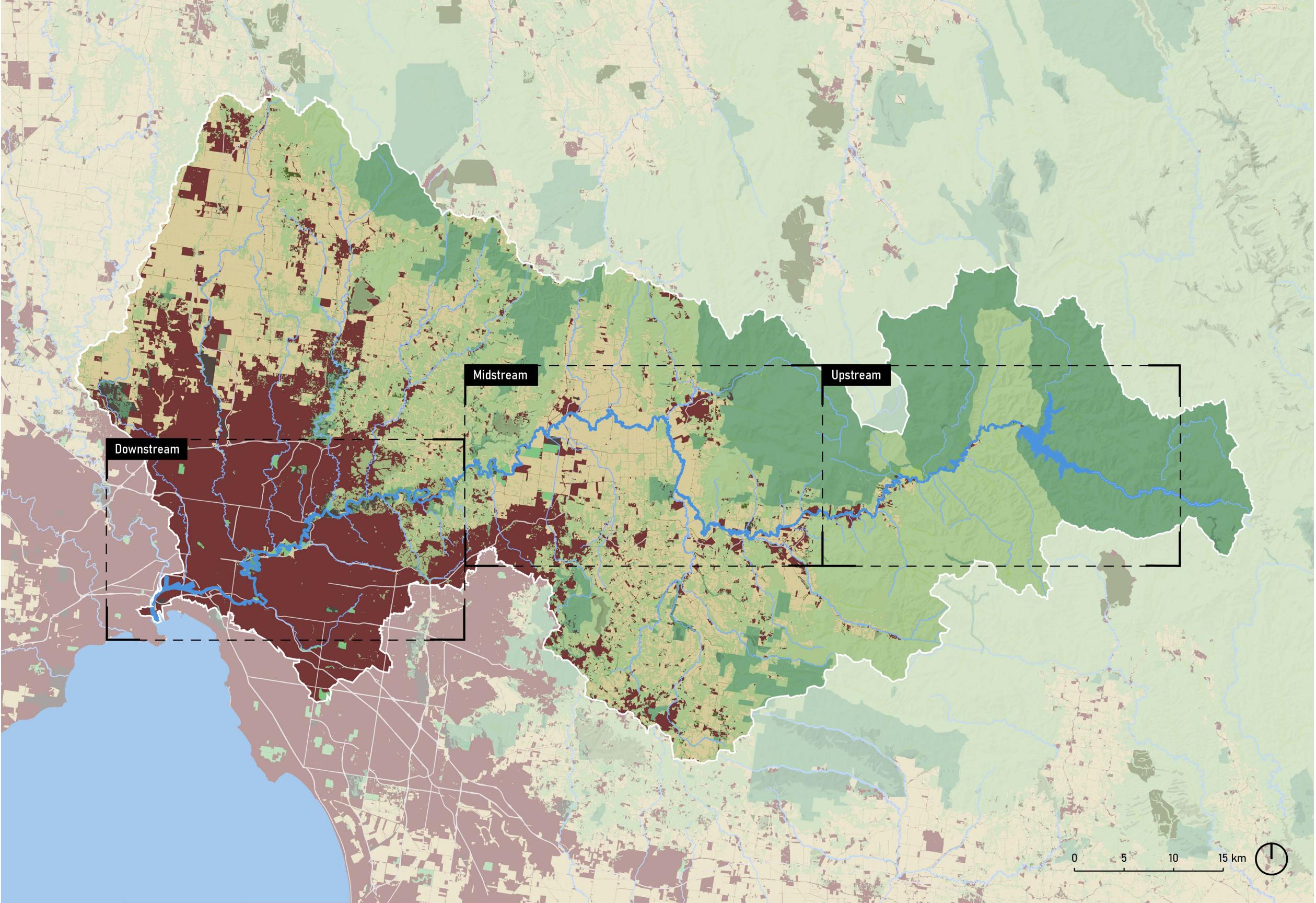
Platypus
River + Riverbanks

Dense riparian vegetation with stable banks



Superb Fairy-wren
Understorey

Dense understorey vegetation

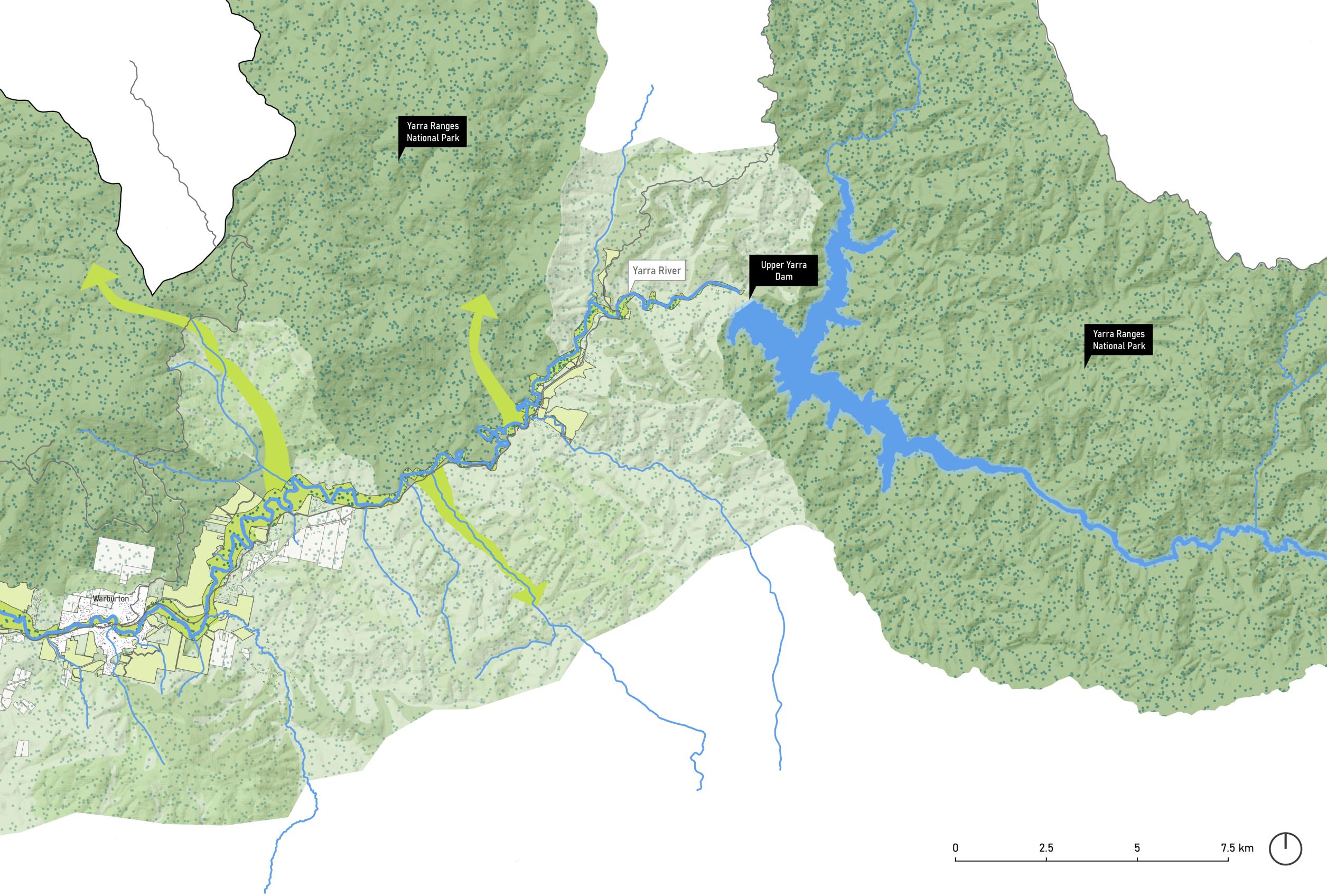


Legend

- Urban zone
- Forested land
- Parks and Reserves
- Agricultural land
- Yarra River
- Creeks

