AECOM

NORTH MELBOURNE, WEST MELBOURNE AND PARKVILLE

ACTIVE TRANSPORT INVESTIGATION

Prepared for Department of Transport
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North Melbourne, West Melbourne and Parkville Active Transport Investigation

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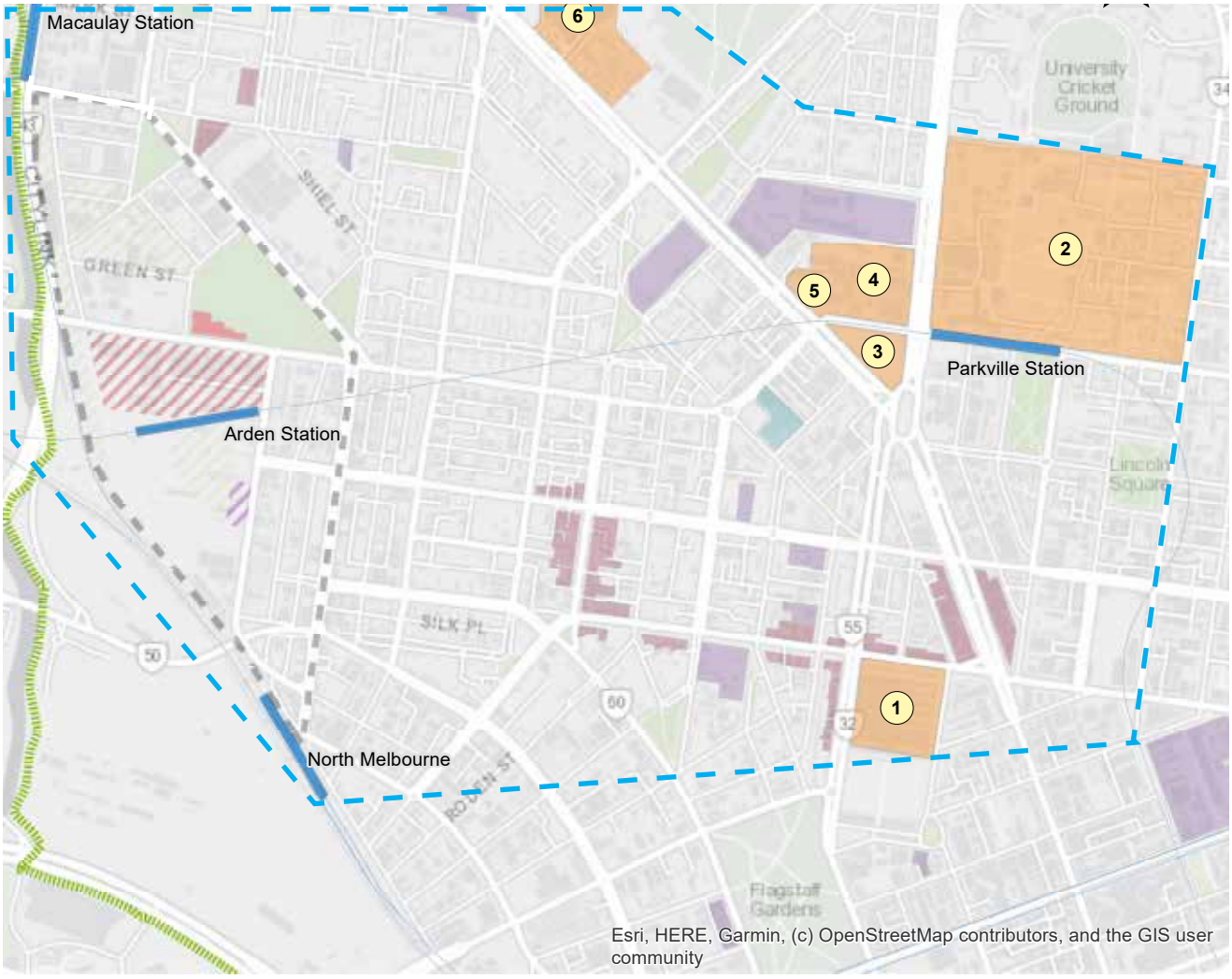
INTRODUCTION + CONTEXT



KEY

1. Queen Victoria Market
2. University of Melbourne
3. Victorian Comprehensive Cancer Centre
4. Royal Melbourne Hospital
5. Royal Women's Hospital
6. Royal Children's Hospital

Capital City Trail

Metro Train stations

Points of interest

- art centre
- recreational centre
- education complex
- park
- activity centre

Arden points of interest

- Arden Precinct boundary
- Innovation Cluster
- proposed school
- proposed open space

1. Introduction and context

The North Melbourne, West Melbourne and Parkville Active Transport Investigation strives to guide the delivery of two high-quality walking corridors and two high-quality cycling corridors between key attractors and nodes within the study area.

Overview

The area of northern Melbourne stretching from Arden to Parkville is poised to become an increasingly important axis of activity, particularly after the opening of Metro Tunnel in 2025. The two high-intensity clusters at either end will be linked by synergies and common uses owing especially to their health and educational facilities. In effect this area could be viewed as an integrated campus, where demand for travel between the two will be high, and where the space in between will house many of the workers and students who will travel to one or both of these clusters on a daily basis.

As such, the walking and cycling environment along key routes connecting these precincts will require a high level of prioritisation to those on foot or bicycle. This will help advance the perception of Arden and Parkville as an integrated specialised destination, and support strong connectivity with public transport facilities both within and surrounding the study area.

Improvements on the public realm and wayfinding are also crucial in encouraging walking and cycling within the precincts.

Project purpose

The purpose of this Active Transport Investigation is to:

- Understand the existing conditions and key constraints and opportunities within the study area
- Identify the two highest priority walking and cycling corridors
- Identify the improvements required on each corridor to provide a high quality pedestrian and cycling environment
- Consult with key stakeholders to achieve an optimal outcome.

Document structure

This report is organised into the following sections:

- **Introduction**
- **Document Review** highlighting key inputs, design guidance and previous studies relevant to this investigation
- **Existing Conditions** documenting the spatial arrangement of key trip origins and destinations within the study area, and their relationships with the walking and cycling networks
- **Priority Corridors** establishing the basis for selecting the two primary walking and cycling corridors for priority enhancement, including a comparative evaluation of multiple candidates
- **Recommendations** for the two priority corridors, including indicative layout, typical cross sections, and proposed sequencing of potential improvements.

> "Walking and cycling are central to a sustainable, safe transport system - and we are investing heavily in both Melbourne and regional Victoria". (Department of Transport, 2019)

02

DOCUMENT REVIEW

2. Document review

This investigation is based on state and local guidance documentation that is currently setting the aspirations for a high-quality active transport network and that is aligned with the future expectations of the study area. These documents include studies, plans and network analysis.

Strategies

Numerous strategies and plans have been developed to guide councils and stakeholders on their work towards achieving an improved urban environment and sustainable growth.

Precinct plans and studies consider the transport network and public realm as basic pillars of sustainable development. These precinct strategies provide a high-level description of the future aspirations for various transport modes and public spaces.

Specific active transport guidance is provided to understand the minimum and desirable requirements to achieve a connected, safe and direct cycling and walking network.

2.1 Victorian Bicycle Strategy 2018-28

The first goal of this State Government strategy emphasises the importance of investing in a safer, lower-stress, better-connected cycling network. This includes application of a Safe System approach (safe roads, safe vehicles, safe speeds, safe people), prioritisation of strategic cycling corridors for investment, and integration of cycling and public transport.

Victoria Bicycle Strategy 2018-28, Transport for Victoria

2.2 City of Melbourne Transport Strategy 2030

Transport Strategy 2030, 2019, City of Melbourne

The fundamental aims of the CoM Transport Strategy are to reallocate more space to people, increase walking, cycling and public transport use in the central city, and improve the experience of streets for people.

Urban design goals expressed in this strategy include:

- Providing for user comfort and amenity which includes tree canopy coverage, a generous public realm, and improvements to general safety and lighting to encourage pedestrian and cycling activity
- Accessibility for all types of users to promote environmental and health objectives, incorporating associated infrastructure including more visually attractive streets and traffic calming measures to give confidence and comfort to users
- A public realm that facilitates cultural, social and knowledge exchange and its associated economic activity, which can be achieved through improved network efficiency including reduction of travel times and strong inter-modal connections.

Outcome 1 – Safe streets for people

The CoM strategy prioritises space-efficient transport modes within the Hoddle Grid, by reallocating more space to people walking in the city and facilitating a permeable street network. Actions proposed to deliver this outcome include widening footpaths, converting parts of the 'Little' streets into pedestrian-priority zones, designing intersections to optimise the flow of pedestrians, installing formal and informal crossings to address gaps in the walking network, and applying a maximum speed limit of 40 km/h on local roads across inner Melbourne.

Intended improvements for streets and intersections include:

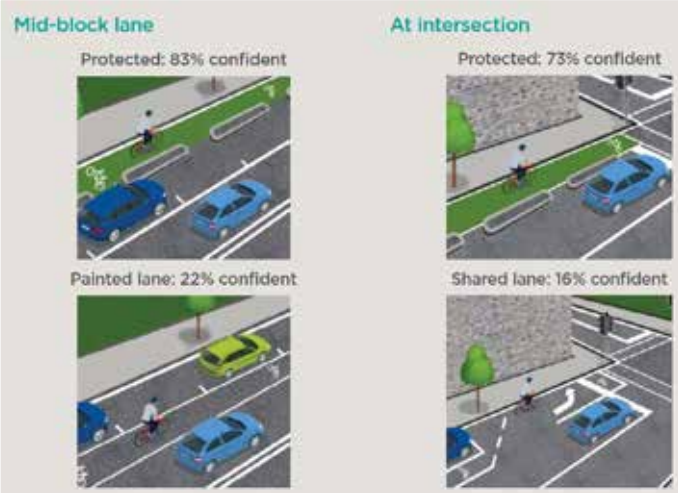
- reallocating traffic lanes to pedestrian space, including at intersections
- reducing crossing distances
- narrowing traffic lanes and introducing traffic calming
- removing kerbs where possible to create level streets
- reallocating on-street parking to people space
- converting some streets into pedestrian-priority zones
- reducing space allocated to car traffic and car parking
- converting roundabouts to conventional intersections.

Outcome 2 – Safe streets for cycling

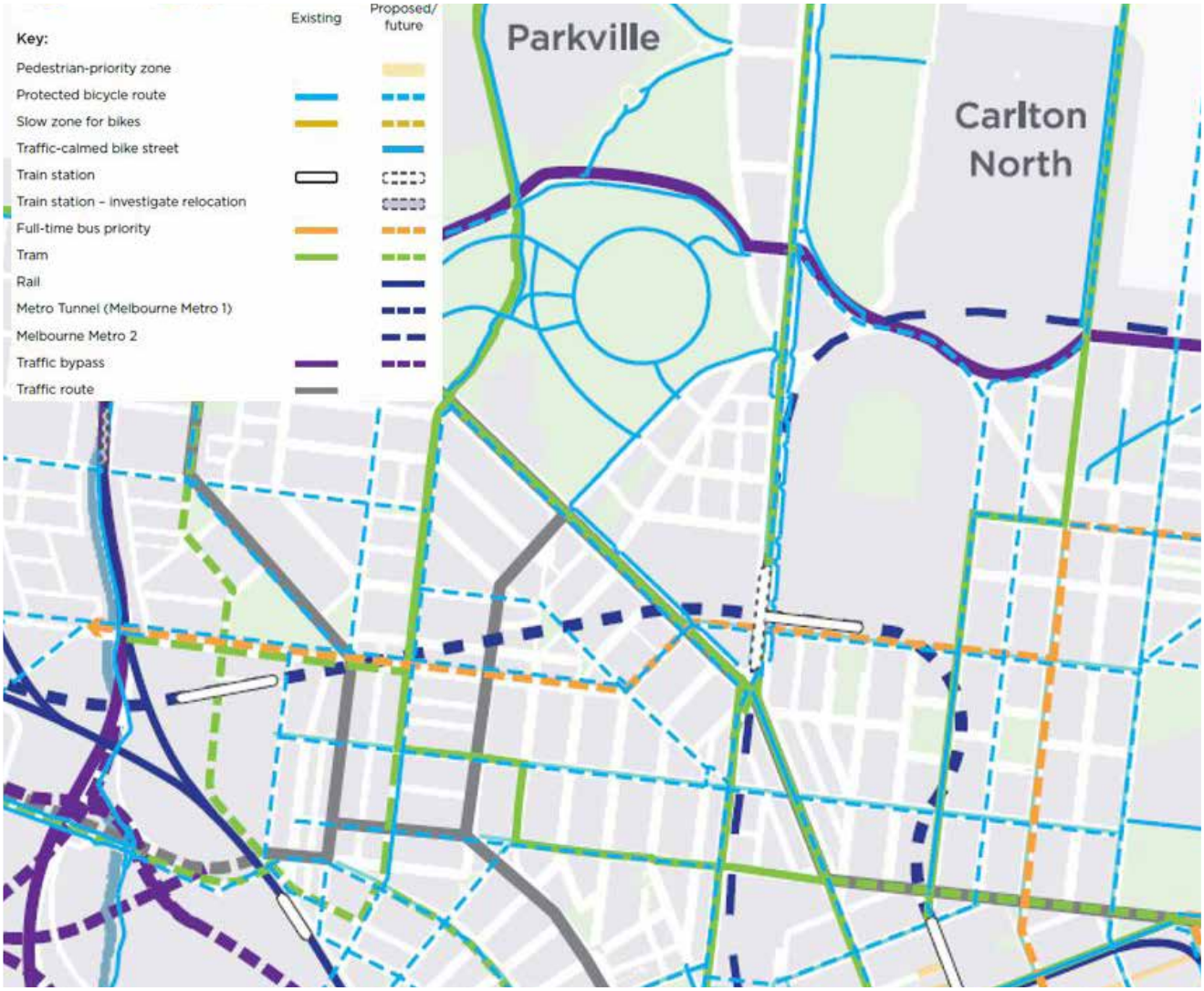
The CoM will deliver a network of safe cycle paths integrated with the Strategic Cycling Corridor (SCC) network. In strategically important locations, on-street parking and traffic lane capacity reductions may be needed. Techniques including physically protected lanes will be used to make riding safer and more attractive to a wider variety of users.

Actions proposed to deliver this outcome include delivering 90 km of connected, physically protected bicycle lanes, developing a more connected bicycle network, providing the safest and highest-standard bicycle lane appropriate for each context, and trialling and implementing protected intersections where appropriate.

The CoM strategy identifies through a Bicycle User Confidence Survey that by implementing protected cycling infrastructure and cycling encouragement programs, a wider range of people will feel confident cycling in the municipality. Consequently, this strategy proposes a wider protected bicycle network by 2030.



Proportion of confident riders on various types of on-road cycling infrastructure



2030 proposed integrated network

2.3 Movement and Place Strategic Plan – North Melbourne, West Melbourne and Docklands

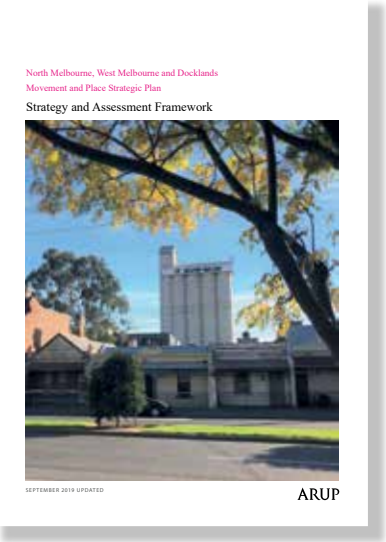
Background Report

This study emerged in response to the potential impacts on the study area of the West Gate Tunnel Project and the Metro Tunnel Project (Figure 1).

Traffic modelling suggests that daily traffic volumes may increase in the inner north west as a result of these investments. This has potential to negatively impact the pedestrian experience, overall walk-ability and cycling movement in several locations. The Metro Tunnel is expected to substantially increase pedestrian volumes in the immediate areas surrounding the new stations, which may conflict with cycling through movement.

This study also identifies the long signal cycles and the lack of crossing opportunities as barriers to walk-ability and permeability. This is a particular challenge for Royal Park and for stretches of Flemington Road, Spencer Street (West Melbourne) and Royal Parade.

Cycling infrastructure varies greatly across the study area. Much of the network is comprised of standard painted bicycle lanes, however only 22 percent of cyclists report feeling confident under these conditions. This drops to 16 percent where lanes disappear at intersections (CoM 2019).



NM, WM and Docklands Movement and Place Strategic Plan, 2019, ARUP

West Gate Tunnel and Metro Tunnel projected impacts

Strategy and Assessment Framework

This study also established an integrated strategy for Movement and Place across the study area and created a framework to assess and prioritise streetscape and amenity improvements.

Aspirational road and street types

Pedestrian infrastructure existing conditions
Average hourly pedestrian counts, pinch points and long-wait pedestrian crossings

Aspirational walking classification

Cycling infrastructure existing conditions
Hourly pedestrian counts, pinch points and types of cycling infrastructure

Aspirational cycling classification

2.4 City of Melbourne Walking Plan 2014-17

The purpose of this plan was to highlight the contribution that walking makes to the City, while laying out a practical plan to improve the walking network and encourage more walking.

The Walking Plan aimed to increase the number of walking trips in 2030 by 63 percent from 2009 levels.

This plan also established principles for planning and design including priority access, safety, access for all abilities, planning for future growth, creation of attractive walking environments, permeability (ability to cross streets) and reducing delay to pedestrians.

Many aspects of this document have been superseded by the CoM Transport Strategy 2030.

Walking Plan, 2014,
City of Melbourne
(Superseded by the Transport Strategy 2030)

2.5 City of Melbourne Cycling Plan 2016-2020 (Superseded)

This plan highlights the contribution that people who ride bicycles make to the municipality, while laying out a practical action plan to further interconnect the bicycle network and encourage more people to ride. The plan establishes principles for planning cycling infrastructure in the city including safety, access for all abilities, planning for future growth, creating bicycle friendly environments, and ensuring comfort and convenience for riders of all abilities.

This plan aims to increase the total mode share of cycling for trips to, from and within Melbourne municipality to 7 percent by 2020 and 10 percent by 2030. Other targets included:

- Development of major continuous bicycle routes north/south and east/west to connect the community to schools, shops and community facilities by 2020.
- Zero fatalities and serious injury crashes
- Goal of one in four vehicles entering the central city in the morning peak to be bicycles.