Three stretches of the river

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



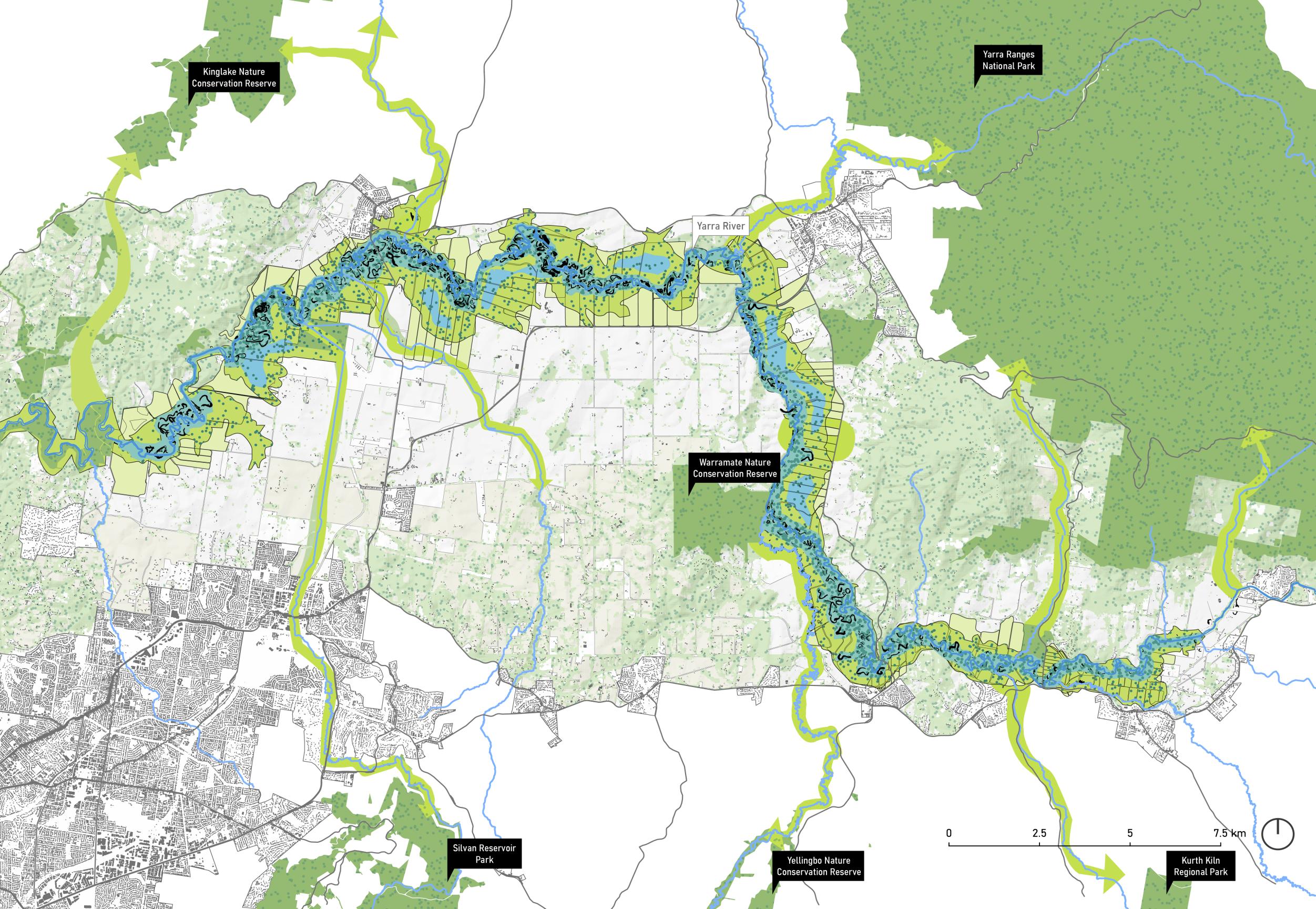
Legend

Strategies

- Riparian regeneration
- (Re)connecting habitats
- Floodplain water retention

Context

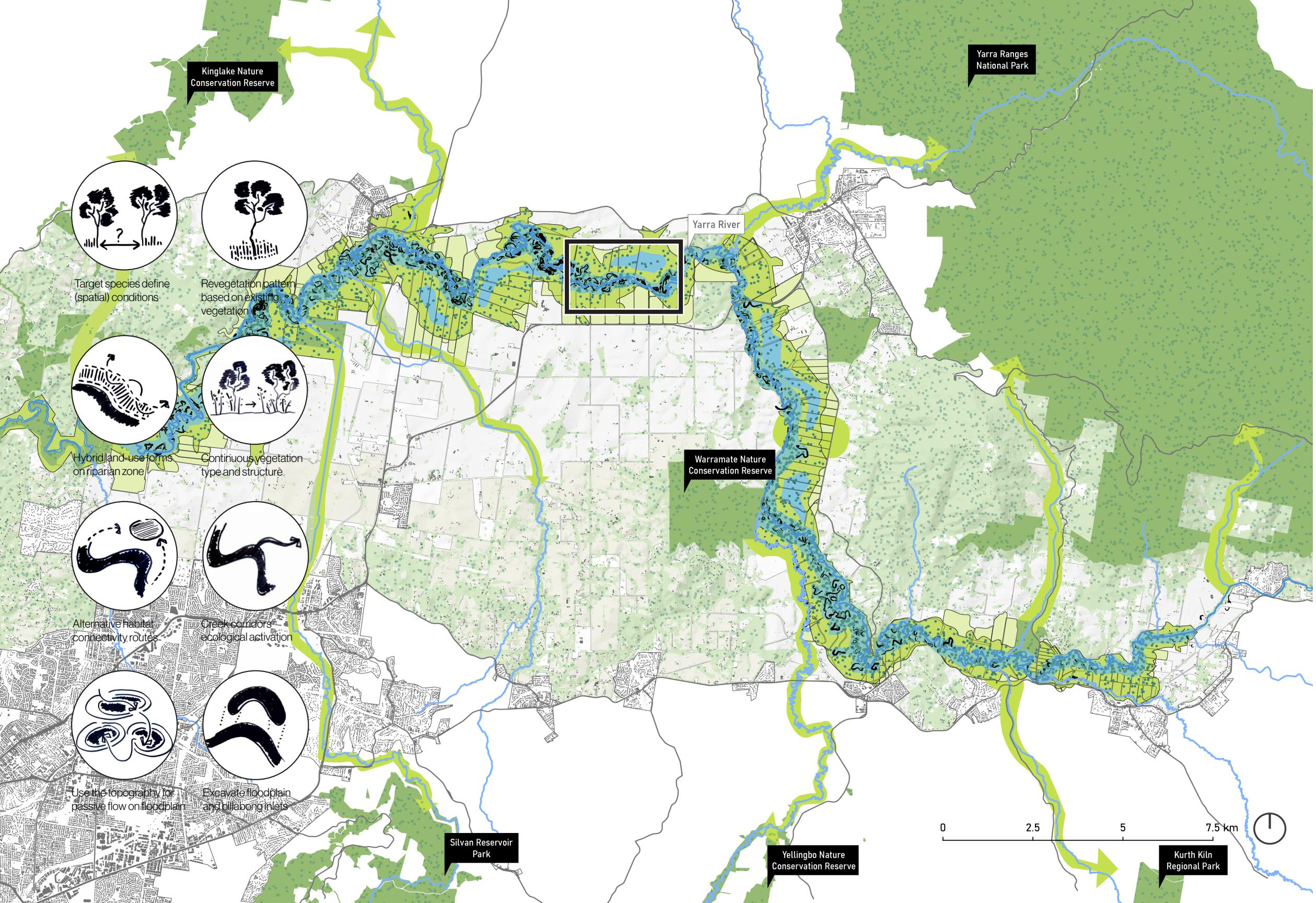
- Yarra River
- Creeks
- Forested land
- Parks and Reserves
- Agriculture
- Golfcourses
- Main infrastructure



Legend	
Strategies	
Riparian regeneration	
(Re)connecting habitats	
Floodplain water retention	
Context	
Yarra River	
Creeks	
Forested land	
Parks and Reserves	
Agriculture	
Golfcourses	
Main infrastructure	

Midstream

Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap



Legend	
Strategies	
	Riparian regeneration
	(Re)connecting habitats
	Floodplain water retention
Context	
	Yarra River
	Creeks
	Forested land
	Parks and Reserves
	Agriculture
	Golfcourses
	Main infrastructure