Many aspects of this document have been superseded by the CoM Transport Strategy 2030.

Bicycle Plan, 2016,
City of Melbourne
(Superseded by the Transport Strategy 2030)

2.6 Arden Vision – 2018

This document is the first step in the implementation of the local-level detailed planning for the Arden urban renewal precinct.

Direction 5, "Prioritising Active Transport", indicates the key active transport links where pedestrians and cyclists should be given priority.

This document includes targets fro all trips to Arden: 60 per cent by public transport, 30 per cent walking and cycling, and 10 per cent by private vehicle.

The Arden Vision identifies the key features of Arden and the surrounding area (including Parkville) that could be significant destinations for pedestrians and cyclists, as listed below.

Arden Vision, 2018, Victoria Planning Authority

Arden key active transport links

Key nodes of the Arden precinct and surroundings

2.9 Arden Structure Plan - June 2020 (draft)

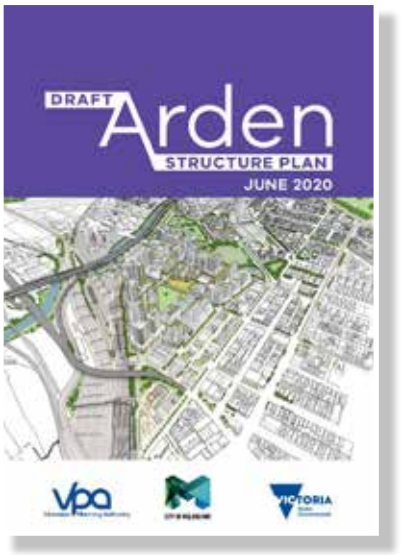
The Arden Structure Plan (in draft form at the time of this review) translates the vision for Arden's future into objectives and strategies to guide how the precinct should develop in the short-, medium- and long-term along economic, physical and social dimensions. This document supersedes the Arden-Macaulay Structure Plan (2012).

The chapter "Prioritising active transport" reflects one of the key directions for Arden's renewal, according to the Arden Vision.

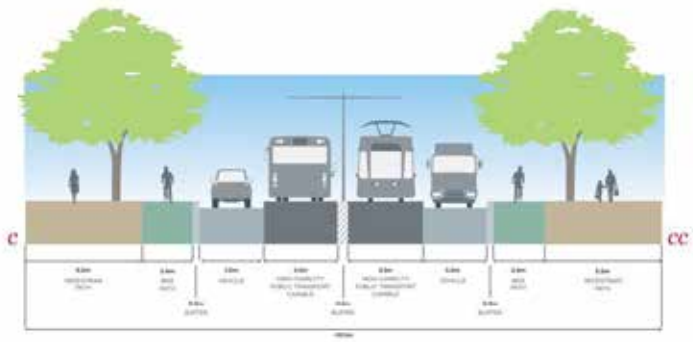
Objective 16 aims to provide safe, direct and connected protected cycling routes through and to the precinct. Within the precinct, there will be four Strategic Cycling Corridors which are designed to improve cycling to and around major activity centres and are routes that cater for the highest cycling volumes while offering protection from other vehicles.

Objective 17 aims to develop a pedestrian network where new and existing streets will be pedestrian-friendly. Streets will provide quick and convenient walking and cycling connections between key spaces including Macaulay, Arden and North Melbourne train stations, and the open spaces both within Arden and beyond.

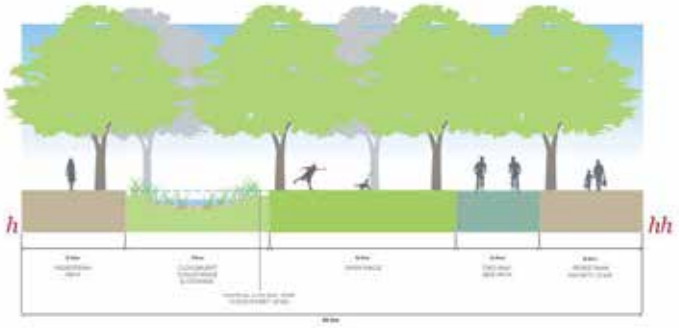
Objective 18 aims to minimise the impact of car parking and associated vehicular movements through Arden. This objective involves the preparation of a 'Vehicle Circulation and Precinct Parking Plan' which caps the supply of parking and directs parking into dedicated off-street parking hubs.



Draft Arden Structure Plan, 2020, City of Melbourne



Proposed cross section - Arden Street



Proposed cross section - Queensberry Street extension

Proposed Arden Transport Network 2051

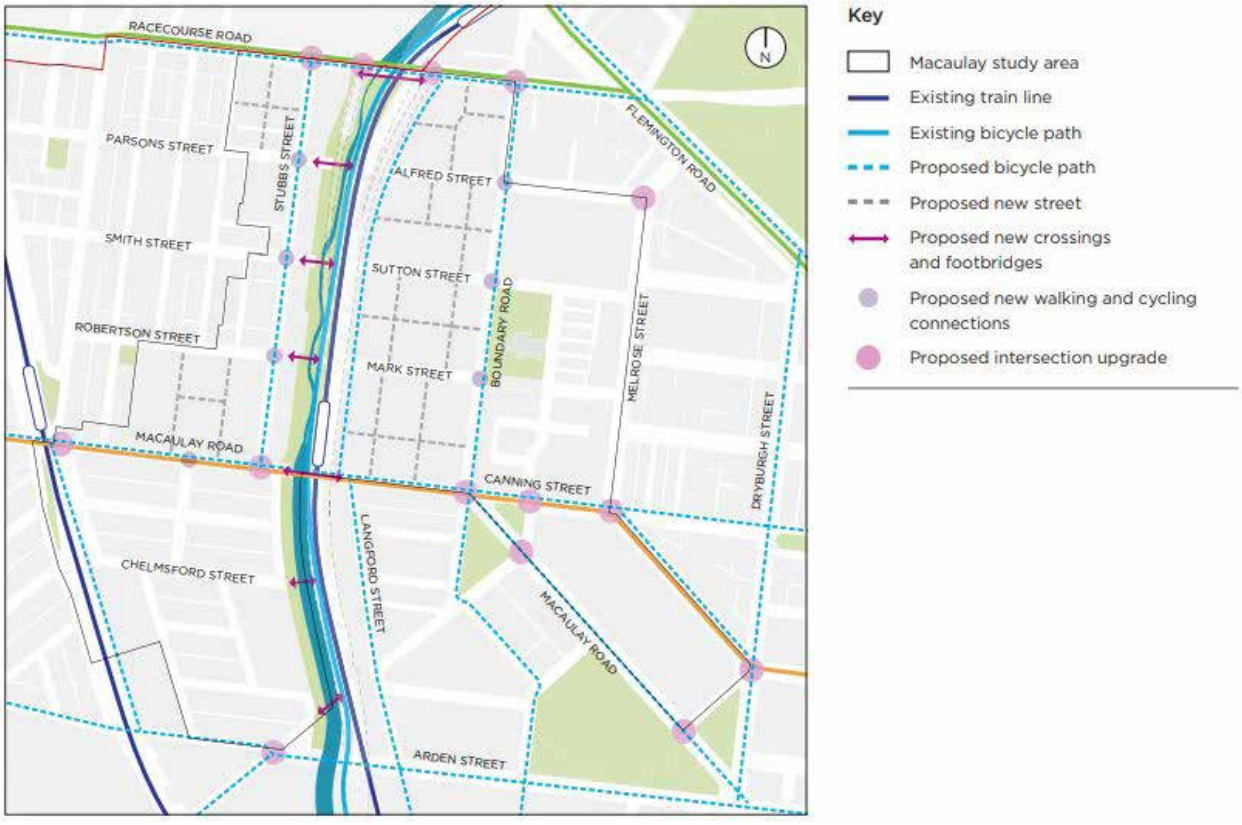
2.10 Macaulay Structure Plan Refresh - 2020 (draft)

This refreshed structure plan for Macaulay precinct intends to maintain the approach to future growth and development from the 2012 Arden-Macaulay Structure Plan and to outline the changes that have occurred since 2012. These changes include Macaulay's movement and access network evolving to support the 20-minute neighbourhood concept.

Objective 10 aims to prioritise active transport by designing streets that are safe and accessible for people walking and riding bikes. Walking will be encouraged through footpath widening and improved road crossings. Riding bikes in Macaulay will be made safer and more attractive by expanding the existing network and providing high-quality protected bicycle lanes and intersections.

Objective 12 aims to improve car parking requirements to support a less car dependent transport system. On-street car parking supply and controls will be reviewed to provide wider footpaths, protected bike lanes, street tree planting and improved amenity.

Macaulay Draft Structure Plan Refresh, 2020, City of Melbourne



Proposed changes to walking and cycling in Macaulay

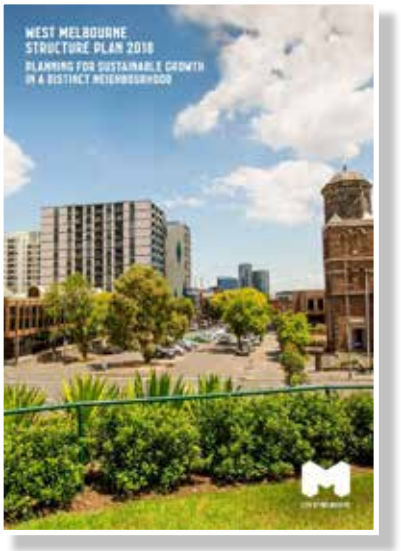
2.11 West Melbourne Structure Plan - 2018

The West Melbourne Structure Plan has been developed using a 'place-based' approach - identifying five distinct places in West Melbourne, each with its own character and qualities. This vision for each of these places is based on a developed framework, which includes the objectives and corresponding actions of the structure plan.

Objective 10 aims to expand and upgrade the cycling network. New separated lanes and bicycle parking will be provided to encourage cycling as a preferred mode of transport and to include a broader range of people who are interested in cycling.

Objective 12 aims to update the supply and management of on-street parking spaces to meet the changing needs of residents, workers and visitors. This involves the identification and conversion of approximately 300 car parking spaces to high quality public open space, tree planting and water sensitive urban design.

Objective 14 aims to create linear open spaces through West Melbourne to enhance connectivity with surrounding areas.



West Melbourne Structure Plan, 2018, City of Melbourne

Proposed changes to the cycling network in West Melbourne

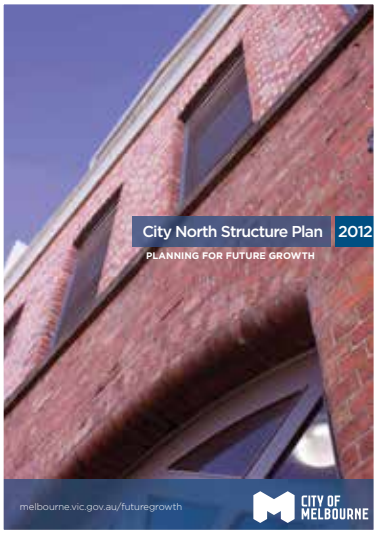
New and expanded open space opportunities, priority tree planting streets and proposed walking and cycling routes in West Melbourne

2.12 City North Structure Plan - 2012

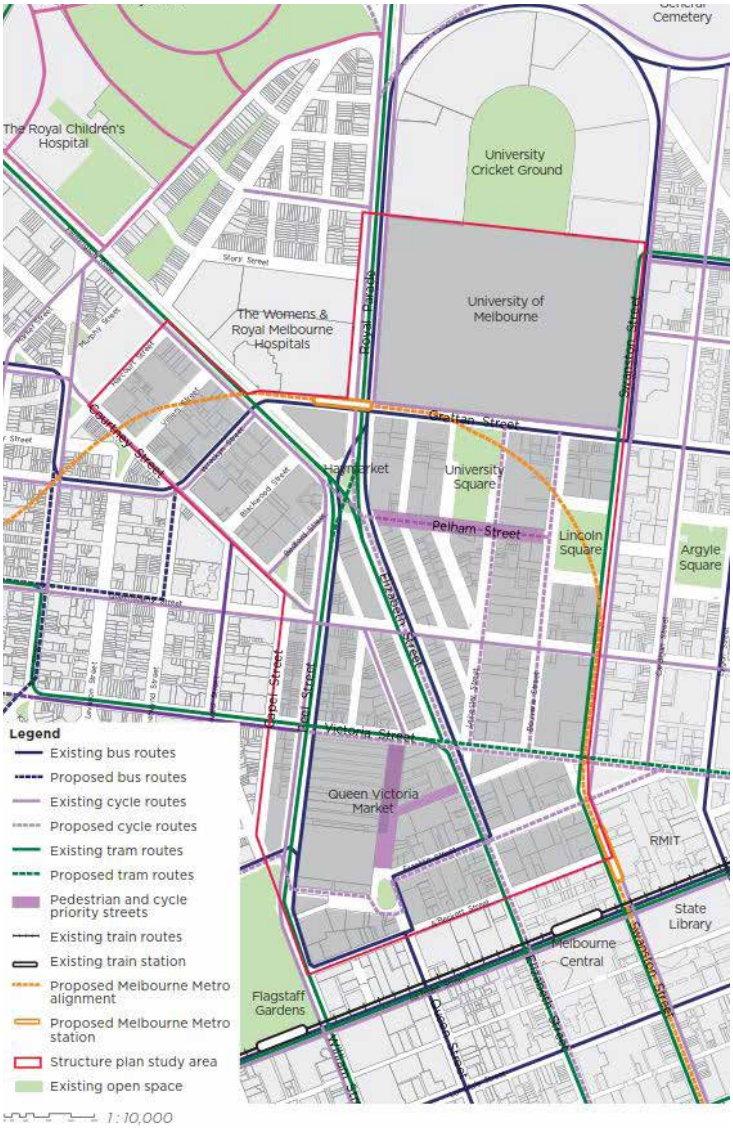
This precinct plan identifies "Transport and access" as a priority theme. Walking and cycling have been considered in two of its main strategies:

- Strategy 2 "Expand and upgrade cycling networks" - Safe cycling paths will be integrated into high-mobility streets, with a combination of separated lanes, early starts at signals and low speed mixed traffic zones. Strategy action T2.R1 proposes to investigate the feasibility of converting on-street car parking spaces to on-street bicycle parking in areas which attract a high number of cyclists, e.g. areas around the University of Melbourne.

- Strategy 3 "Promote a walking city" - Streets will be upgraded to include generous, connected and safe pedestrian paths which improve permeability. Safe, clear, enhanced pedestrian crossings and links between public transport interchanges and key destinations will contribute to the delivery of a high-quality integrated network. Large canopy trees will provide shading and cooling for pedestrian comfort. The intricate laneways in City North will be enhanced and activated to improve the permeability and experience of the area. Streets should be designed to provide:
  - New pedestrian crossings and wider pedestrian crossings at signals along key pedestrian corridors
  - Footpaths a minimum of 3 metres wide
  - Large canopy trees for passive shading and cooling
  - Water sensitive urban design
  - Links to open space, urban plazas, community and cultural facilities
  - Traffic calming treatments and lower speed limits
  - Signage to key destinations and attractions including the Queen Victoria Market, the hospitals, the universities, local activity centres, and the Meat Market
  - All existing laneways to be retained. Upgraded and new laneways should be designed to be a minimum width of 6 metres to provide vehicular access for service vehicles, in addition to landscaping.



City North Structure Plan, 2012, City of Melbourne



Proposed Transport Mode Routes
Including priority walking and cycling streets

2.13 Melbourne Innovation Districts City North Opportunities Plan

This plan provides an innovation lens with which to view the current and future urban realm of the Melbourne Innovation Districts (MID) City North. There are 5 key Urban Realm Objectives:

1. Aims to create places that attract people with a holistic approach to place-making

2. Aims to be exemplar in urban infrastructure and environmental management

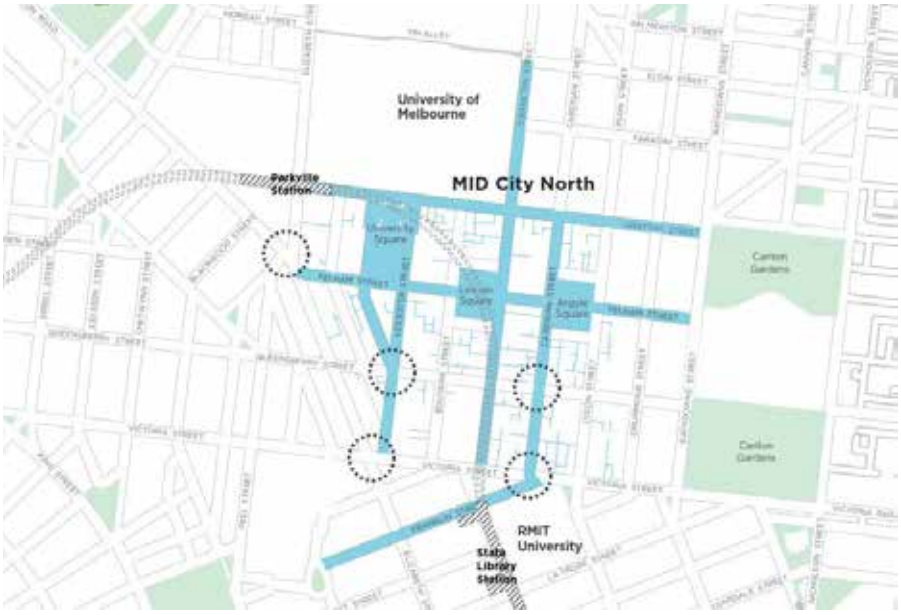
3. Promotes new ideas to inspire and engage, build literacy and stimulate economic growth

4. Seeks further alignment, integration and consistency between the vision and principles of adjacent projects, bodies and stakeholders

5. Aims to create a hyper-connected and accessible inter-modal network.

This plan also identified five intersections to act as key gateways to enable safer and easier pedestrian and cyclist access within MID City North. These intersections have been identified as pedestrian barriers which inhibit the flow of people from north to south and east to west.

Melbourne Innovation Districts City North Opportunities Plan, 2020, City of Melbourne



Key streets, intersections and places of MID City North

2.14 Moonee Ponds Creek Strategic Opportunities Plan

The vision of this plan is to transform Moonee Ponds Creek to a thriving corridor that supports the liveability and resilience of the city. The movement goal considers creating safe, accessible paths that connect pedestrians and cyclists to local communities and facilities on either side of the creek, as well as the central city.

The Macaulay Terraces, located at the south end of the intersection with Arden Street, has been considered a key strategic project which will potentially increase the pedestrian and cyclist traffic flow to this area.

Moonee Ponds Creek Strategic Opportunities Plan 2019, 2018, City of Melbourne

2.15 Urban Forest Strategy 2012-2031

The City of Melbourne's urban forest will be resilient, healthy and diverse and will contribute to the health and well-being of the community and to the further advancement of a liveable city. This strategy establishes a range of targets that should be combined with the intent to identify priority walking and cycling routes. Pedestrian and cyclist comfort and experience are vital to successfully activated movement networks. The guiding principles in this document include:

- Mitigate and adapt to climate change
- Reduce the urban heat island effect
- Design for health and well-being
- Create healthier ecosystems
- Design for liveability and cultural integrity
- Become a water sensitive city
- Position Melbourne as a leader in urban forestry.

Urban Forest Strategy, 2012, City of Melbourne

2.16 Nature in the City Strategy 2017

The Nature in the City Strategy identifies the need to focus on the natural environment and the attributes that contribute to the overall health of the city. The strategy aims to improve biodiversity and foster greater connection between people and natural systems. This is outlined through the Vision with a set of associated goals and priorities.

Vision: "The City of Melbourne will support diverse, resilient, and healthy ecosystems that improve the environment and well-being of our community, providing the foundation for a liveable city."

Goals:

- Create a more diverse, connected, and resilient natural environment
- Connect people to nature
- Demonstrate leadership in urban ecology and conservation of biodiversity.

Nature in the City, 2012
City of Melbourne

2.17 Climate Change Adaptation Strategy Refresh

Melbourne is adapting to climate change so it can continue to prosper and thrive. This strategy includes a series of goals for managing the potential impacts of climate change on the localised environment and the city's liveability:

Goal 1: Enhance the natural environment and green spaces of our municipality.

Goal 2: Shape our built form and urban renewal areas to withstand future climate change impacts.

Goal 3: Strengthen the resilience of our inclusive, family friendly and culturally diverse community.

Goal 4: Protect and enhance our diverse economy.

Goal 5: Continue to build Melbourne's adaptation capabilities and expertise.

Climate Change Adaptation Strategy Refresh, CoM, 2017

Design reference documents

The key documents listed below will guide the basis of design of the Active Transport Investigation and will set the minimum and desirable standards to deliver high-quality walking and cycling corridors.

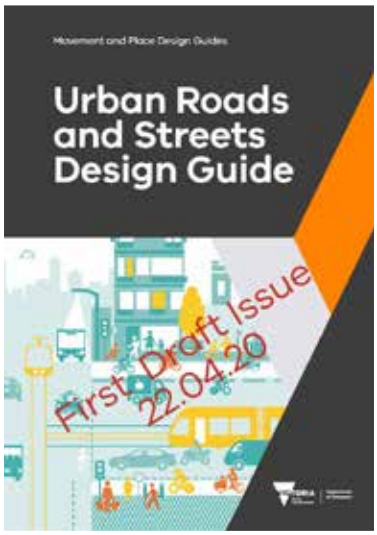
- Guide to Road Design Part 6A: Paths for Walking and Cycling, 2017
- VicRoads Supplement to AGRD Part 6A, 2012
- VicRoads TEM Vol 3 Part 218 Design Guidance for Strategically Important Cycling Corridors, 2016
- DoT SCC Overview Document for Metropolitan Councils, 2018 - Extended description on the following page
- City of Melbourne Bike Lane Design Guidelines, 2019
- DoT Urban Roads and Street Design Guide (Movement and Place Design Guides), 2020 Draft
- DoT The Cycling Guide (Movement and Place Design Guides), 2020 Draft

AGRD Part 6A, 2017, AustRoads

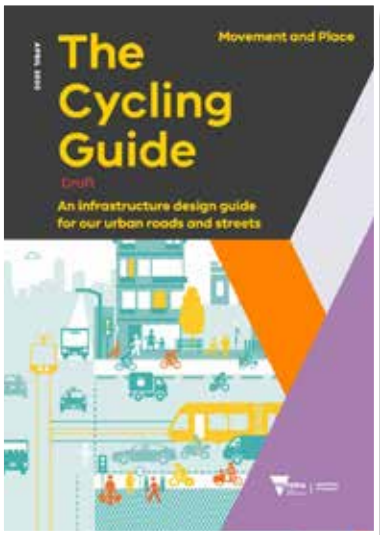
Supplement to AGRD Part 6A, 2012, VicRoads (DoT)

TEM Vol 3 Part 218, 2016, VicRoads (DoT)

Bike Lane Design Guidelines, 2019, City of Melbourne



Urban Roads and Streets Design Guide, 2020 Draft, DoT



The Cycling Guide, 2020 Draft, DoT

2.18 Strategic Cycling Corridors - Overview Document for Metropolitan Councils

The five principles that define the metropolitan SCC network are that they are:

- destination based
- safe
- direct
- integrated
- connected

The intent of the SCC network is to encourage the "interested but concerned" group of the potential cycling population to take up cycling or to cycle more often. Two types of SCCs have been identified:

- Main routes (C1 Movement and Place classification)
    - Primary function: Commuting (plus some local trips)
    - Target users: Comfortable for most adults
    - Level of stress: 2 (or lower)
    - Design speed: 25-30 km/h
- Primary routes (C2 Movement and Place classification)
    - Primary function: Local trips
    - Target users: All ages and abilities
    - Level of stress: 1
    - Design speed: 20 km/h

This document also acknowledges Parkville as a National Employment and Innovation Cluster (P3 classification under review).

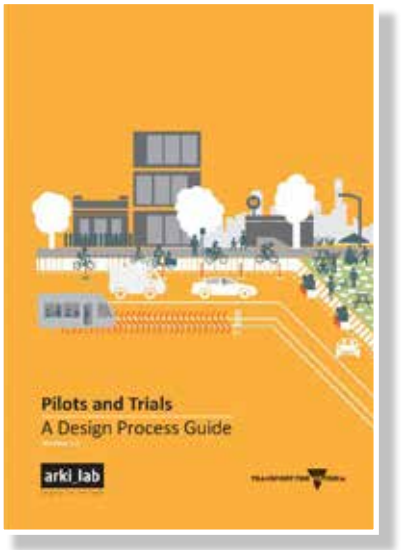
The SCC network is shown and correlated to the study area in Chapter 3.

SCC - Overview Document for Metropolitan Councils, 2018, Department of Transport

2.19 Pilot and Trials - Design Process Guide v1.1

Piloting and trialling have been deployed globally to help deliver short-term initiatives for roads and streets that work towards a longer-term vision for a city's public spaces and transport network. This document has been developed in Victoria to offer a guiding framework for potential 'new ways of working' for transport to respond to the complexities facing our street and road space into the future. The document is divided in two parts:

- Part A - PROCESS GUIDE: This section provides an overview of the process and the general steps that have been developed to demonstrate how a pilot or trial project may be conceived, developed, implemented and evaluated. It also contains some general information on global case studies on how other cities have approached this 'way of working'.
- Part B - PILOT AND TRIAL TOOLKIT: This section is envisaged as a guidance 'toolkit' catalogue that may be drawn from in developing a pilot or trial project. It is intended to be a reference guide for developing a pilot or trial project with a standard set of common elements as much as designing for any 'bespoke' or custom-designed features.



Pilot and Trials, 2018, VicRoads

03

EXISTING CONDITIONS

3. Existing conditions

This existing conditions analysis has guided the identification of the key corridors within the study area, the prime goal of this active transport investigation. This section analyses the existing infrastructure, key trip generators, and the critical routes identified by previous studies, strategies and plans.

Existing infrastructure and key attractor nodes

The developed urban areas of Macaulay, Arden, North Melbourne and Parkville already provide a dense walking and cycling network.

The analysis of the existing infrastructure is key to understand the gaps in the network that can be less attractive or less safe for users.

In this investigation, the key attractor nodes represent the largest origins and destinations for cyclists and pedestrians. These include local trips and metropolitan trips, which connect into the study area via Strategic Cycling Corridors or via linked trips using the Melbourne public transport network.

20-minute neighbourhoods

State Government of Victoria's Plan Melbourne 2017-2050 is guided by the principle of 'living locally - 20-minute neighbourhoods'. This type of planning intends to create more inclusive, vibrant and healthy neighbourhoods, acknowledging that areas that are the most walkable are often the most liveable.

Based on this principle, an 800 metre catchment has been set as the key parameter for walking distance. This distance is supported by Plan Melbourne and corresponds to a round trip travel time of 20 minutes (10 minutes each way) to the analysed nodes.

Cycling travel times

Bicycle travel times depend on the type of user, the type of route, and context specific delay times.

Therefore, an average cycling speed has been selected for the purpose of determining approximate catchment distances. These have been validated with average trip times to different destinations according to open web based trip planning resources.

The catchment distances have been identified as follow:

- 30 minute travel time: 6500 metres
- 20 minute travel time: 4400 metres
- 10 minute travel time: 2200 metres
- 5 minute travel time: 1000 metres.

Map Data Sources:

Victorian Government Open Data - https://www.data.vic.gov.au/

City of Melbourne Open Data Portal - https://data.melbourne.vic.gov.au/

Public Transport Victoria Datasets - https://www.ptv.vic.gov.au/footer/data-and-reporting/datasets/

Arden Tram Feasibility Study GIS data (AECOM)

Plan Melbourne Spatial Data - https://www.planmelbourne.vic.gov.au/maps/spatial-data

Key attractor nodes

1. Queen Victoria Market
2. University of Melbourne
3. Victorian Comprehensive Cancer Centre
4. Royal Melbourne Hospital
5. Royal Women's Hospital
6. Royal Children's Hospital

Capital City Trail

Metro Train stations

Points of interest

- art centre
- recreational centre
- education complex
- park
- activity centre

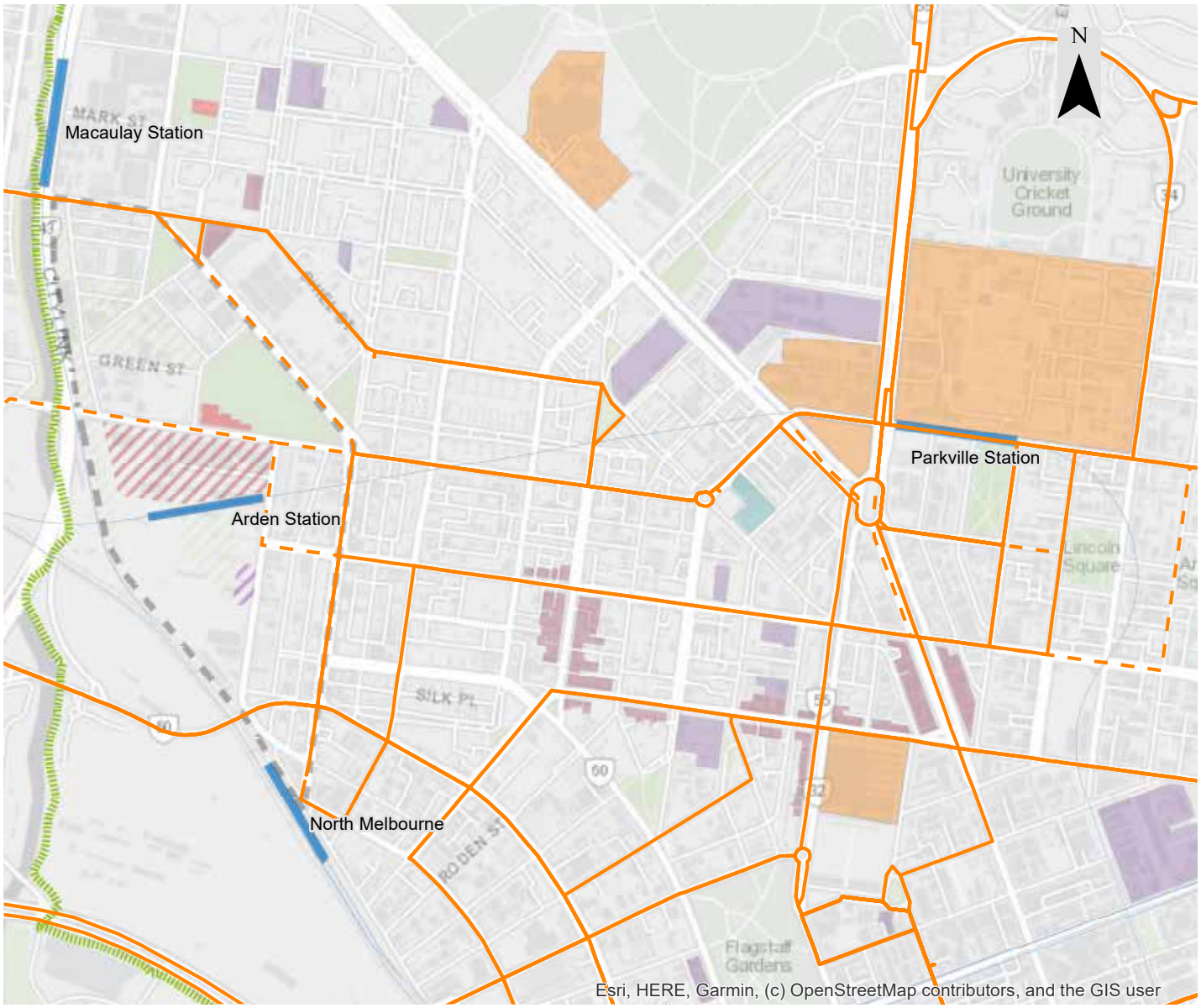
Arden points of interest

- Arden Precinct boundary
- Innovation Cluster
- proposed school
- proposed open space

The area of the City of Melbourne covered by this investigation involves a mix of land uses which contributes to a vibrant and attractive urban environment.

The key metropolitan attractor nodes in the study area include the Royal Melbourne Health Cluster, Queen Victoria Market, University of Melbourne and the proposed Arden Innovation Cluster. Important local attractor nodes include local activity centres such as North Melbourne and Melrose/Canning, education centres such as North Melbourne Primary School, recreational centres, and the Meat Market art centre.

Current and future metropolitan bus routes

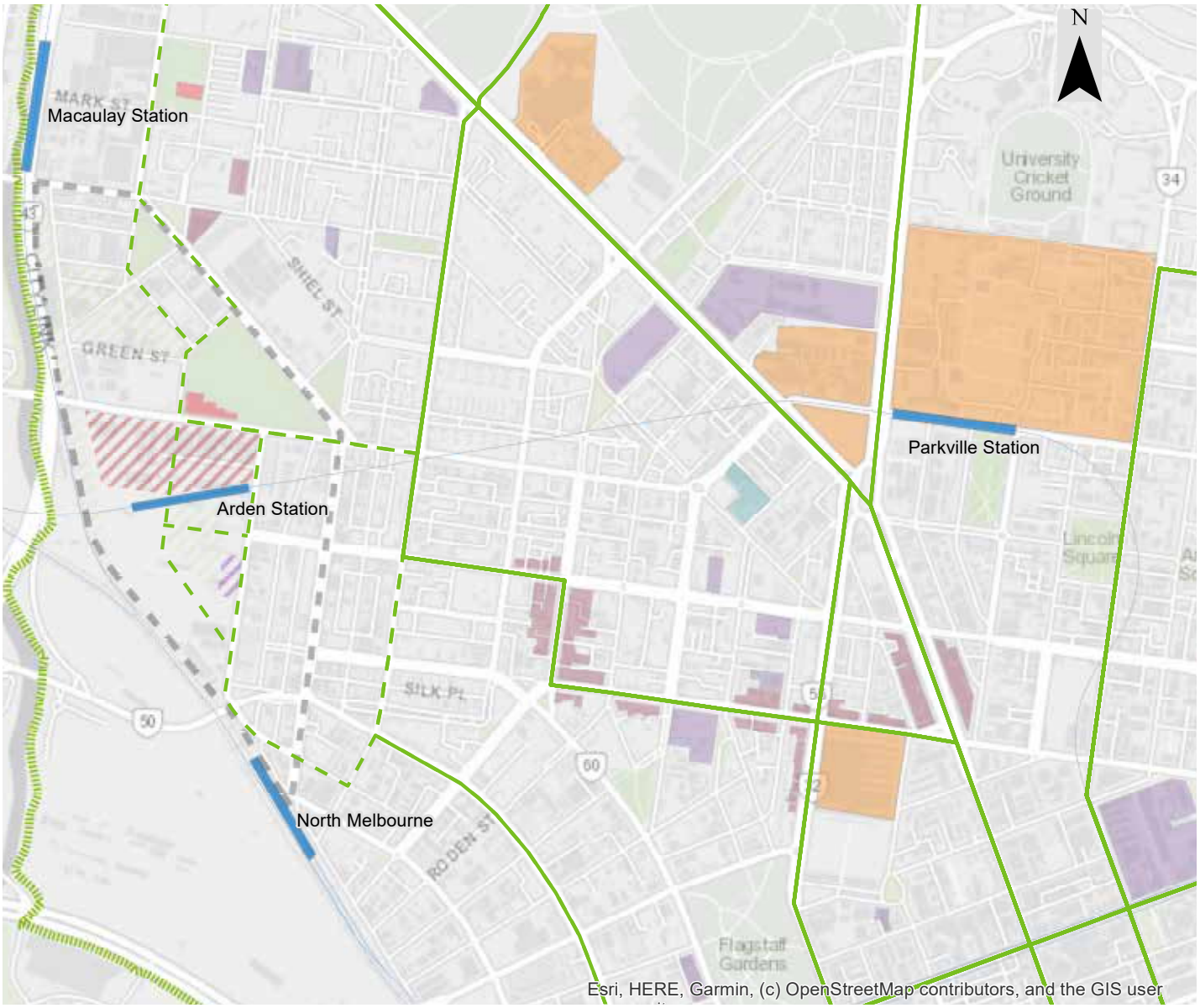


- Bus route
- Potential future bus routes
- Capital City Trail
- Metro Train stations

City of Melbourne provides a well-connected bus network within the study area, including east-west corridors such as Canning Street, Arden Street, Grattan Street, Queensberry Street and Victoria Street.