Midstream

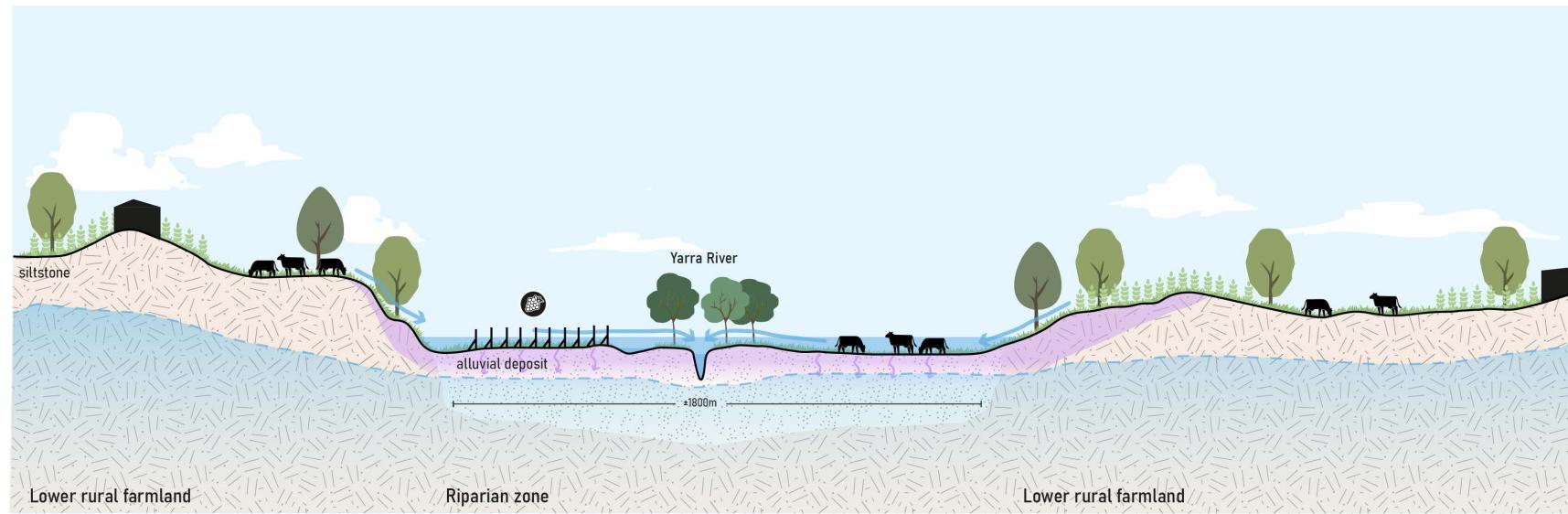
Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap

Rural riparian zone / Floodplain

Current rural riparian zone

Intensive agriculture causes

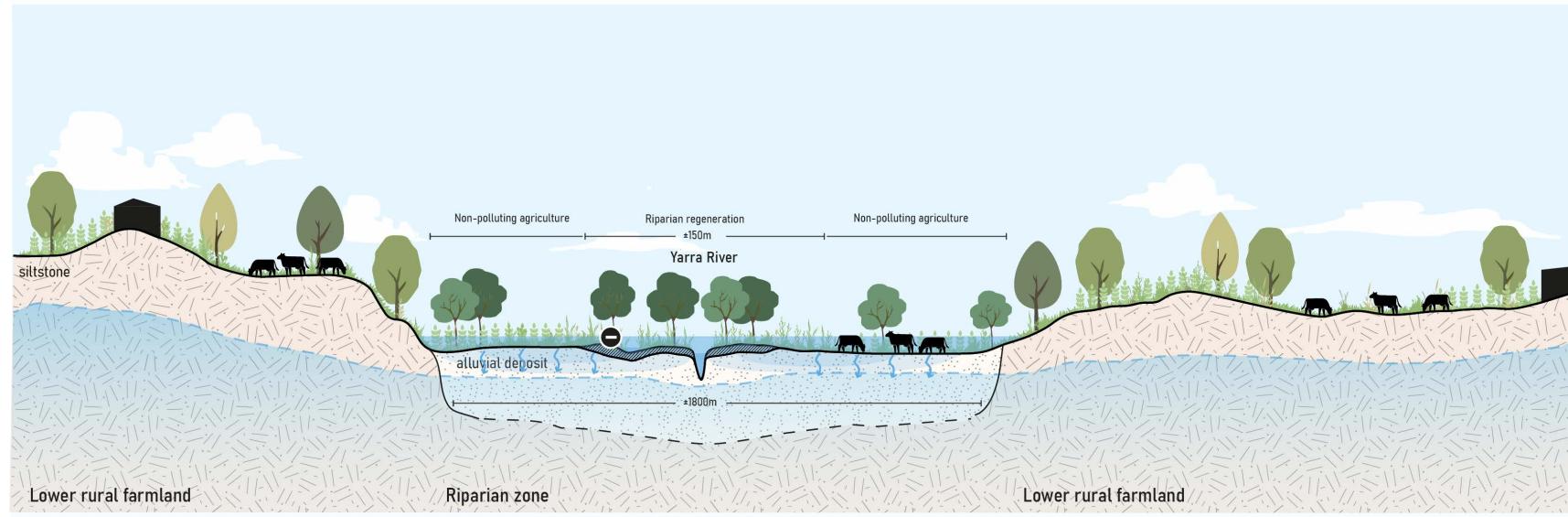
- quick water runoff
- water pollution
- fragments ecological corridor