Upgrades on the bicycle infrastructure along these routes will need to cater for bus requirements.

Current and future tram routes

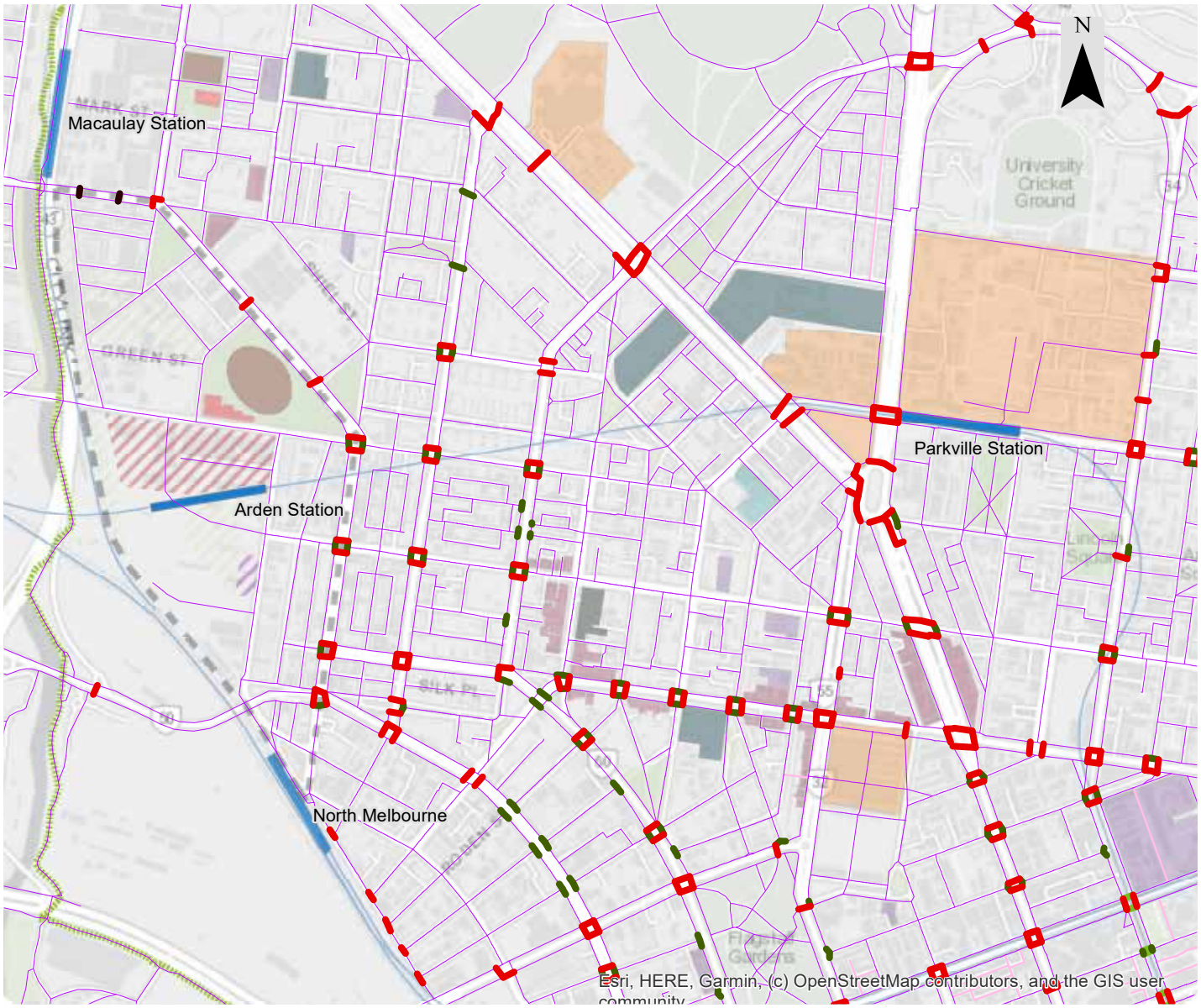


- Tram route
- Potential future tram route
- Capital City Trail
- Metro Train stations

Tram routes 57, 58 and 59 cross and connect the study area for this investigation. The draft Arden Structure Plan references a High Capacity Public Transport Capable Corridor in Arden which could accommodate tram services, and this includes a section along Arden Street.

Short term improvements to bicycle infrastructure should allow for any potential future tram extensions. All bicycle path upgrades along tram routes require the provision of safe tram stops for all users: pedestrians, bicycles, motorised vehicles and trams.

Existing pedestrian infrastructure



- Metro Train stations
- Capital City Trail
- Pedestrian Footpath
- Lane
- Long-wait crossing
- Short-wait crossing
- Tram crossing
- Zebra crossing

Due to the urban nature of the study area, the footpath network is dense and interconnected. However, long wait times at some traffic signals can be perceived in some areas as barriers to the convenience of walking. As shown above, City of Melbourne has classified the intersections within the study by their waiting times, with signal cycles exceeding 75 seconds considered less desirable for pedestrians and cyclists.

The research investigation "Reducing pedestrian delay at traffic signals", undertaken by the NZ Transport Agency, shows that if delays are perceived to be too long (i.e. greater than 30 seconds between walk signals), it may increase non-compliant (risk-taking) behaviour, specifically jaywalking.

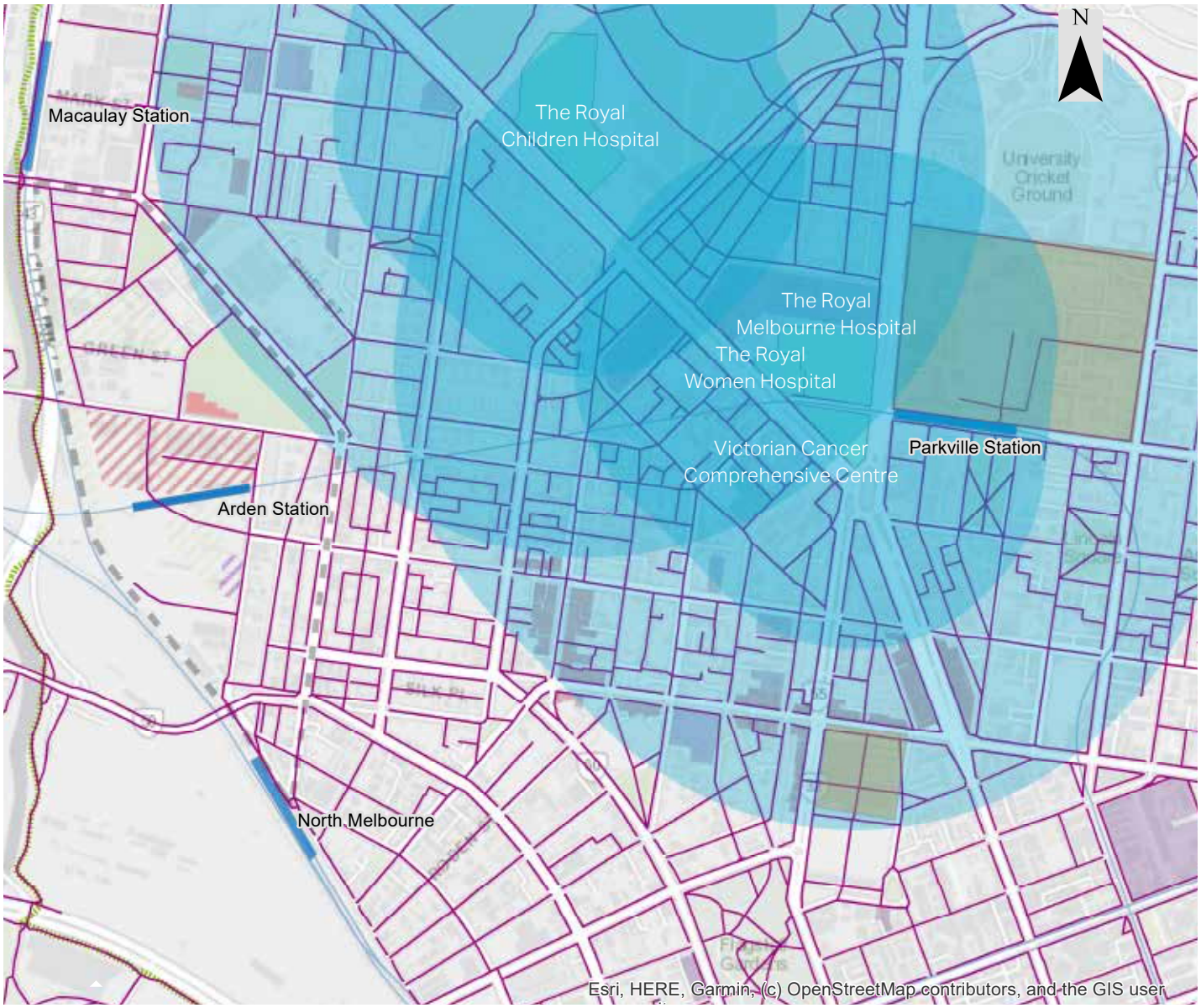
Pedestrian catchment to key attractor nodes - Metro Train station entrances

- Pedestrian footpath
- Metro Tunnel station entrances
- Metro Train stops - 400m and 800m catchments
- Capital City Trail

The study area is well integrated with the Metro Train network (including the proposed Metro Tunnel project). Pedestrians with the study area will generally be able to access at least one of the stations shown above within a 10 minute walk.

Parkville station will provide very good connectivity (less than 10 minutes walk) to the University of Melbourne and the Royal Melbourne Hospital complex, except for the Royal Children's Hospital further north. Arden station will provide good access to the proposed Arden Innovation Cluster and the wider Arden Precinct.

Pedestrian catchment to key attractor nodes - Hospitals

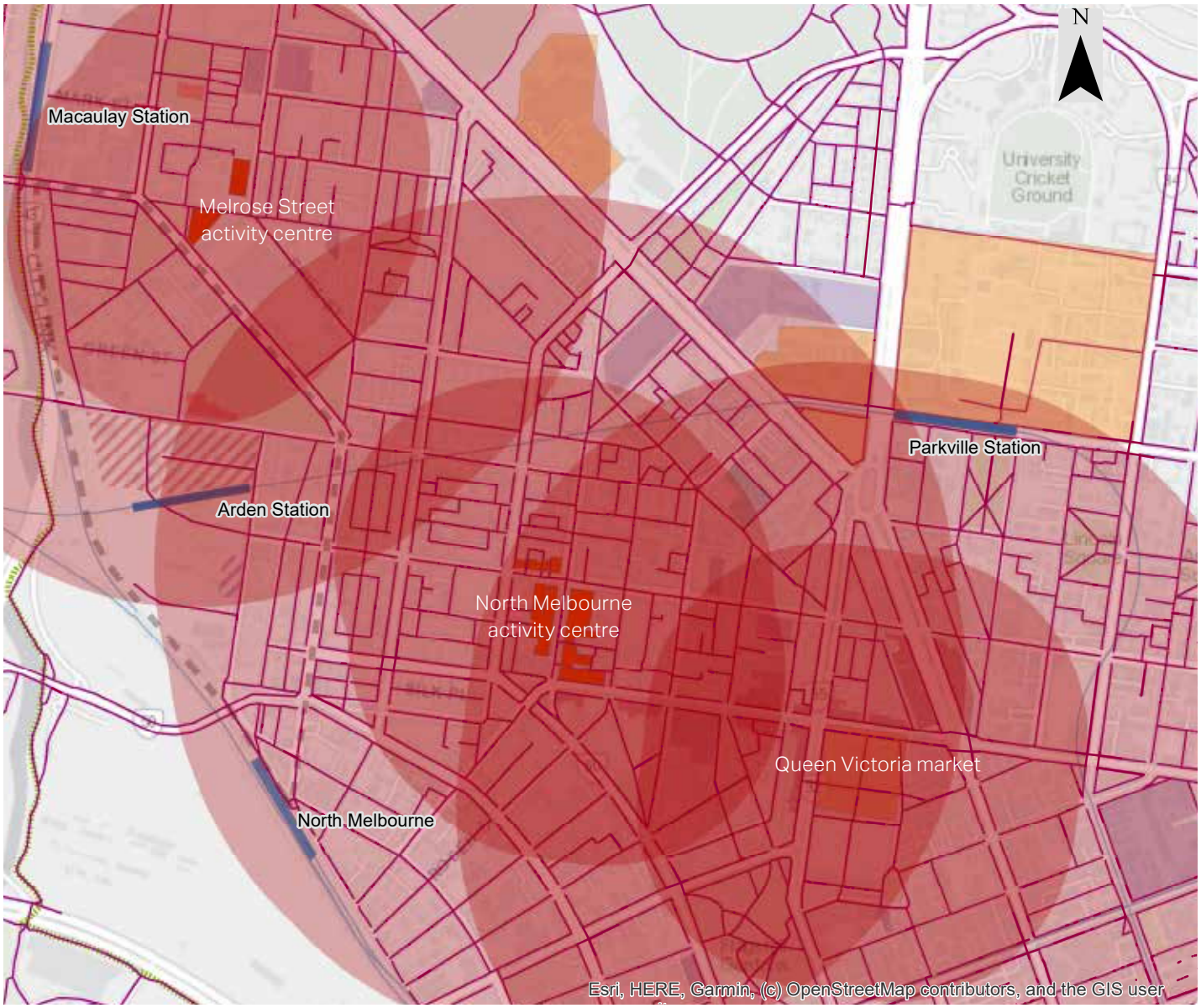


- Pedestrian footpath
- Hospitals - 400m and 800m catchments
- Metro Train stops
- Capital City Trail

The Royal Melbourne Hospital complex is a key attractor for local and metropolitan users, who in the future will be able to arrive through Parkville station to access the Royal Melbourne Hospital, the Royal Women's Hospital and the Victorian Cancer Centre. The Royal Children's Hospital is not within the 800 metre catchment of any of the existing or proposed train stations but is served by multiple tram routes on Flemington Road.

This complex is well-connected to surrounding activity centres which - given safe and convenient walking connections - can serve the daily needs of staff and visitors in terms of dining, goods and necessities.

Pedestrian catchment to key attractor nodes -Activity centres

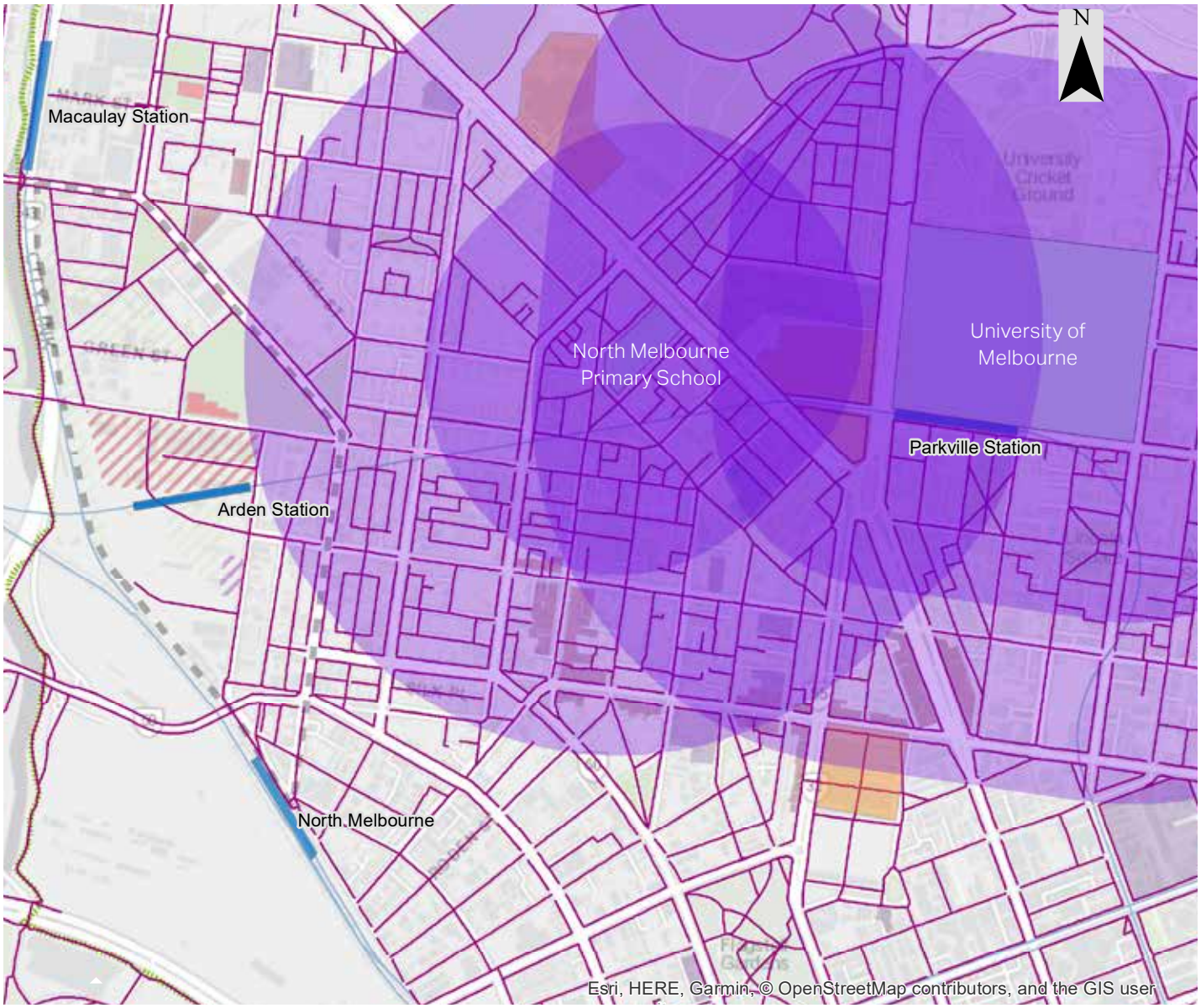


- Pedestrian footpath
- Activity centres - 400m and 800m catchment
- Metro Train stops
- Capital City Trail

Key activity centres in the study area include the Errol Street area, Melrose Street area, and Queen Victoria Market. Generally local residents will access these areas for shopping, dining and leisure, with Queen Victoria Market also drawing visitors from all across Melbourne. Queen Victoria Market in the future will be conveniently accessible via both Metro Tunnel to the north (Parkville station) as well as from the City Loop to the south.

Although Macaulay activity centre is outside the study area, it has been also considered in following stages of this investigation.

Pedestrian catchment to key attractor nodes - Education centres

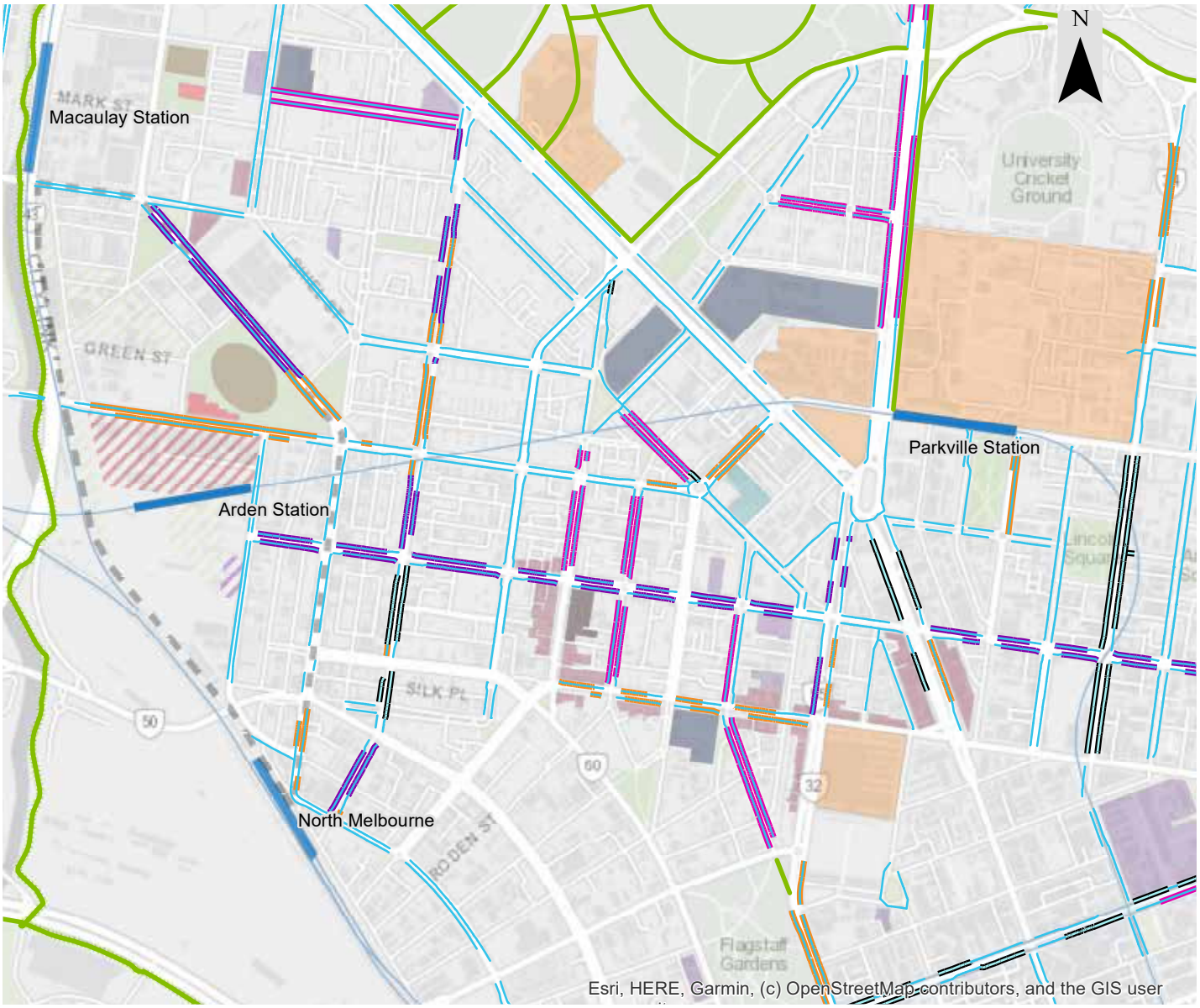


- Pedestrian footpath
- Key education centres - 400m and 800m catchments
- Metro Train stops
- Capital City Trail

North Melbourne Primary School is a key attractor for local students and their guardians. Well-connected and safe routes to this school can encourage children and parents to travel by foot and help limit localised traffic congestion. Docklands Primary School's catchment is not included due to the poor connectivity and little impact to the study area.

The University of Melbourne attracts metropolitan students who in the future will be able to access the university via Parkville station, in addition to existing trams. Many students who live locally would also benefit from any enhancements to the walking environment in the surrounding area.

Existing cycling infrastructure



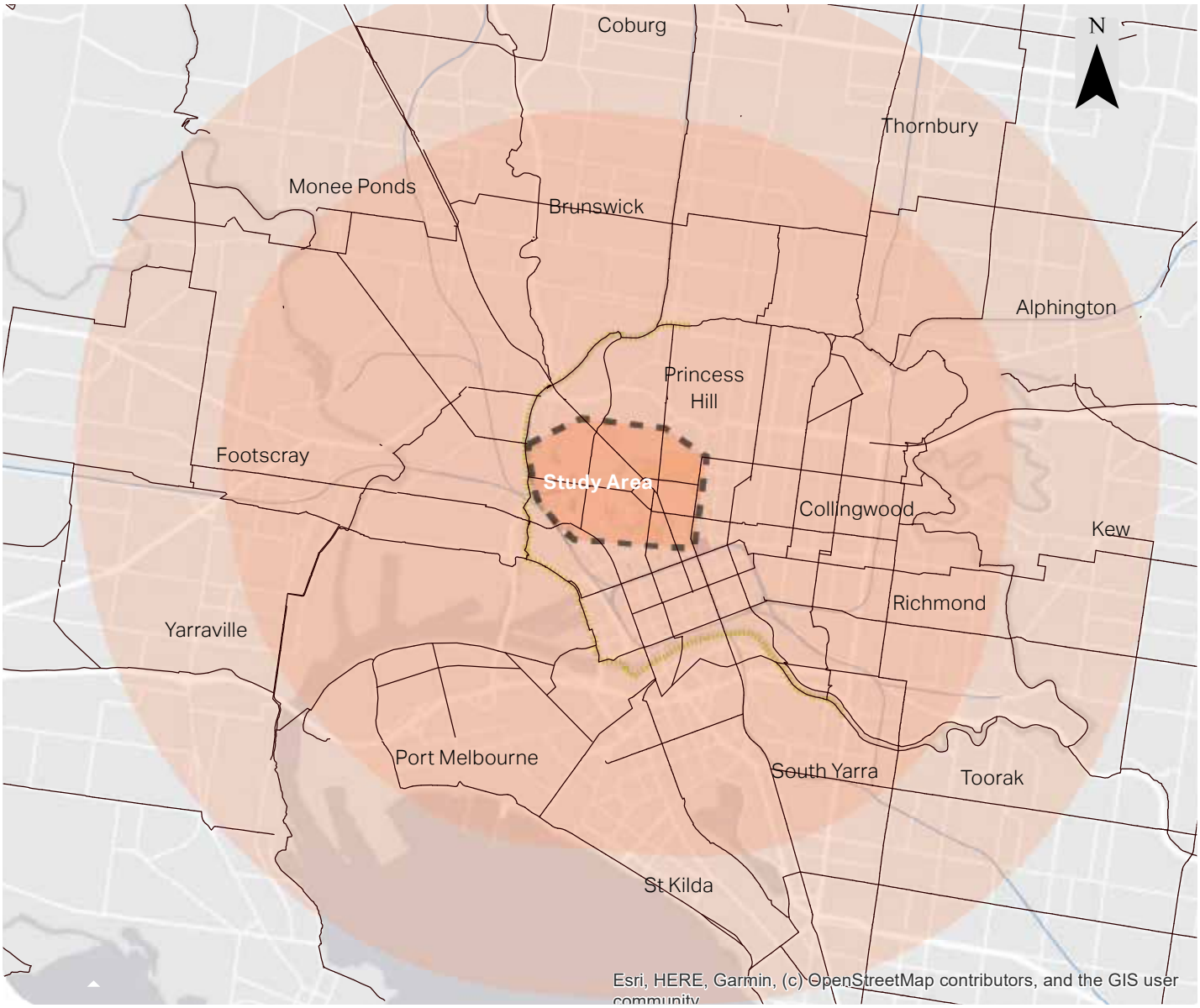
- Capital City Trail
- Key attractors
- Metro Train stations
- Kerb protected lane
- Total protected chevron
- Traffic protecting chevron
- Dooring protecting chevron
- Standard bicycle lane
- Sharrow
- Off-road bicycle path

The study area is well covered by cycle lanes. However, the majority are not fully protected from traffic and car parking, and only a few sections are fully kerb-protected cycle lanes.

The Capital City Trail is a strategic cycling ring corridor that connects several areas of metropolitan Melbourne. This corridor connects into North Melbourne via Arden Street. The University of Melbourne can also be accessed from this corridor along an off-road path via Princes Park. Royal Park also provides a mesh of off-roads paths which connect directly to the Royal Children's Hospital.

The existing most protected on-road corridors are Queensberry Street, Abbotsford Street and Swanston Street between the University of Melbourne and Queen Victoria Market.

Cycling metropolitan catchment to the study area

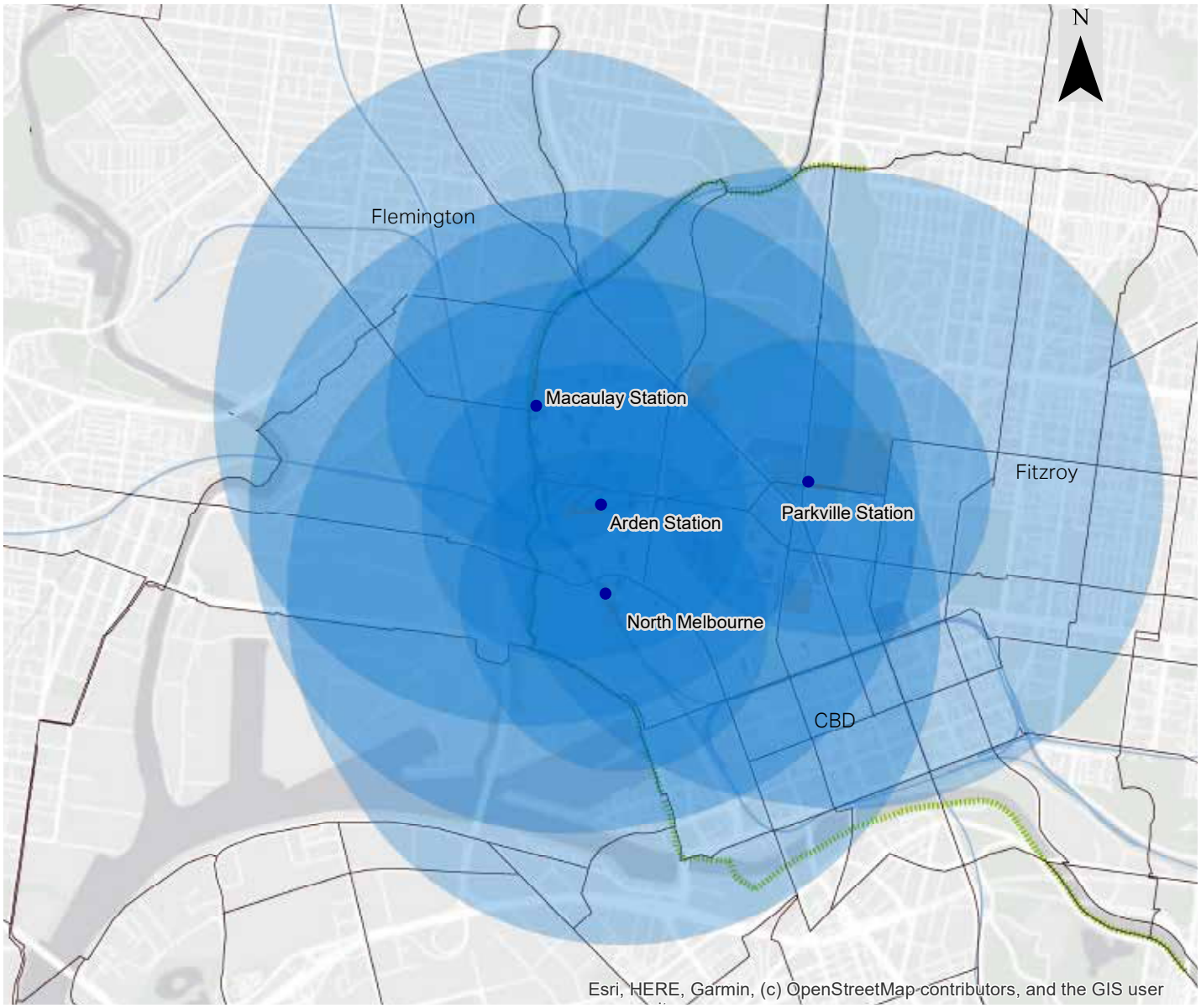


Strategic Cycling Corridors

Study area - 20min and 30min catchments

Cyclist commuters working or studying in the study area can gain access to the local cycling network via Strategic Cycling Corridors from several suburbs in metropolitan Melbourne within a 20 or 30 minute ride, as approximated in the diagram above.

Cycling catchment to key attractor nodes -Metro train station entrances



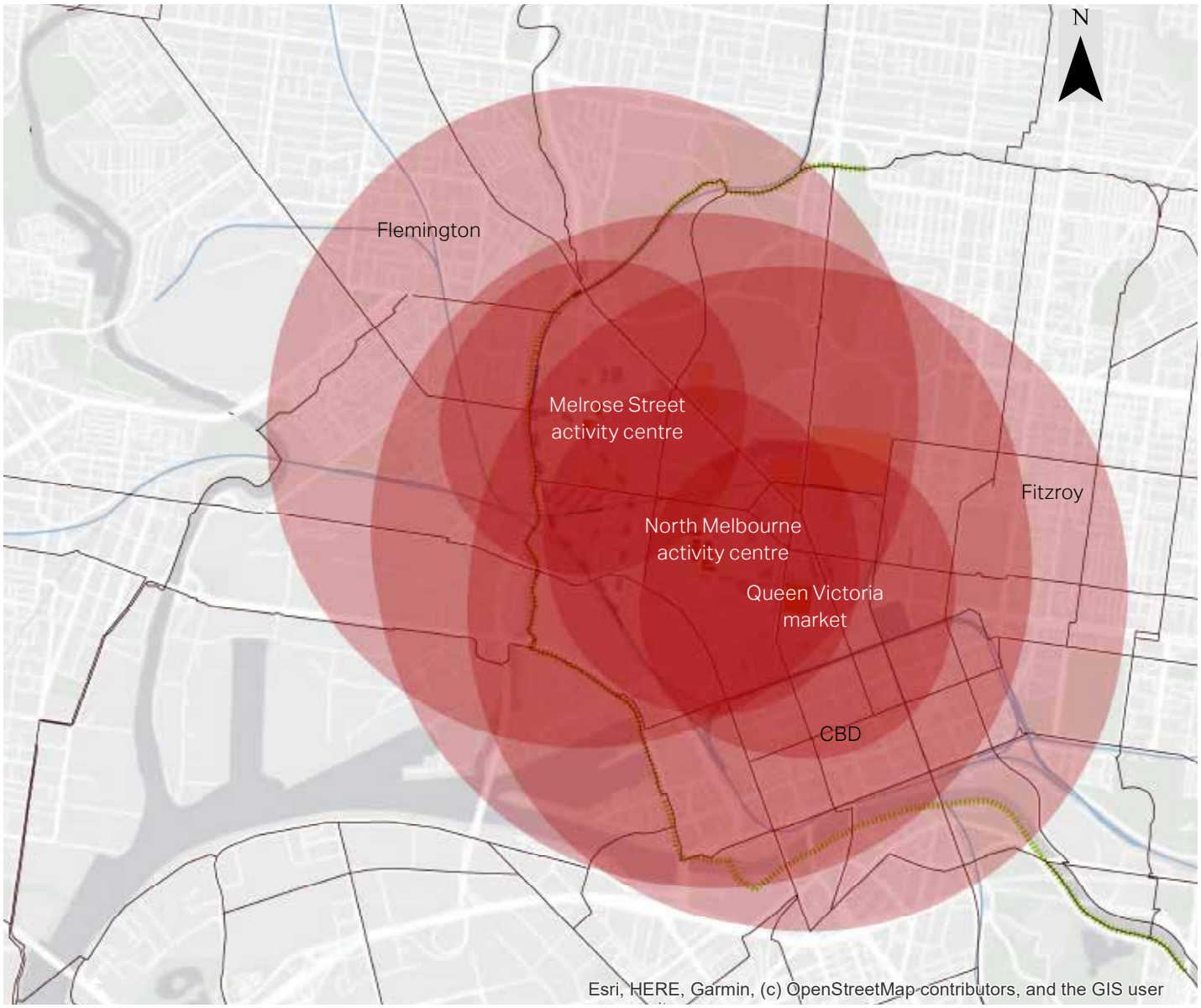
— Strategic Cycling Corridors

● Metro Train stations - 5min and 10min catchments

Many local residents can access multiple Metro train stations within a 5 minute ride. This degree of connectivity contributes to the effectiveness of City of Melbourne's integrated transport network.

Safe cycling connections to these interchanges - along with strategically located end of trip facilities - can help maximise the breadth of users who could viably use cycling and public transport in combination for a wider variety of trip purposes.