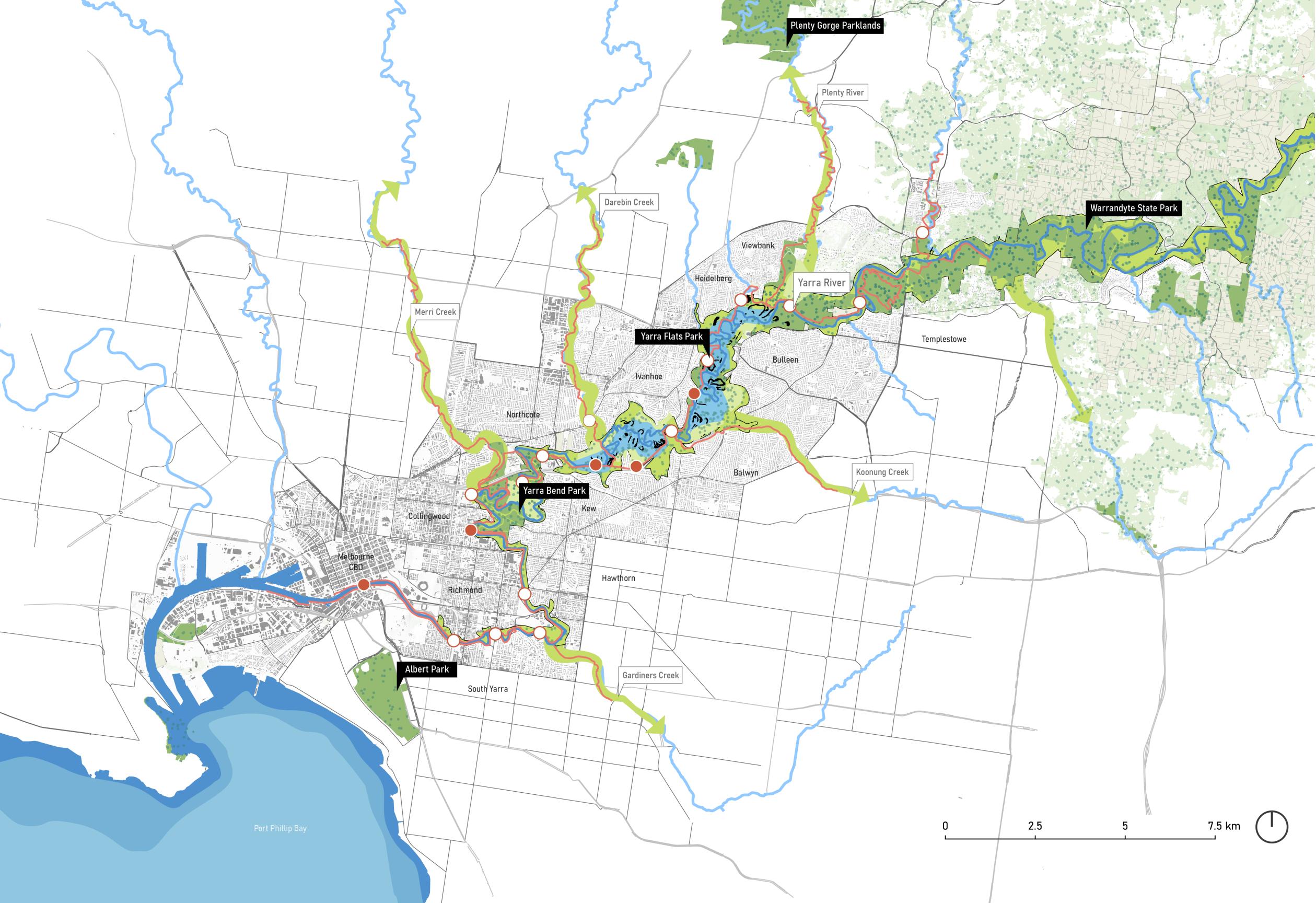


Proposed rural riparian zone

150m wide riparian buffer with adjacent non-intensive agricultural land

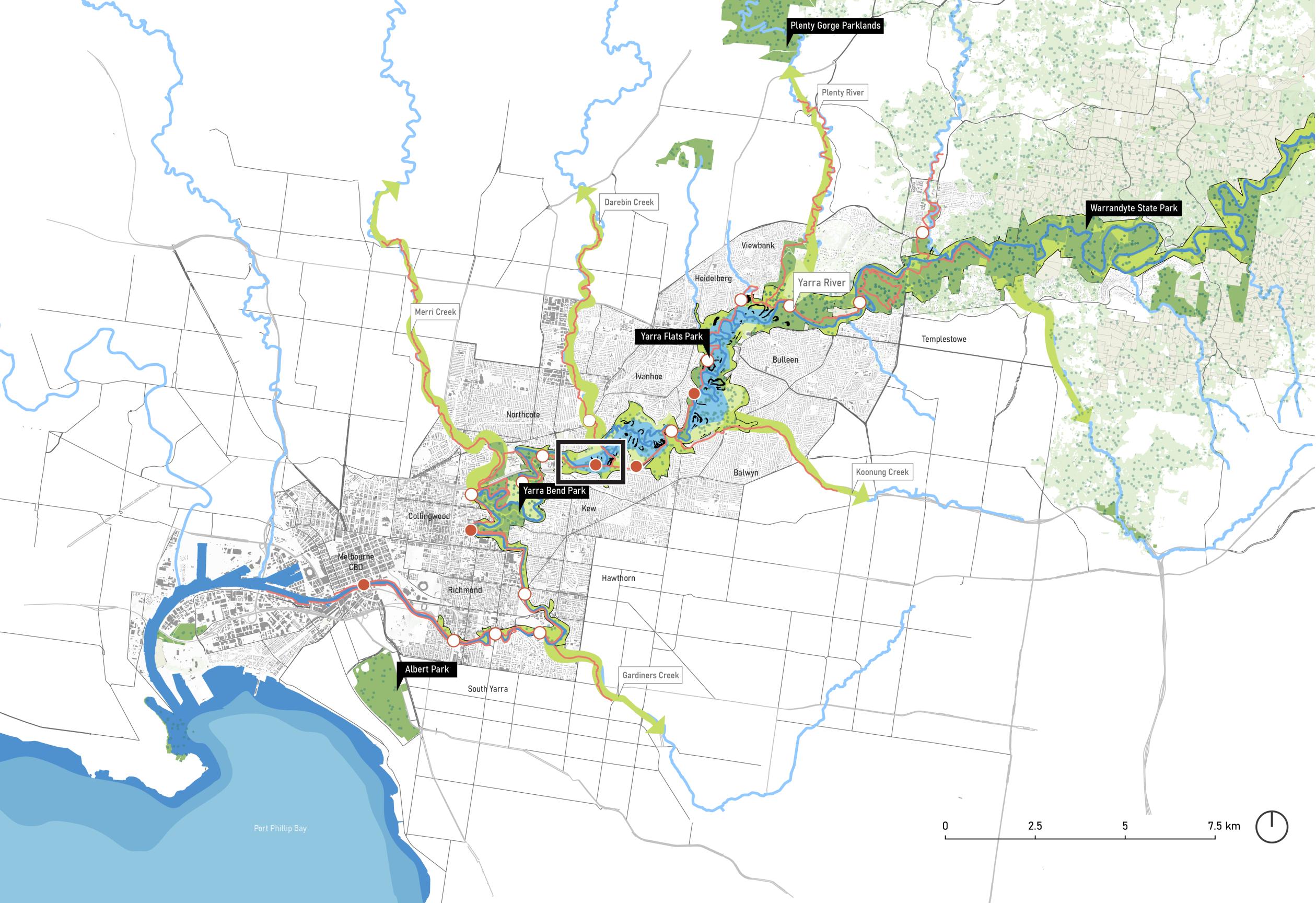
- improved water retention
- riparian habitat regeneration





Downstream

Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap



Downstream

Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap

Urban floodplain



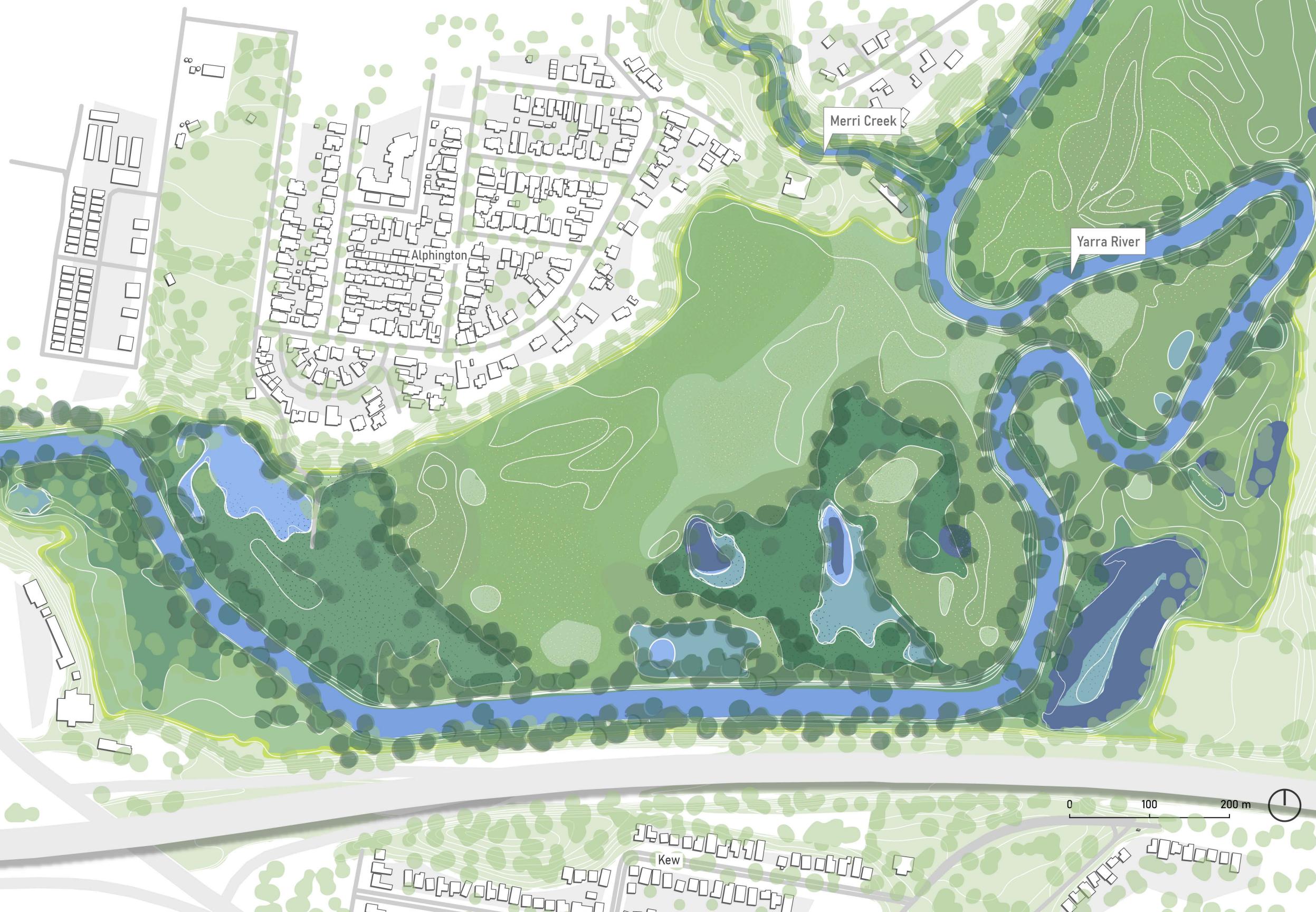
Golf courses on the downstream
floodplain flood during high river levels





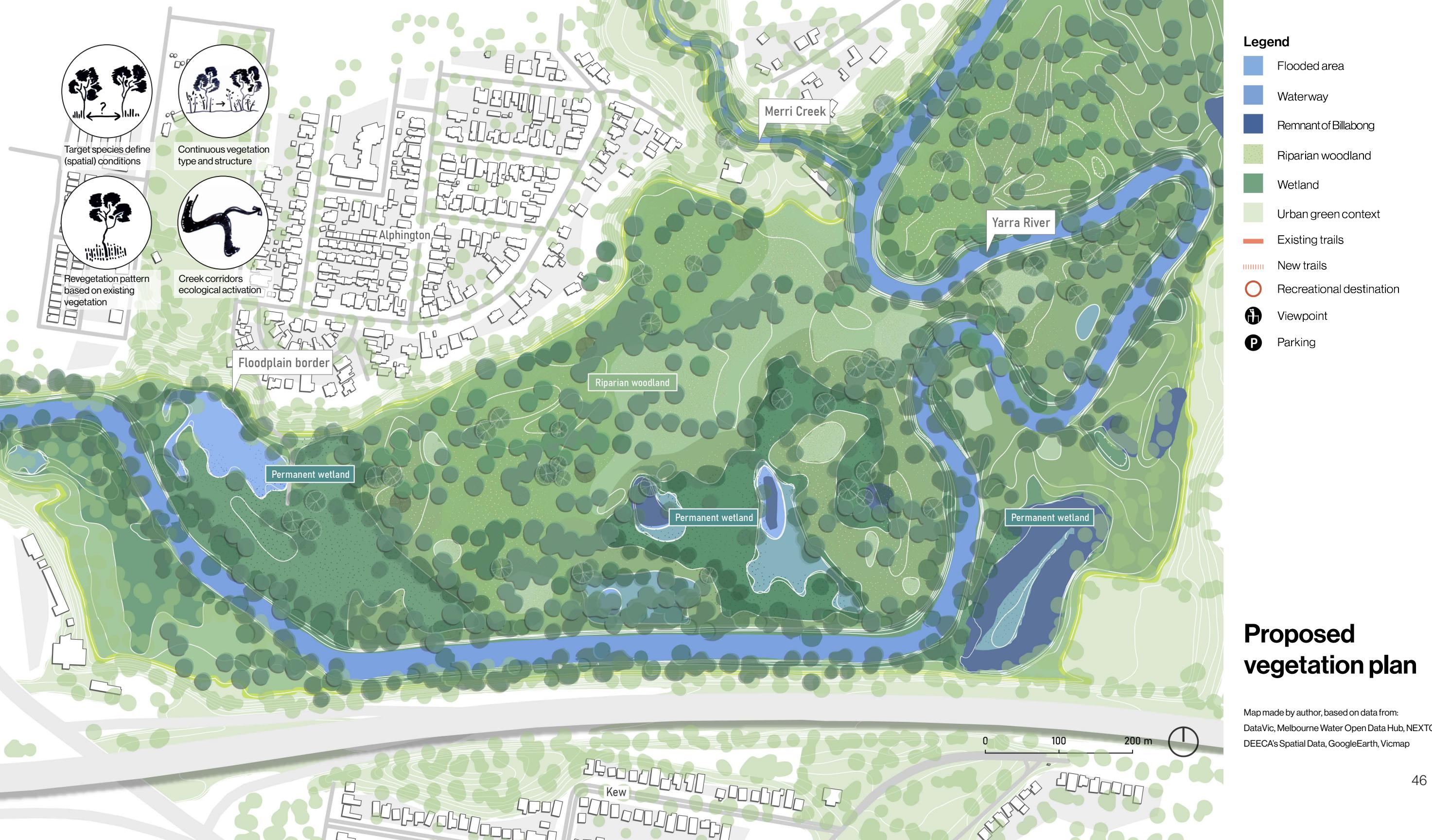
Downstream urban floodplain

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



River red gums bordering streams

Map made by author, based on data from:
DataVic, Melbourne Water Open Data Hub, NEXTGIS,
DEECA's Spatial Data, GoogleEarth, Vicmap



Floodplain trails

Gravel trails and boardwalks through the floodplain

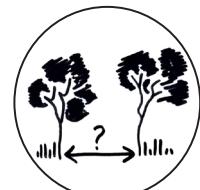
// Local basalt stone artefacts to suggest interaction with landscape