Cycling catchment to key attractor nodes - Activity centres

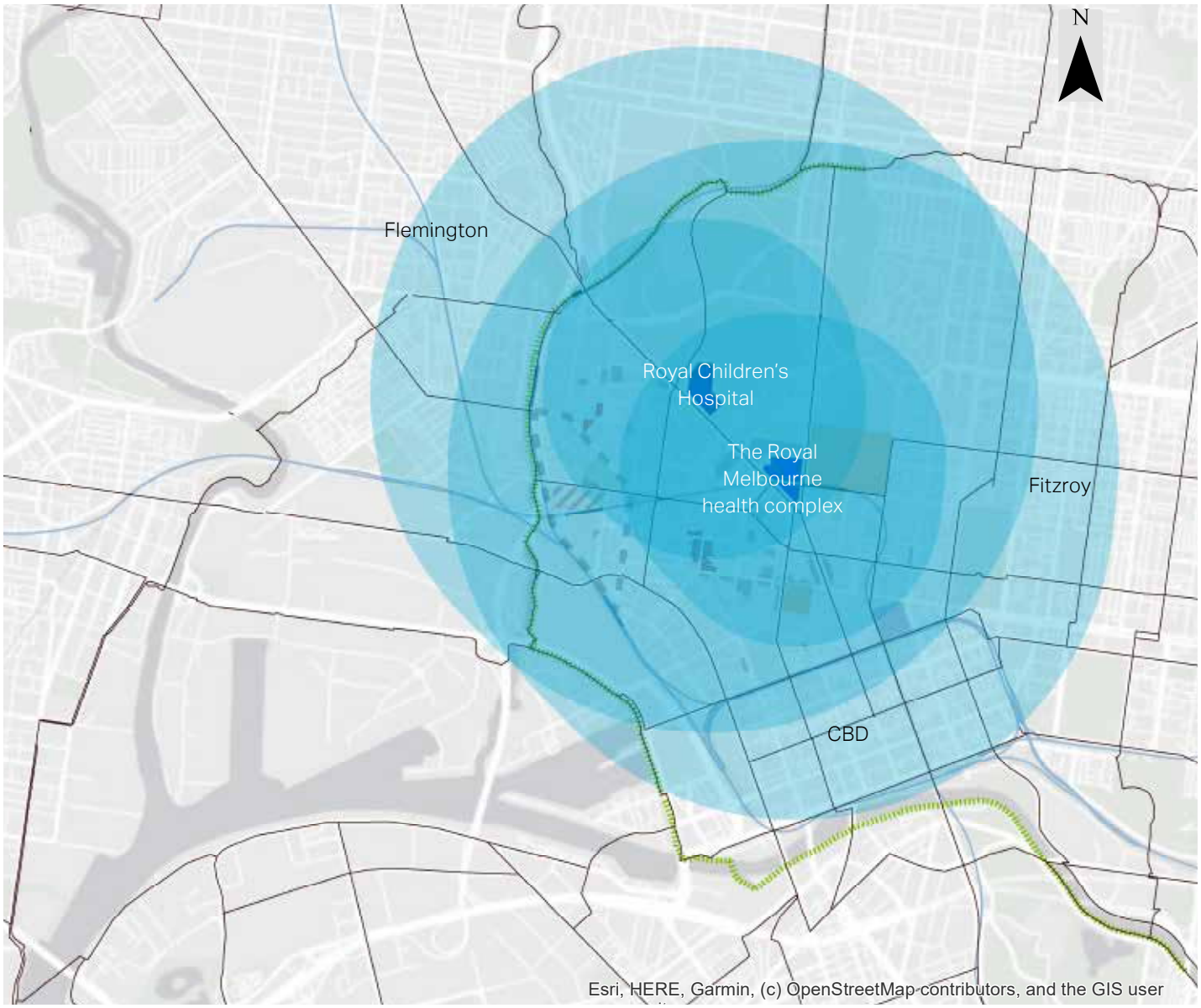


Strategic Cycling Corridors

Actiity centre - 5min and 10min catchments

Most of the key activity centres in the study area can be reached by local residents via a 5 minute cycle trip, with 10 minute catchments stretching well into the surrounding inner suburbs. Strategic Cycling Corridors together with local cycling links can offer convenient cycling access to and from the highly populated areas of the CBD, Fitzroy and Flemington, among others.

Cycling catchment to key attractor nodes - Health centres



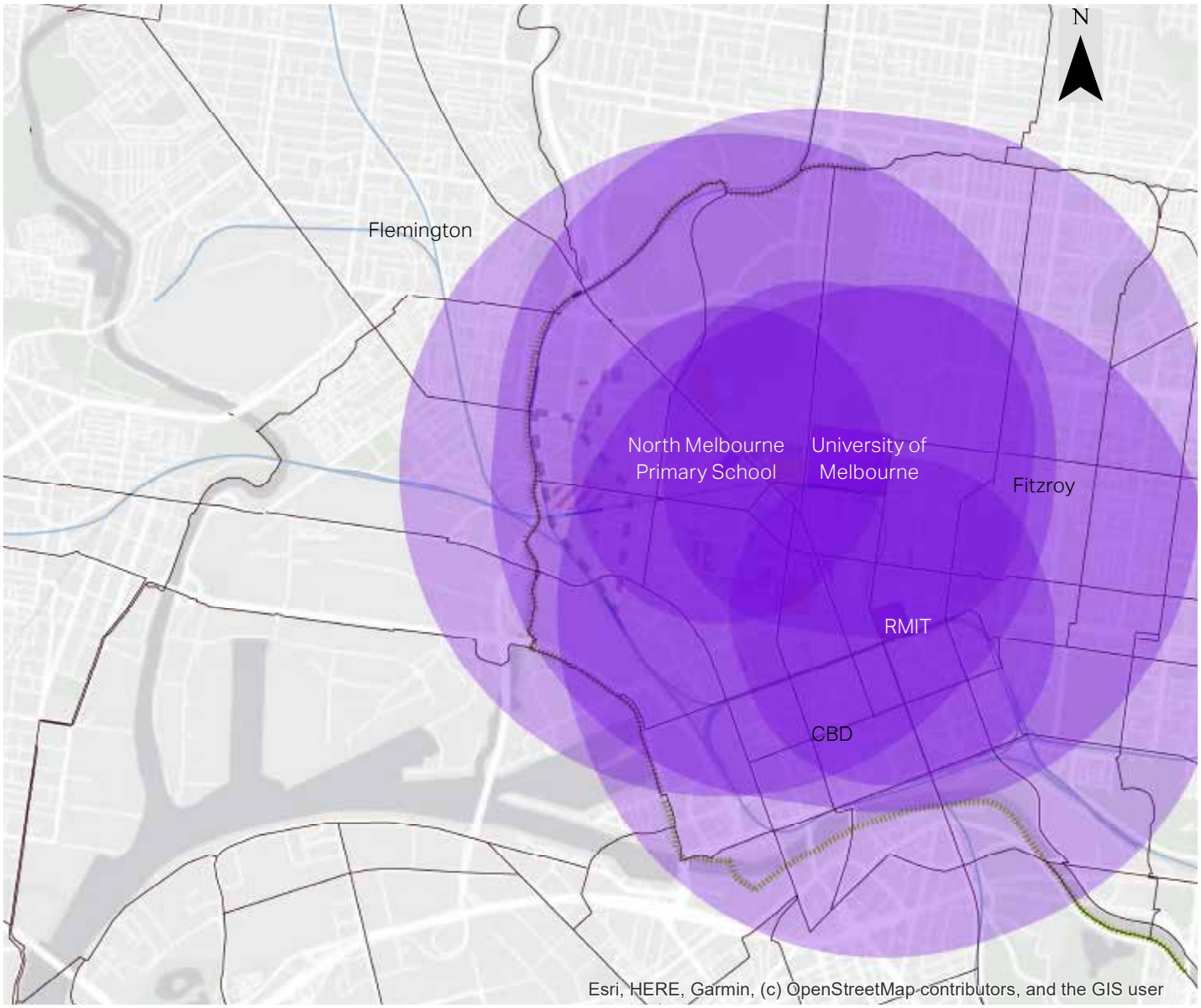
Strategic Cycling Corridors

Health cluster - 5min and 20min catchments

Hospitals can be attractors for cyclists particularly pertaining to staff and visitors.

The Royal Children's Hospital can be accessed in approximately 5 minutes from the Capital City Trail. The remainder of the Royal Melbourne health complex and University of Melbourne Parkville campus can be accessed from the Capital City Trail and other key regional connectors in 10 minutes or less.

Cycling catchment to key attractor nodes - Education centres

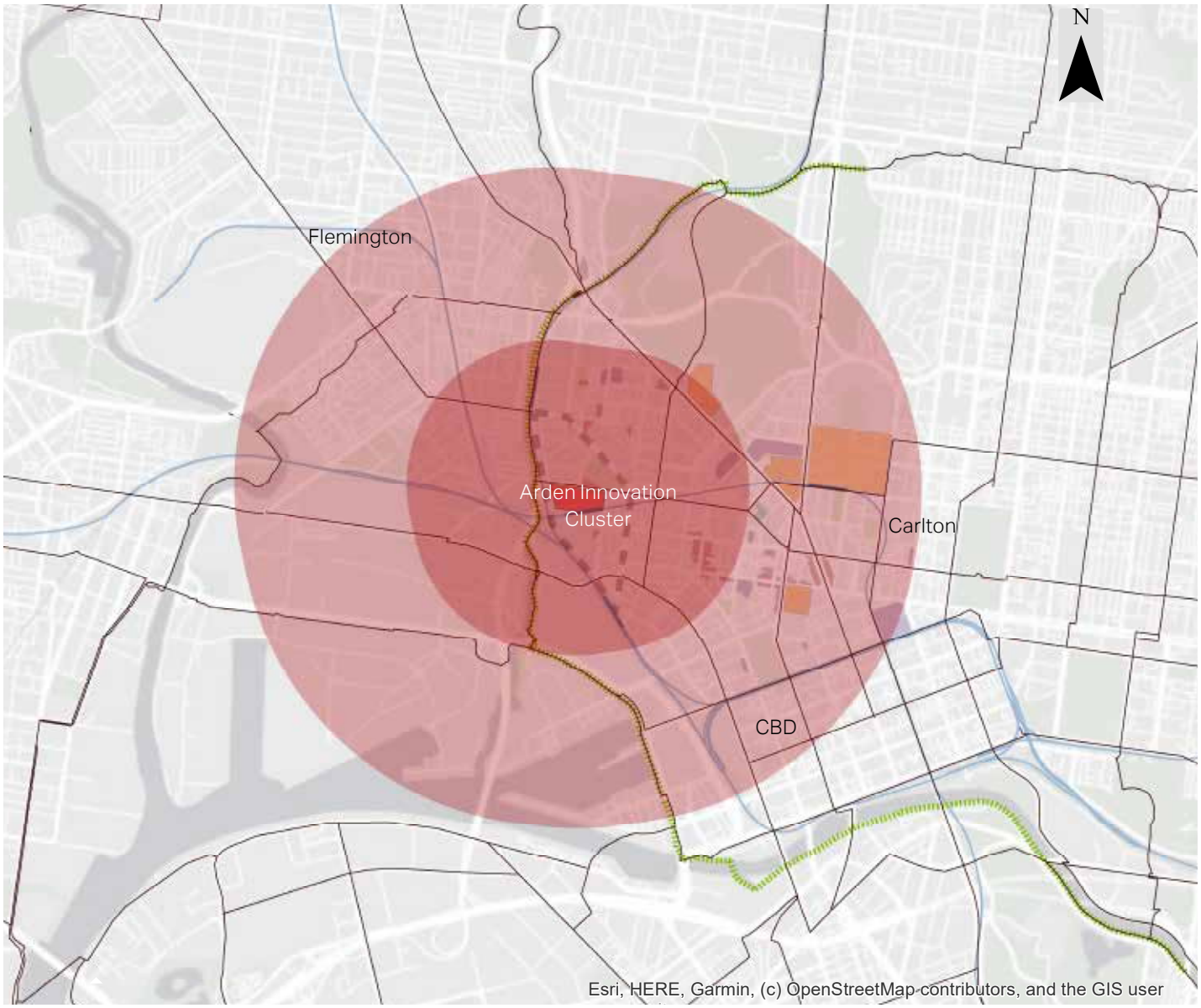


Strategic Cycling Corridors

Education centre - 5min and 10min catchments

The 5 and 10 minutes cycling catchments of RMIT covers the vast majority of the study area, enabling students and staff living within the area to commute to campus by cycling given safe and convenient connections.

Cycling catchment to key attractor nodes - Arden Innovation Cluster



— Strategic Cycling Corridors

Arden innovation cluster - 5min and 10min catchments

The proposed Arden Innovation Cluster includes the Arden activity centre and its expected future institutional uses, presumed to include health-related facilities. The vicinity of this cluster with respect to the Royal Melbourne Health Cluster is expected to generate new trips between these nodes, underscoring the value of safe and direct cycling connections as a sustainable and efficient travel option.

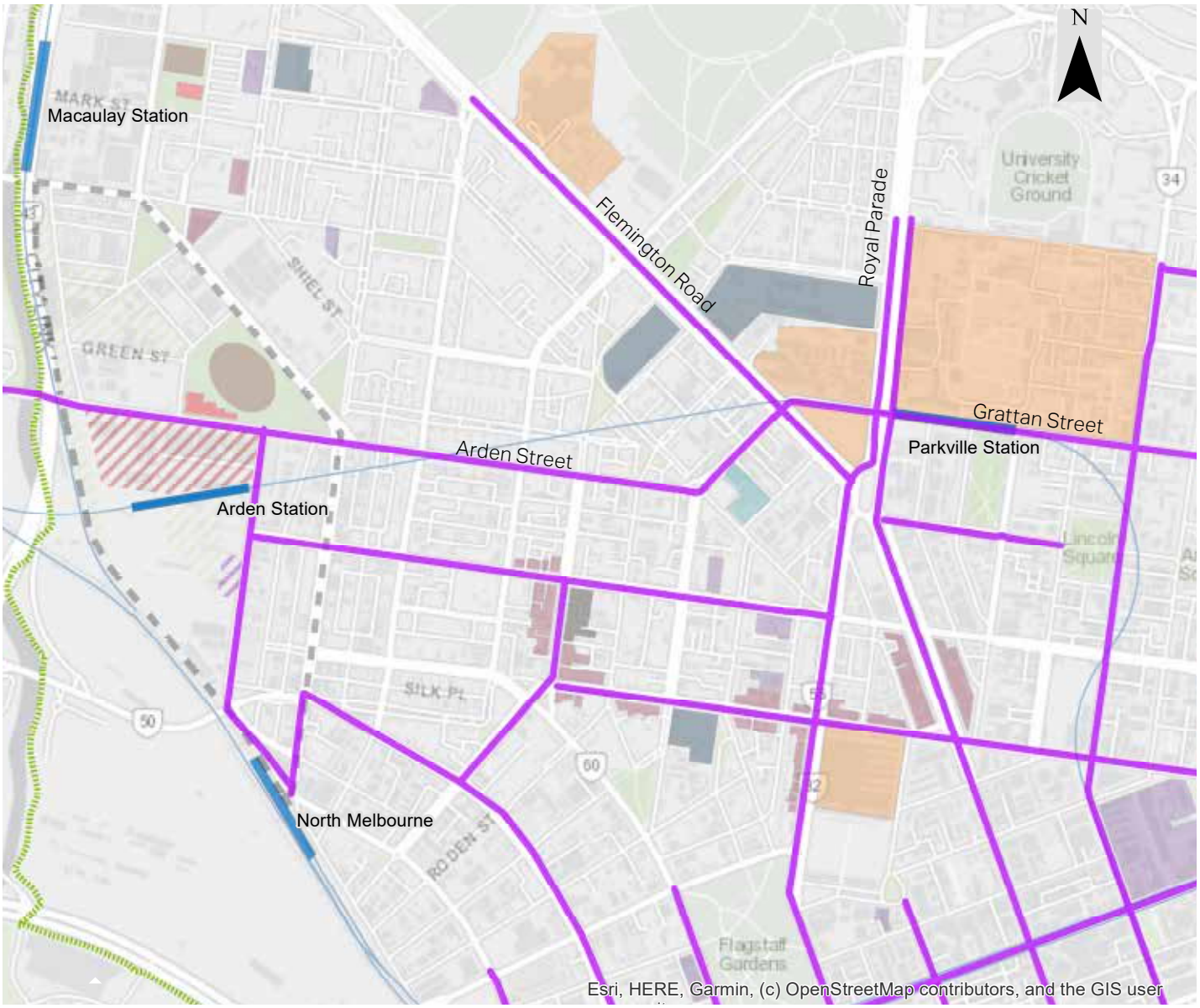
Document review maps

Several of the strategies and plans reviewed in Chapter 2 identify strategic walking and cycling routes through the study area. Though not completely consistent across all the reviewed plans, there are a number of commonalities that can help inform the identification of the most critical active transport corridors.

The following set of maps overlays the outcomes of these previous investigations to highlight the areas where their recommendations converge.