Planting around existing vegetation

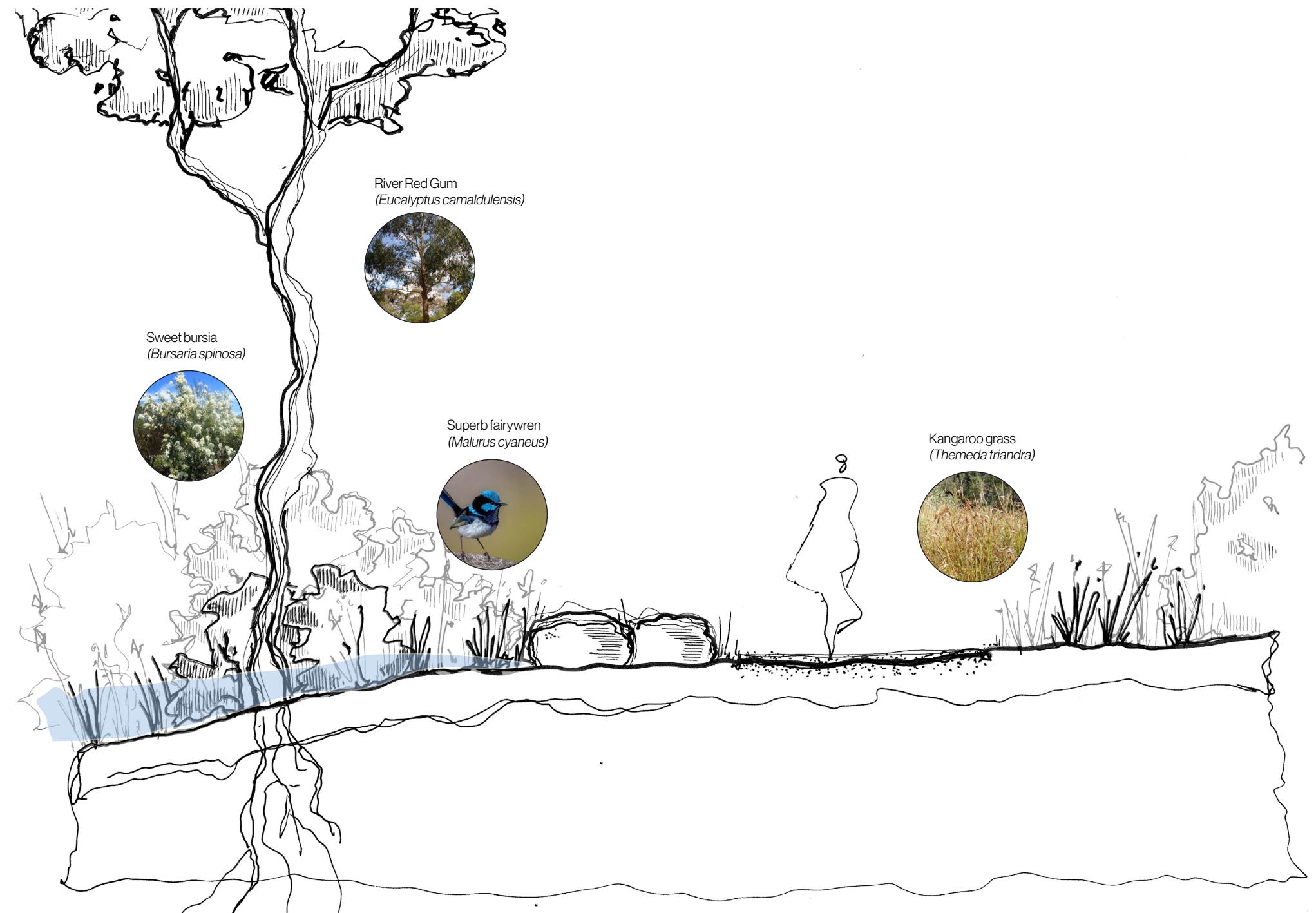
// Fast growing pioneer species



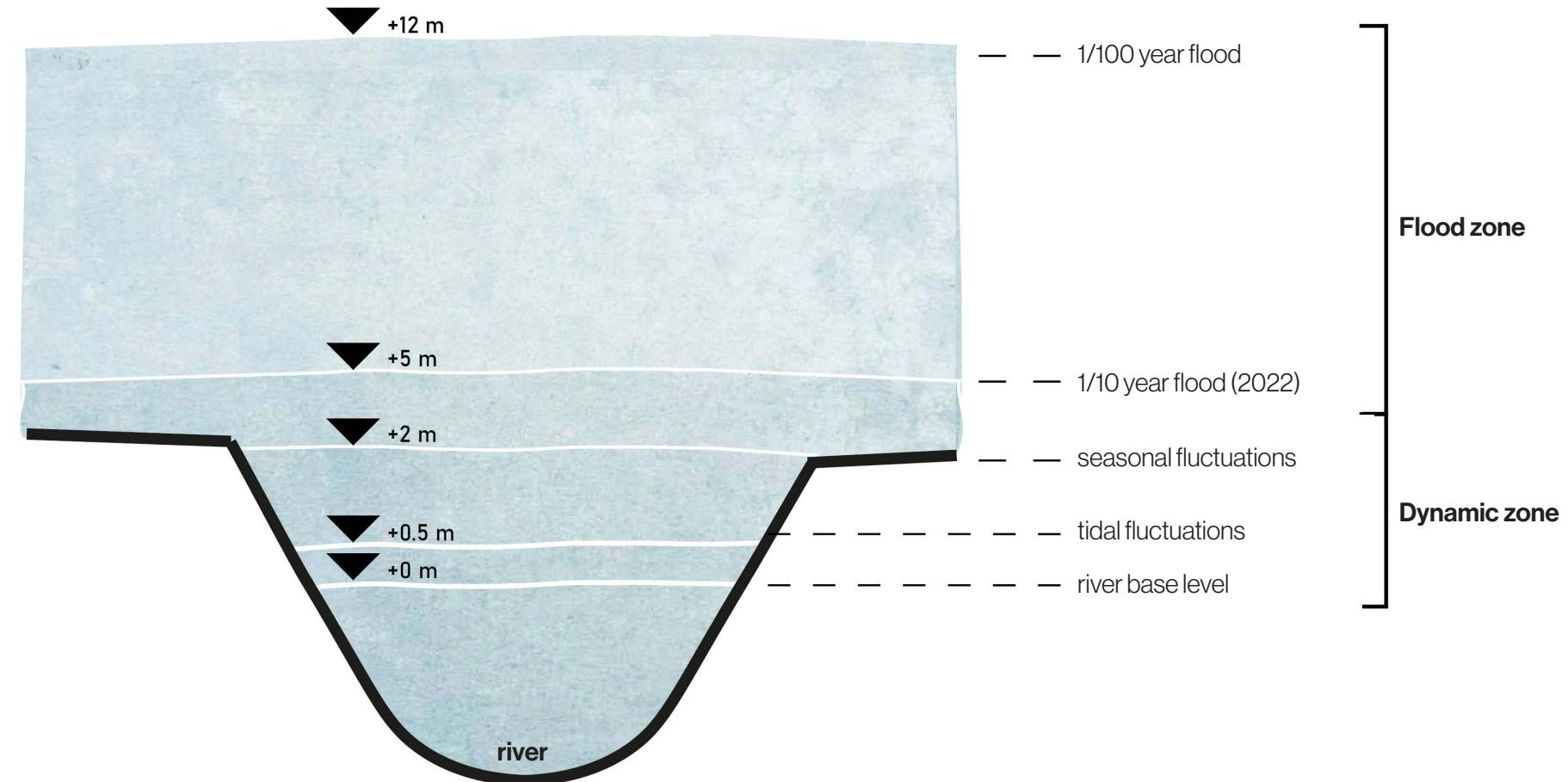
Revegetation pattern
based on existing
vegetation



Target species
define (spatial)
conditions



River dynamics



Flooding in the city





Legend	
Flooded area	
Waterway	
Remnant of Billabong	
Riparian woodland	
Wetland	
Urban green context	
Existing trails	
New trails	
Recreational destination	
Viewpoint	
Parking	

Proposed trails & programming

Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap









Dynamic wetland

Current golf course wetland

// little to no inundation events

// no public access due to surrounding golf courses



Source: (Friends of Yarra Flats Park, n.d.)

Dynamic wetland

Proposed golf course wetland

// improved vegetation gradient

// improved access and experience
of wetlands through boardwalks and
platforms



River Red Gum
(*Eucalyptus camaldulensis*)



Superb fairywren
(*Malurus cyaneus*)



Kangaroo grass
(*Themeda triandra*)

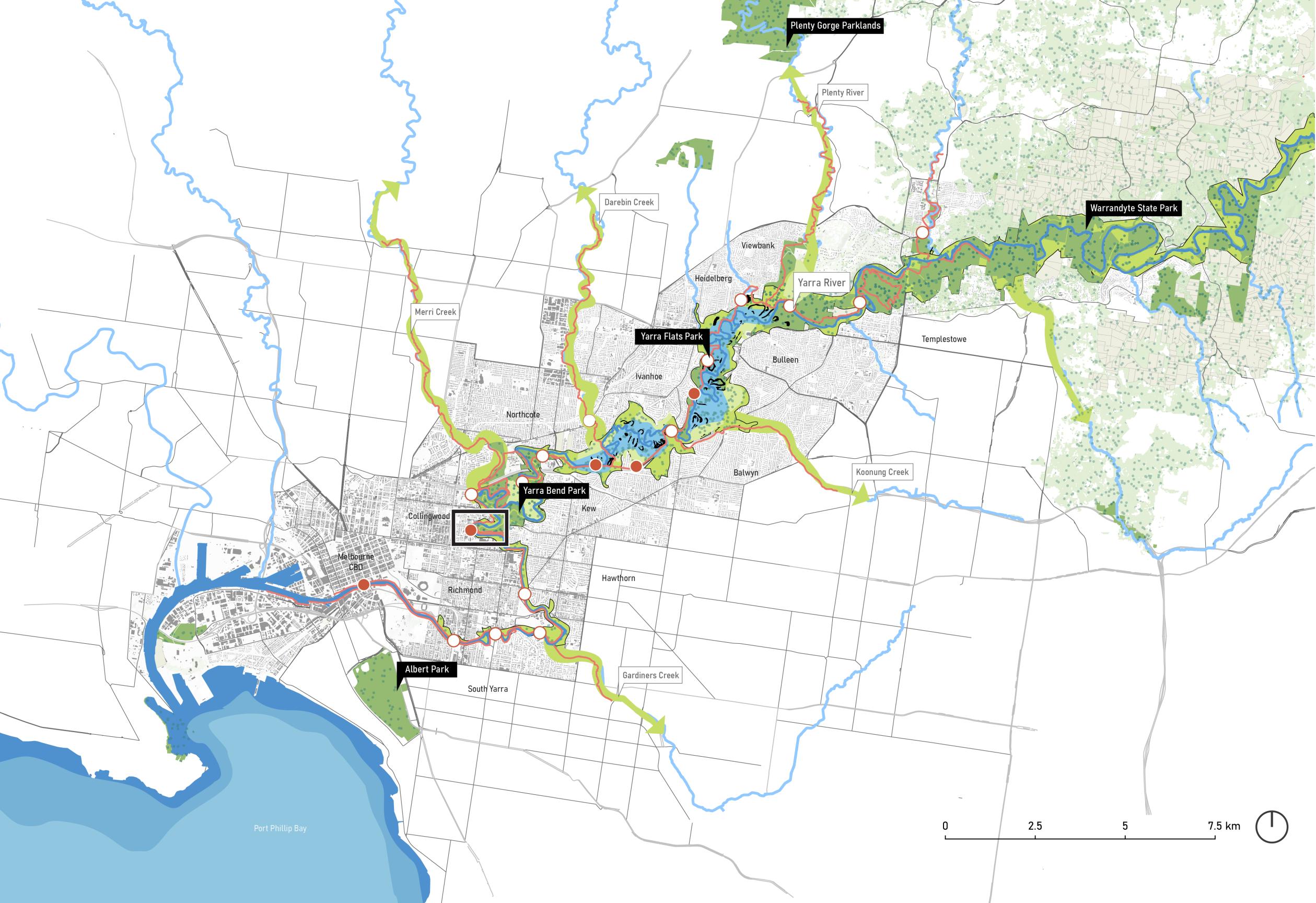


Growling Grass Frog
(*Ritoria raniformis*)