Existing cycling/walking infrastructure at Arden Street

Document review - Walking strategic routes

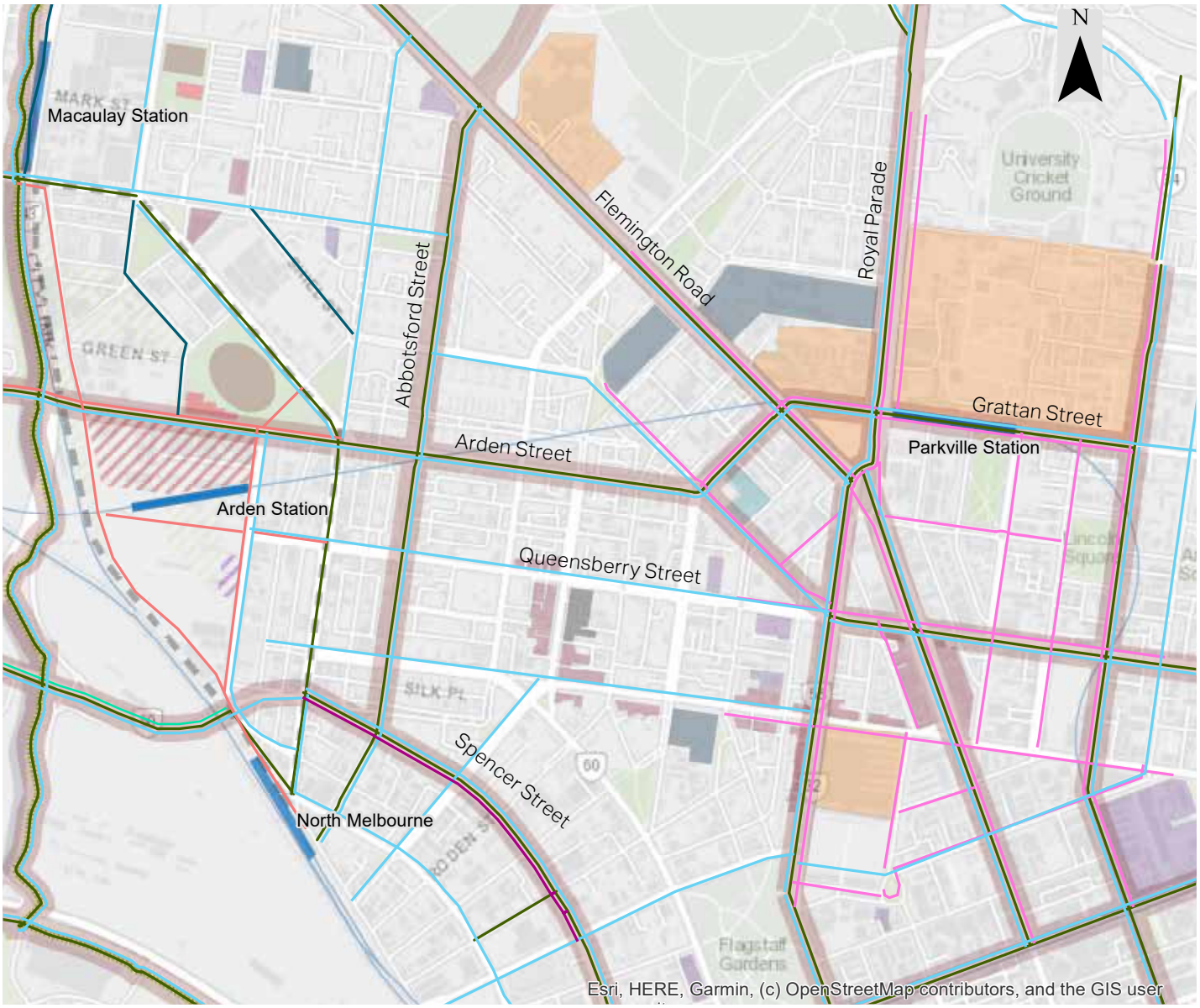


- Movement and Place Strategy - Walking priority routes
- Metro Train stations
- Key attractors
- Capital City Trail

As shown above, the Movement and Place Strategy identified key walking routes based on the Movement and Place Framework, including the key east-west corridor traversing the whole of the study area via Arden Street, Wreckyn Street and Grattan Street.

Key north-south corridors include Flemington Road, Royal Parade, Elizabeth Street and Peel Street, all intersecting at the complex Haymarket roundabout.

Document review - Cycling strategic routes



- Transport Strategy 2030 - Protected bike lane
- City North PSP - Cycling route
- Macaulay PSP - Additional protected bicycle path
- Arden PSP - Strategic Cycling Corridor
- West Melbourne PSP -Bicycle priority route
- Movement and Place Strategy - Cycling priority route
- West Gate Tunnel cycling path
- 2020 SCC update
- Metro Train stations
- Key attractors
- Capital City Trail

As highlighted above, there are multiple plans and strategies that identify various priority corridors or upgrades in the cycling network. Several key areas of note in relation to the 2020 update of the Strategic Cycling Corridors include:

- Arden Street/Grattan Street/Queensberry Street east-west corridor
- Spencer Street north west-south corridor
- Haymarket intersection: Flemington Road, Royal Parade, Elizabeth Street and Peel Street
- Abbotsford Street north-south corridor

04

PRIORITY CORRIDORS

Points of interest

- art centre
- recreational centre
- education complex
- park
- activity centre

Arden points of interest

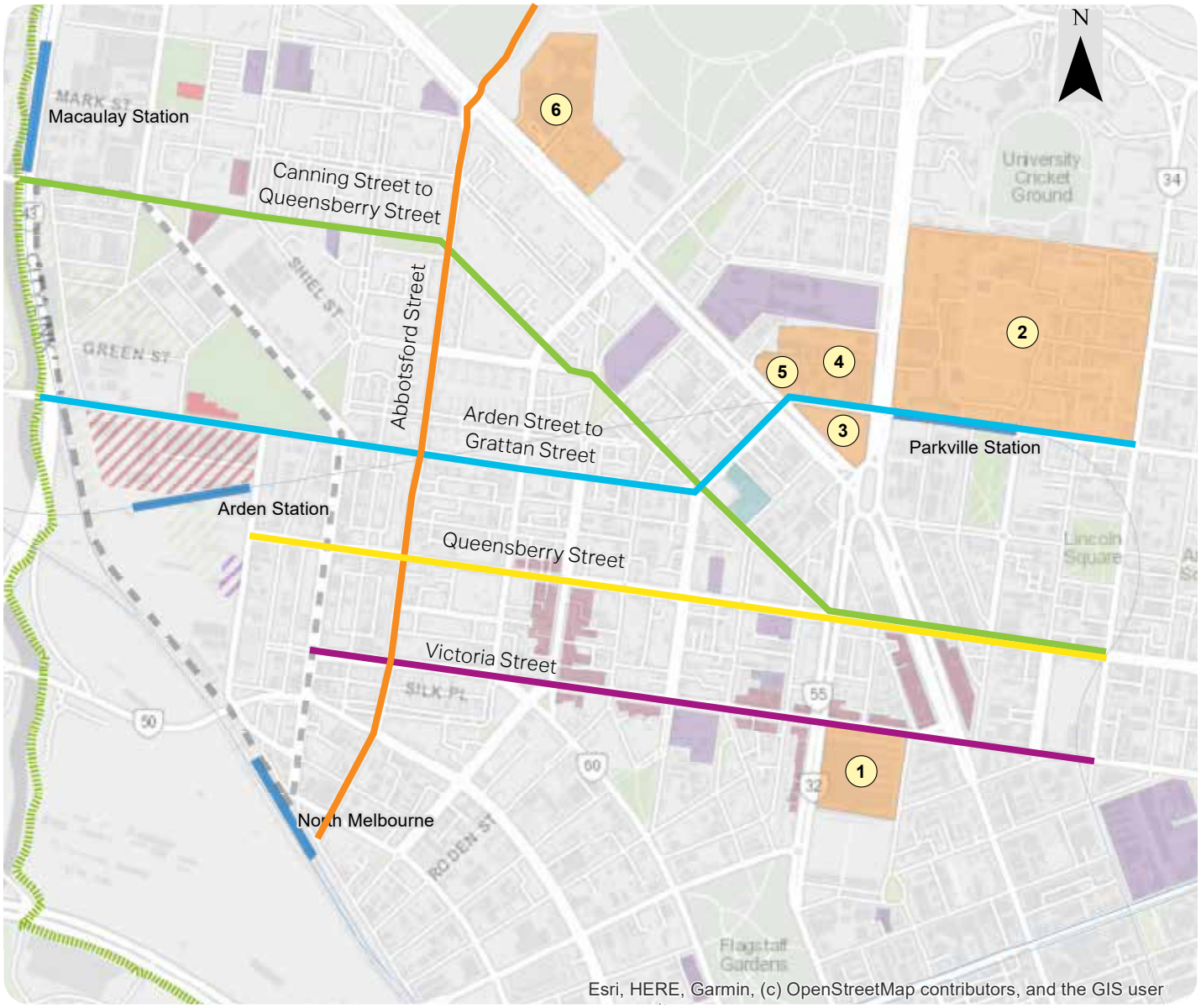
- Arden Precinct boundary
- Innovation Cluster
- proposed school
- proposed open space

1. Queen Victoria Market
2. University of Melbourne
3. Victorian Comprehensive Cancer Centre
4. Royal Melbourne Hospital
5. Royal Women's Hospital
6. Royal Children's Hospital

Capital City Trail

Metro Train stations

Key study area corridors



4. PRIORITY CORRIDORS

The project scope of this investigation is to identify two priority corridors, both for pedestrians and cyclists, between the Arden and Parkville precincts. This section provides a summary of the evaluation framework used to identify the preferred corridors.

Evaluation framework

An evaluation framework has been developed to identify the preferred priority walking and cycling corridors.

The comparative evaluation considers the existing conditions along each of the potential routes, their strategic importance with respect to the goals of this study, and the potential degree of enhancement that could be realistically achieved on each.

Key stakeholders have been engaged across this process to ensure all critical factors have been fully considered.

Basis of analysis

The starting point of the prioritisation assessment is based on the analyses conducted as part of this study, including:

- Existing infrastructure conditions
- Land use and key attractor nodes
- Document review with identified priority corridors or future infrastructure improvements.

The inputs and conclusions of these preliminary analyses are presented in Chapters 2 and 3 of this report.

Key corridors

Five main corridors within the study area were compared based upon their importance to the active transport network, relevance to the project objectives, and their potentiality for significant upgrade, as informed by the preliminary analyses discussed above along with stakeholder feedback.

These corridors have included:

- Abbotsford Street
- Canning Street continuing to Queensberry Street
- Arden Street continuing to Grattan Street
- Queensberry Street
- Victoria Street

The evaluation process and conclusions with respect to these five candidate corridors are presented on the following pages.

Prioritisation methodology

4.1 Corridor assessment

Each of the identified key corridors within the study area was assessed according to four criteria:

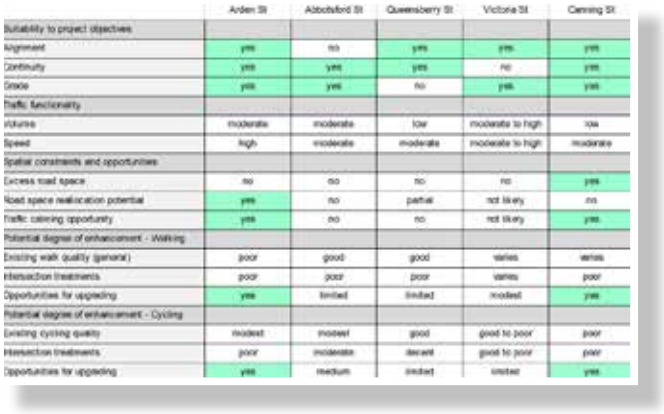
- Functionality according to project scope, land use, connectivity, and relative level of priority identified in previous studies and strategies
- Existing conditions, particularly the magnitude of existing safety issues
- Key challenges to the implementation of a continuous high-quality active transport route
- Proposed improvements to the corridor.

4.2 Comparative evaluation

The prioritisation of the two walking and cycling corridors have been determined using a multi-criteria assessment based on the factors noted above.

The decision framework was divided into five main categories: suitability to project objectives, traffic functionality, spatial constraints and opportunities, potential degree of walking enhancement, and potential degree of cycling enhancement.

The Arden Street and Canning Street corridors were assessed as the corridors with the most potential for upgrades that achieve the goals of the project scope.



4.3 Stakeholder workshop

The Department of Transport, City of Melbourne, Victorian Planning Authority, and Department of Jobs, Precincts and Regions were invited to participate in a workshop undertaken on 13 July 2020 to discuss the comparative evaluation of the key candidate corridors and to agree on selection of two main routes for walking and cycling enhancement.

4.4 Outcome

The conclusions of the prioritisation process, described in the previous page, with respect to each of the candidate corridors are discussed below:

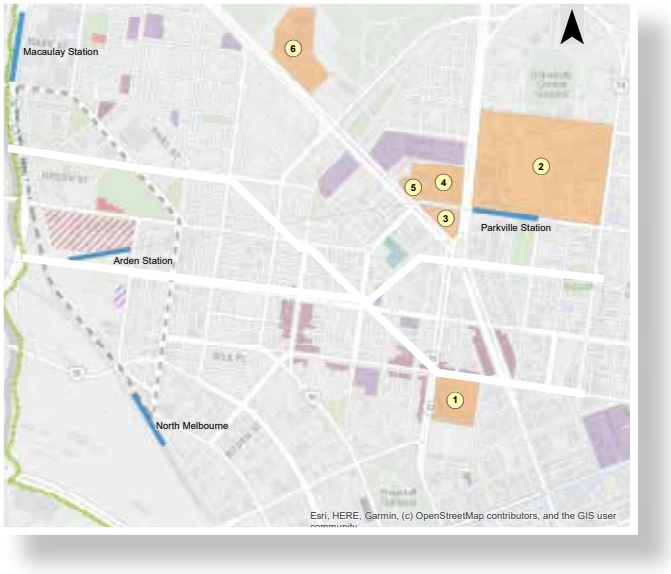
Arden Street – This is a strategic east-west connection with unsatisfactory existing conditions (particularly for cycling) and significant opportunity for enhancement pending the reduction of the traffic cross section from two lanes to one lane in each direction.

Abbotsford Street – Although an important connection through the study area to/from the CBD, Abbotsford Street's strategic functionality in linking together the major activity clusters within the precinct is lower than that of the evaluated east-west corridors. Abbotsford Street also is already programmed for short term improvement through the City of Melbourne's upgrade program.

Queensberry Street – This corridor is an important connection between the Arden and Parkville precincts, yet its steep grade and discontinuity on the western end makes it less attractive as a cycling corridor than the adjacent parallel Arden Street. Also, in comparison with the Arden Street and Canning Street routes, its existing walking environment is more comfortable and less interrupted by difficult crossings, and therefore not as much in need of immediate upgrade as the other routes.

Victoria Street – Victoria Street varies considerably in character from west to east, with a highly traffic oriented western end giving way to a pedestrian oriented commercial corridor east of Errol Street. Its location on the periphery of the study area, along with its limited opportunities for enhancement due to competing transport functions, make it less of an immediate candidate for end to end active transport improvement than the other east-west corridors considered.

Canning Street – The Canning Street corridor as defined for this study consists of a multiple roads and cross sectional configurations. Although generally pleasant for walking and cycling due to the low traffic volumes along the route, the hazards associated with several key road crossings limits its current viability as an active transport connector for a wider variety of user types.



The overall result of this comparison is that the Arden Street and Canning Street corridors would represent the optimal combination of routes for both walking and cycling.

Whilst Arden Street would be the main 'commuting' corridor with its very direct connection between the Arden and Health Precincts, the Canning Street corridor offers a community centric 'green' connection amongst residential areas, key neighbourhood centres, and educational facilities whilst connecting the Macaulay and Arden North Precincts to Parkville. Upgrade of this route (particularly the intersections) would address existing critical safety issues and attract larger numbers of pedestrians and cyclists in the future.

Priority corridors summary

4.5 Canning Street continuing to Queensberry Street

The Canning Street to Queensberry Street corridor provides an east-west connection via residential and local roads. This route travels through generally low-stress environments and along parks and tree-covered areas. It diverts from the Queensberry Street Strategic Cycling Corridor to connect with the Macaulay precinct via North Melbourne Primary School.

The existing pedestrian infrastructure consists of standard footpaths beneath a generally dense tree canopy. The existing cycling infrastructure varies from standard cycle lanes to informal unmarked shared zones. Courtney Street provides buffered (chevron) cycle lanes between the car parking and traffic lanes, whilst Queensberry Street currently includes narrow cycle lanes with little to no separation between parked cars and moving traffic.

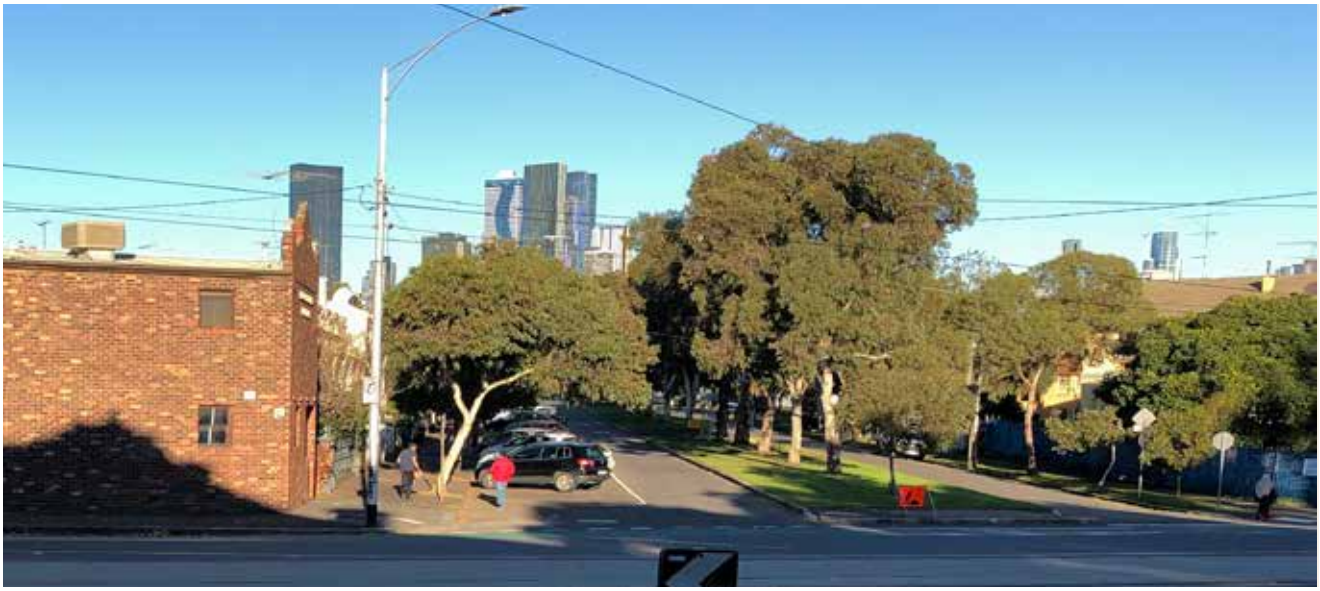
The key challenges of this corridor are the intersections at Abbotsford Street and Curzon Street, which presently disrupt the continuity of the corridor and restrict its appeal as a cycling and walking route.

An alternative route may be considered along Shiel and Haines Streets, which provides a flatter alignment but requires consideration of bus movements.