Water Ribbon
(*Triglochin procerum*)





Downstream

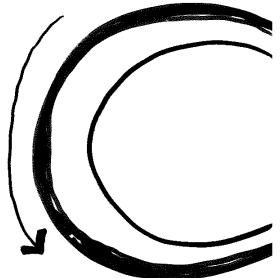
Map made by author, based on data from:
 DataVic, Melbourne Water Open Data Hub, NEXTGIS,
 DEECA's Spatial Data, GoogleEarth, Vicmap

Yarra Bend Park

Current lower bank

// poor accessibility

// no interaction with river

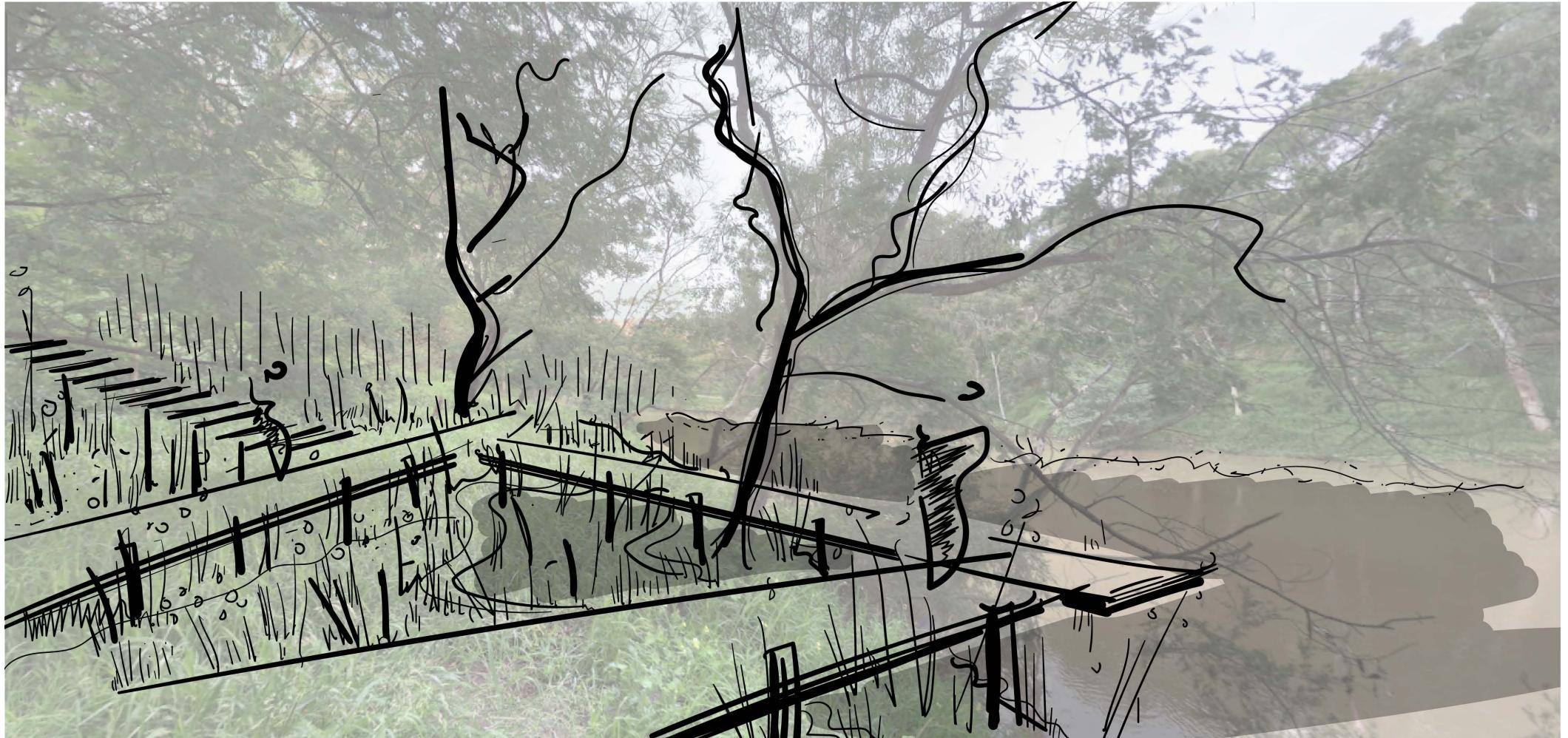


Yarra Bend Park

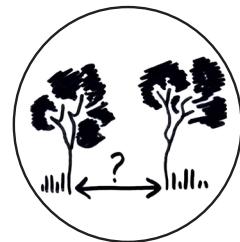
Proposed lower bank

// improved access from upper to lower bank

// routing with boardwalks for experiencing river dynamics and riparian vegetation



Yarra Bend Park



Target species define (spatial) conditions



Sightlines and trails encourage slow recreation



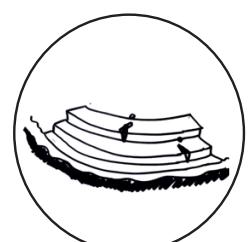
Revegetation pattern based on existing vegetation



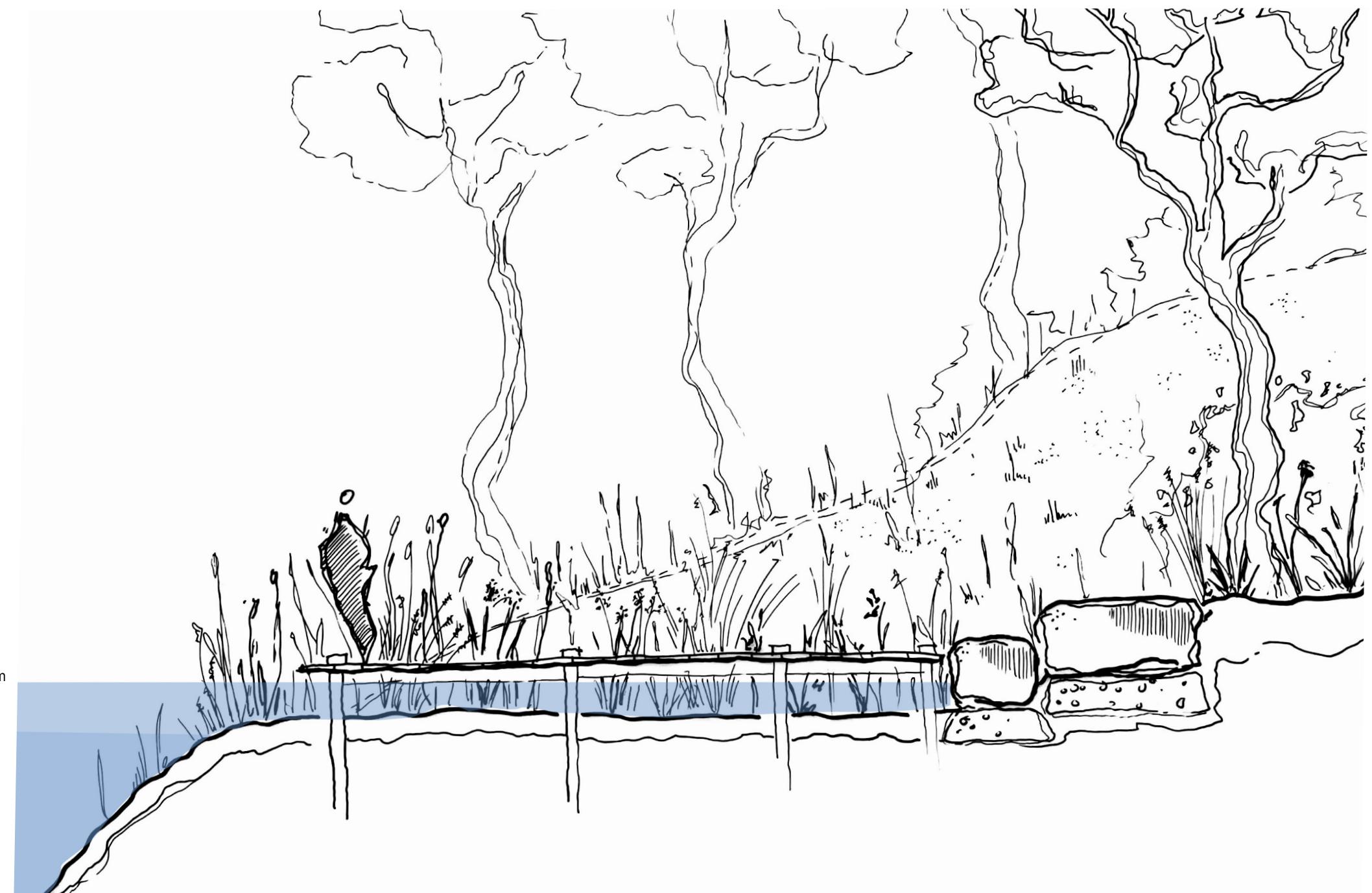
Activating public space on riparian zone



Materiality as a tool to indicate transitions

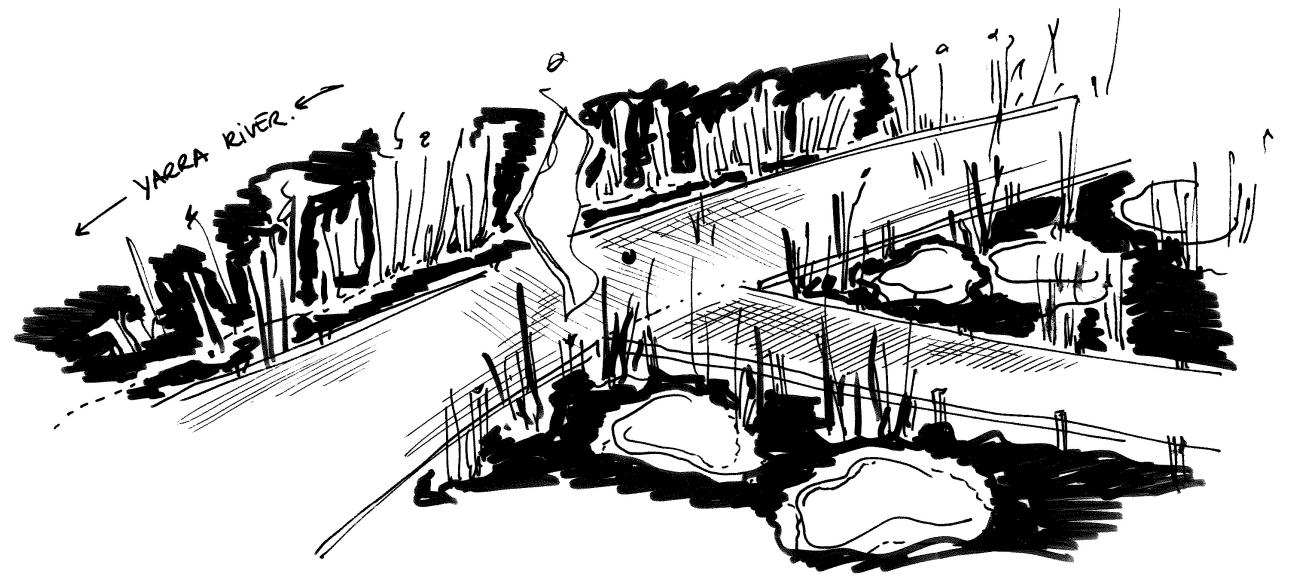


Activated banks through architectural artifacts



Limitations & Recommendations

- // Research Through Design
- // Simplification of the system
- // Viability and transferability to other river systems
- // Integration into Melbourne's green network
- // Indigenous values and knowledge

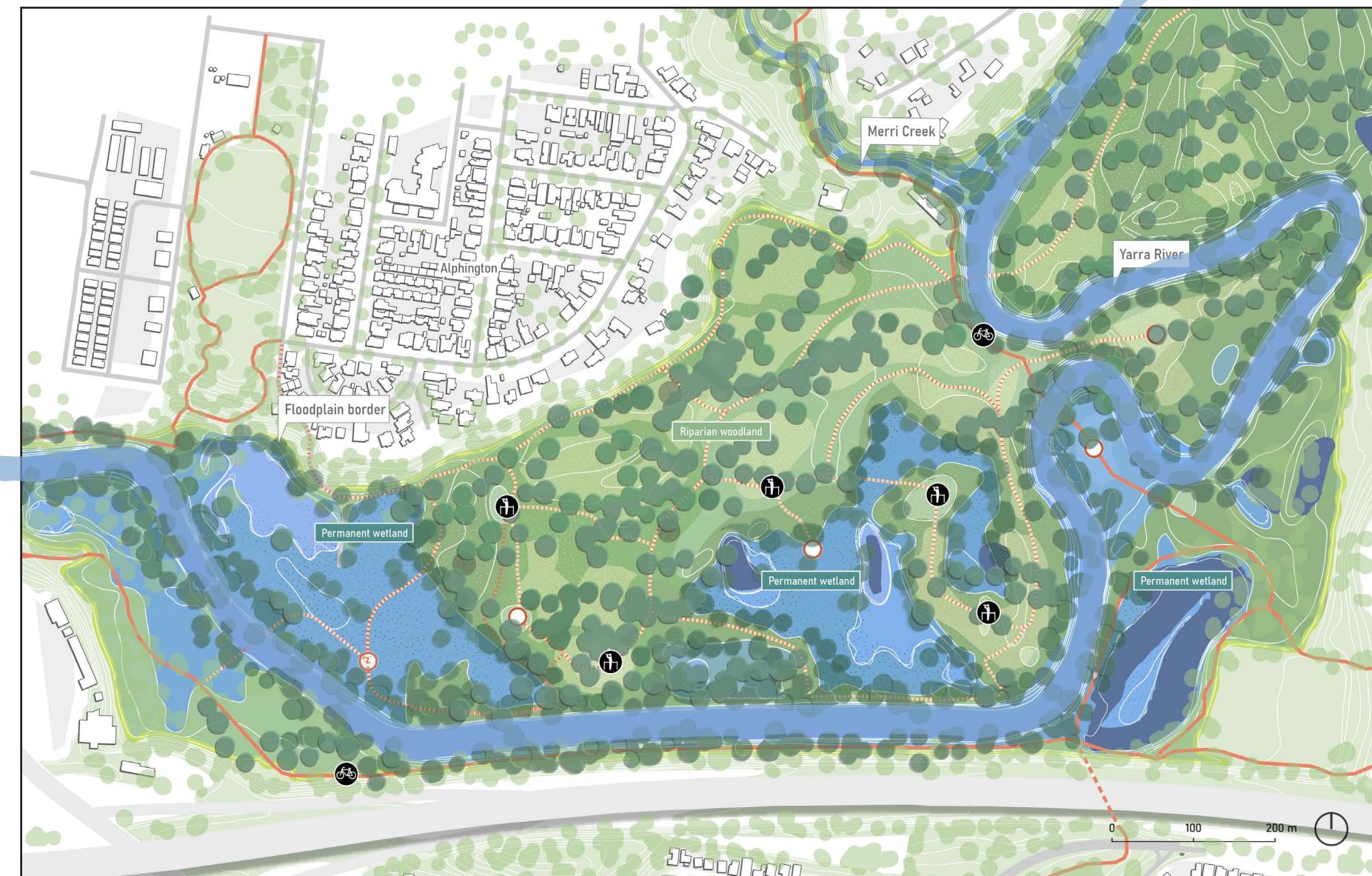


Conclusion



Rethinking Birrarung

Regenerating a dynamic
Yarra River corridor



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MSc Architecture, Urbanism and Building Sciences
Track: Landscape Architecture

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EFL STICHTING



STICHTING P.H.BOS
ter bevordering van de landschapsarchitectuur

Rethinking Birrarung

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Cool-burning as a maintenance principle