Canning Street east of Macaulay Road

Crossing location at Curzon Street

Intersection with Abbotsford Street



Molesworth Street

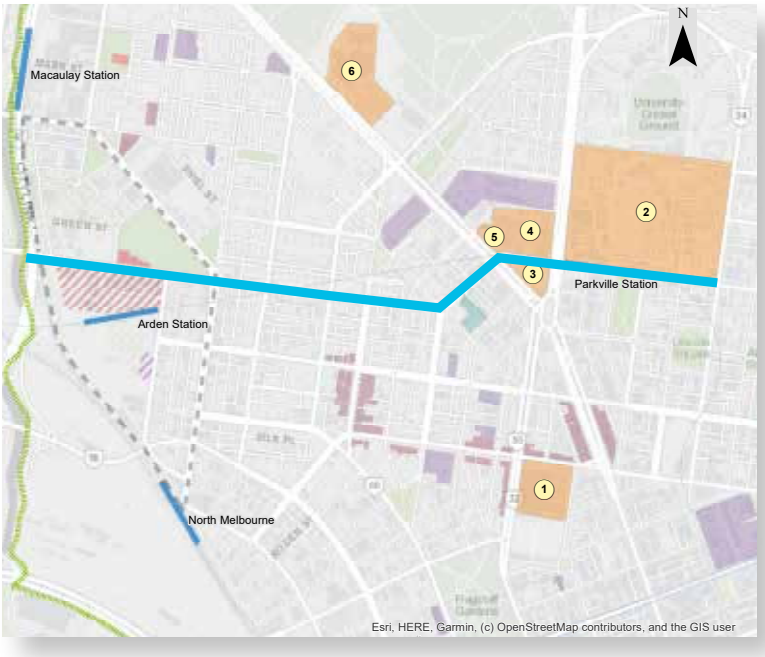
4.6 Arden Street continuing to Grattan Street

The Arden Street to Grattan Street corridor provides a direct connection between the Arden and Parkville precincts, specifically the Arden Innovation Cluster and the Royal Melbourne Health Cluster. This corridor is part of the Strategic Cycling Corridor network (2020 update).

The existing pedestrian infrastructure consists generally of standard footpaths within a largely unappealing environment for pedestrians, owing to Arden Street's generous traffic provisions. Arden Street provides standard cycle lanes with chevron protections to traffic and parking in some sections. Grattan Street does not provide cycling infrastructure, and is largely under reconstruction associated with the preparation of Parkville station.

The key challenges of this corridor are the generous widths given over to car traffic, along with long pedestrian waiting times at numerous intersections.

Residential parking demand is a challenge that may influence or limit potential design solutions, and in some cases may require further study. Complications also include the pending traffic outcome on Grattan Street which may require a complex solution at Royal Melbourne Hospital to maintain the hospital's access requirements. The Metro Tunnel project is expected to include provision of new cycle lanes on Grattan Street between Royal Parade and Bouverie Street.



Arden Street typical lane arrangement

Arden Street transition to two lanes at Leveson Street

Grattan Street typical layout (Source: Google Streetview)

Royal Melbourne Hospital

05

RECOMMENDATIONS

5. RECOMMENDATIONS

This section of the report lists a scope of improvements for each of the preferred corridors. These improvements have been further prioritised and sequenced according to criticality and cost.

Treatments

The identified improvements intend to fix connectivity gaps and provide a high-quality pedestrian and cycling environment for users for the full length of each of the routes.

See below an overview of the indicative treatments proposed for both the Canning Street and Arden Street priority corridors.

Corridor improvements

- No improvement required
- Rearrangement of road elements
- Resizing of road elements with improved striping
- Road space reallocation with protected cycle lanes

Improvements to intersections

- Expanded signal operation
- Improvements to crossings
- Lane configuration changes
- Local circulation changes
- Scale reduction measures

Canning Street Corridor

The proposed cycling infrastructure improvements along the Canning Street to Queensberry Street corridor intend to achieve a green and low-stress connection with mixed facility types. The indicative proposal for Canning Street is to implement kerb-protected cycle lanes, bidirectional paths and shared zones to support a fully interconnected high quality cycling corridor.

Pedestrian infrastructure improvements would involve crossing upgrades and signal coordination at several key intersections, along with improved paths and crossings at some locations.

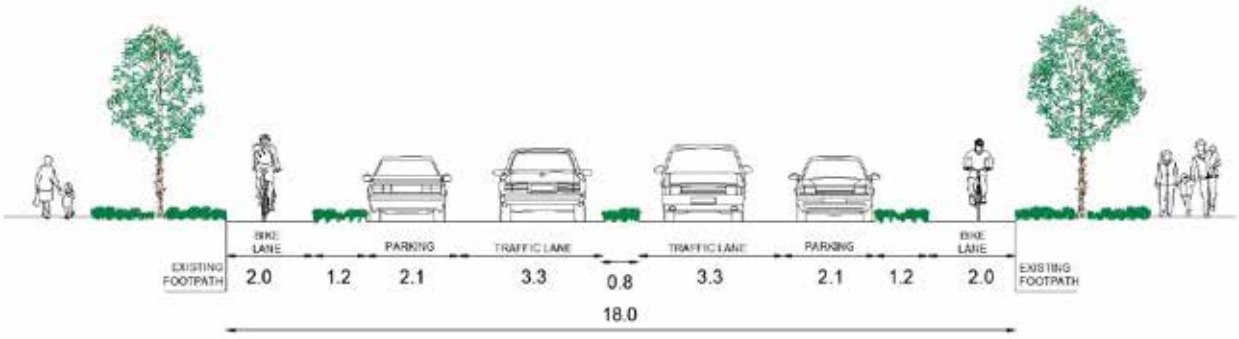
The following pages provide an indicative vision of what types of enhancements could be deployed on the Canning Street corridor to help improve upon the existing walking and cycling conditions. Whilst the types of measures shown have been used to develop high level cost estimates and an indicative level of priority, the details of each location will have to be subject to a more complete design study accounting for safety implications, sight distances, maintenance requirements, drainage implications, and design vehicle swept path requirements.

The Queensberry Street section has not been shown in detail owing to its dependence on long term traffic outcomes related to Metro Tunnel works.

Example bi-directional cycle paths - Capital City Trail, Brunswick East

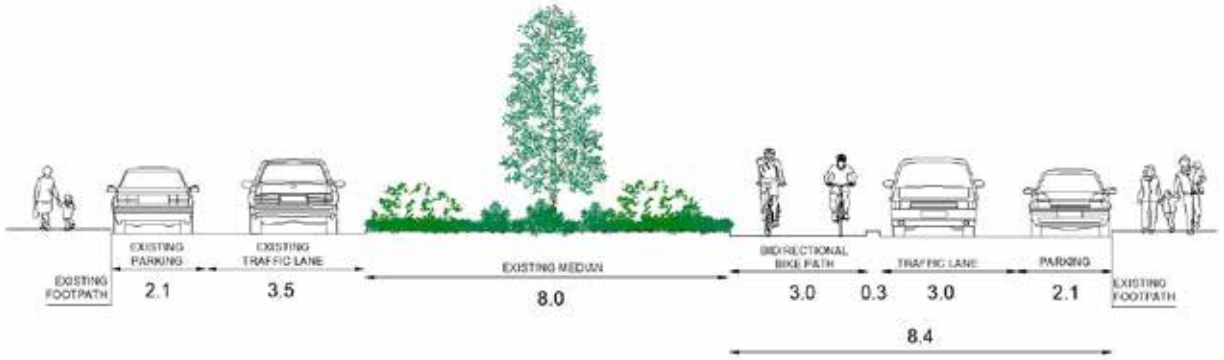
Source: https://commons.wikimedia.org/wiki/File:Capital_city_trail,_melbourne,_australia.jpg - Mat Connolley

Canning Street corridor cross sections



Canning Street proposed typical cross section

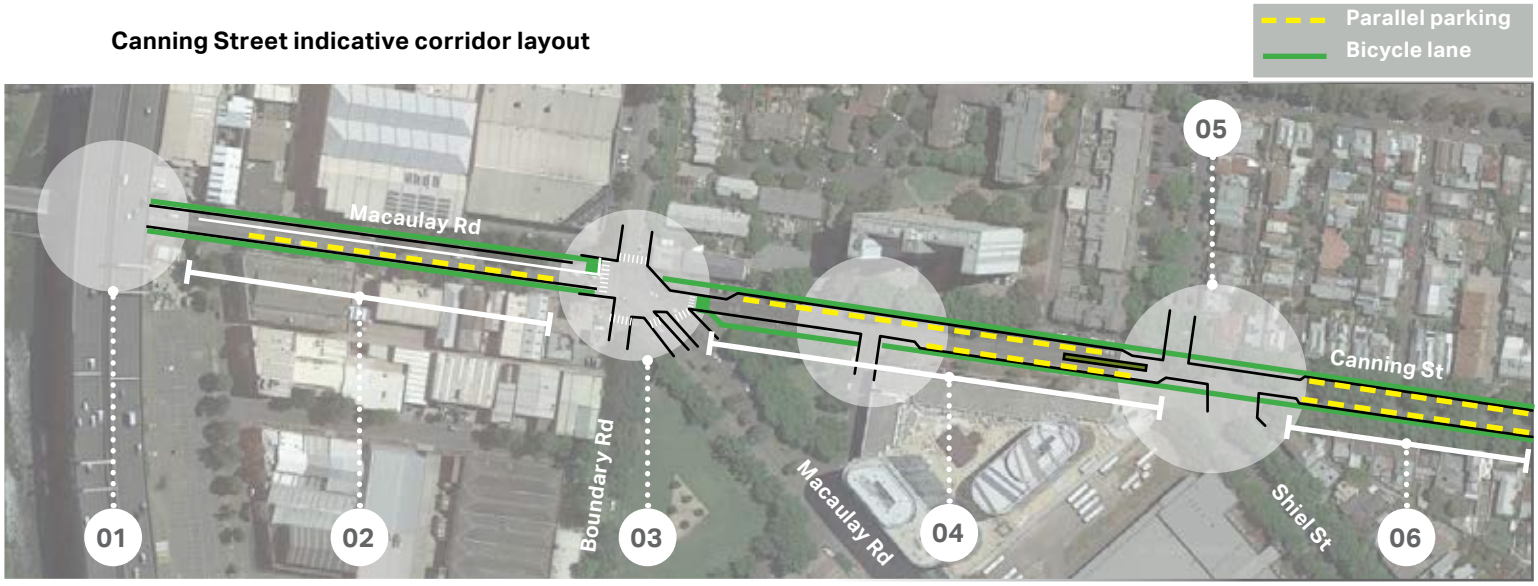
Indicative only: This cross section to be refined upon further study to reflect considerations including parking removal impacts, traffic performance, and general access requirements.



Molesworth Street proposed cross section

Canning Street Corridor

Canning Street indicative corridor layout



01 Awareness treatments

02 Typical cross section with parking on one side of the road

03 Pedestrian and cyclist crossing improvements -protected intersection for cyclists

04 Typical cross section with parking on one side or both sides of the road

05 Cyclist and pedestrian priority crossings

06 Typical cross section

Indicative only: These concepts are preliminary in nature and will require refinement upon further study to reflect a wider range of design considerations including parking removal impacts, traffic performance, road surface conditions, and general access requirements.

Example low intensity pedestrian environment - Royal Parade, Carlton North

Source: https://www.realestateview.com.au/real-estate/22-283-royal-parade-parkville-vic/property-details-sold-residential-12368952/

06 Typical cross section

07 Cyclist and pedestrian priority crossing

08 Bidirectional bicycle path

09 Marked or signalised ped/ bike crossing and shared zone treatment

10 Bidirectional bicycle path

11 Signalised crossing (as an extension of Haines St signal operation) and shared zone treatment either side

12 Shared zone treatment

13 Cycle crossing and shared zone treatments

14 Formalised pedestrian crossing

15 Protected cycle lanes

16 Roundabout with cycling priority

Arden Street Corridor

The cycling infrastructure improvements along the Arden Street to Grattan Street corridor intend to achieve a consistent and direct connection with the installation of continuous kerb-protected cycle lanes. This would necessitate the reduction of the number of traffic lanes from two to one in each direction on the western half of Arden Street between Citylink and Leveson Street.

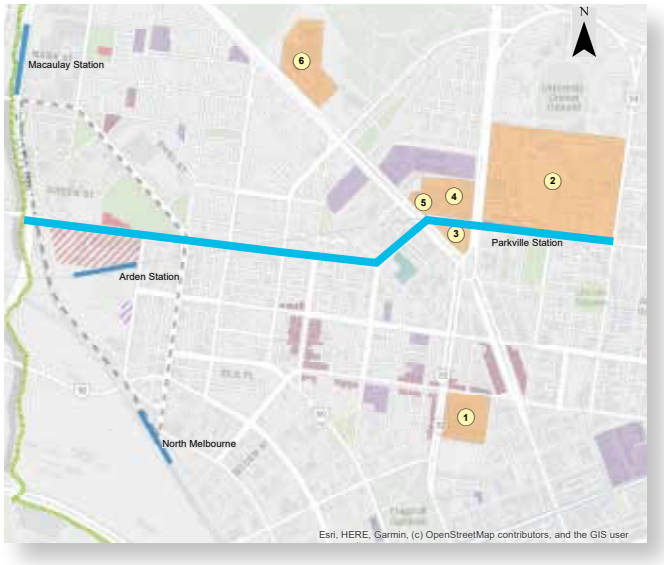
Pedestrian infrastructure improvements involve the increase of tree canopy where possible (minimum 20 percent cover according to the Urban Forest Precinct Plan), crossing upgrades, and signal coordination to reduce pedestrian delay times.

The indicative concepts on the following pages reflect a reduction in traffic cross section from two lanes to one lane in each direction, and have been arranged to accommodate proposed future infrastructure changes including a tram extension between Abbotsford Street and Fogarty Street.

The Arden Street typical cross section is indicative only and could be adjusted depending on bus priority requirements (Transport Strategy 2030) and B1 route designation (Movement and Place).

The indicative concepts exclude:

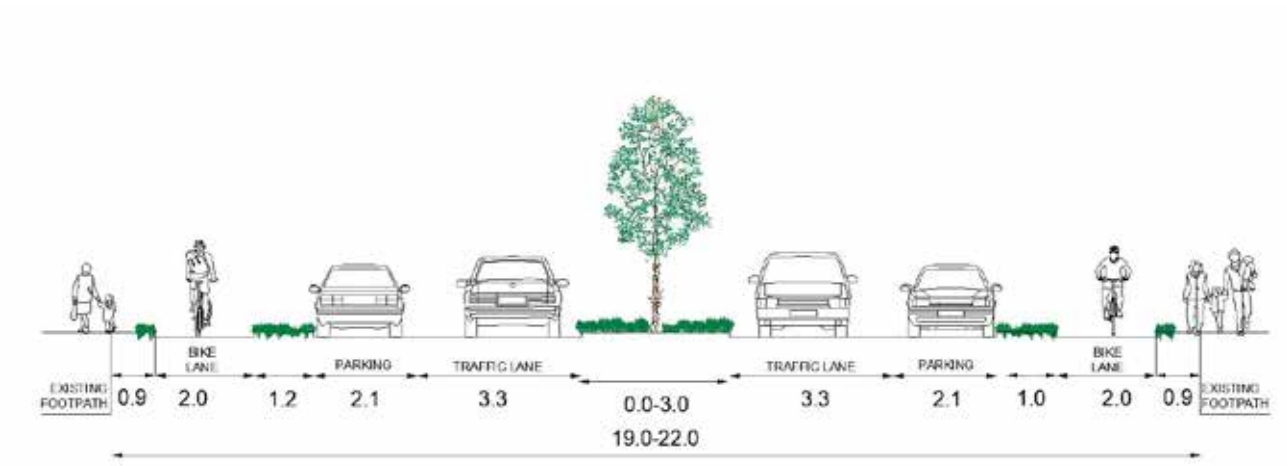
- Wreckyn Street, which has existing cycle lanes (striped buffers) that could be upgraded to protected lanes
- Royal Melbourne Health cluster area, which requires detailed study due to hospital access requirements
- Grattan Street, which is under construction as part of the Metro Tunnel Project.



Example high amenity separation - Constitution Avenue, Canberra

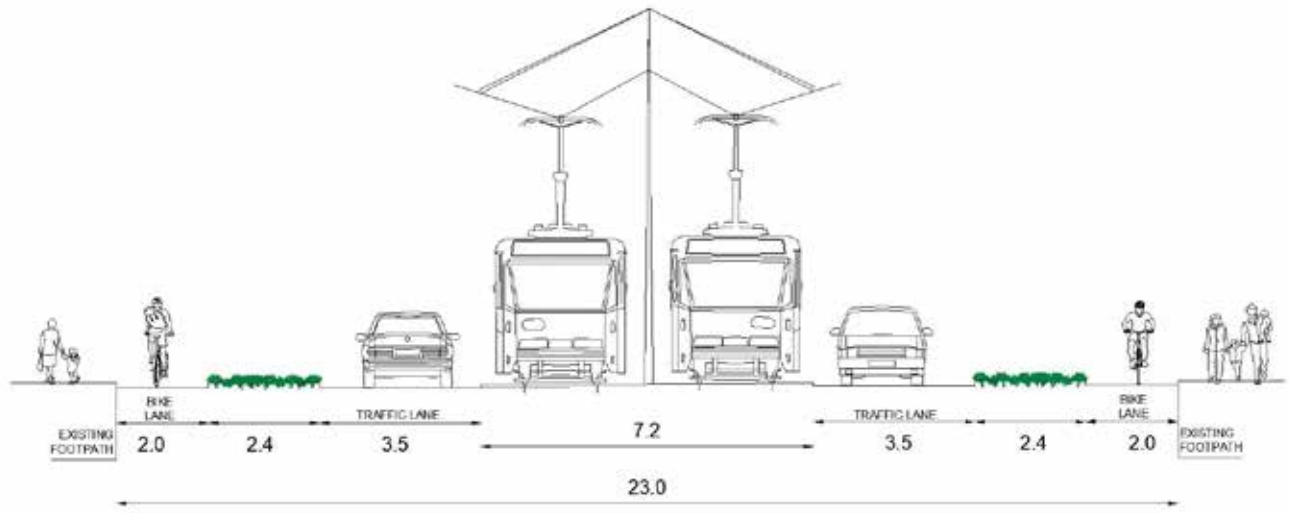
Source: https://www.foreground.com.au/parks-places/griffins-canberra-reclaiming-streets-people - John Gollings

Arden Street typical cross sections



Arden Street proposed typical cross section

Indicativeonly:Thiscrosssectiontoberefineduponfurtherstudytoreflectconsiderationsincludingparkingremovalimpacts, traffic performance, and bus priority routes and requirements.



Arden Street proposed typical cross section with tram or high capacity public transport lane (between Fogarty Street and Abbotsford Street)

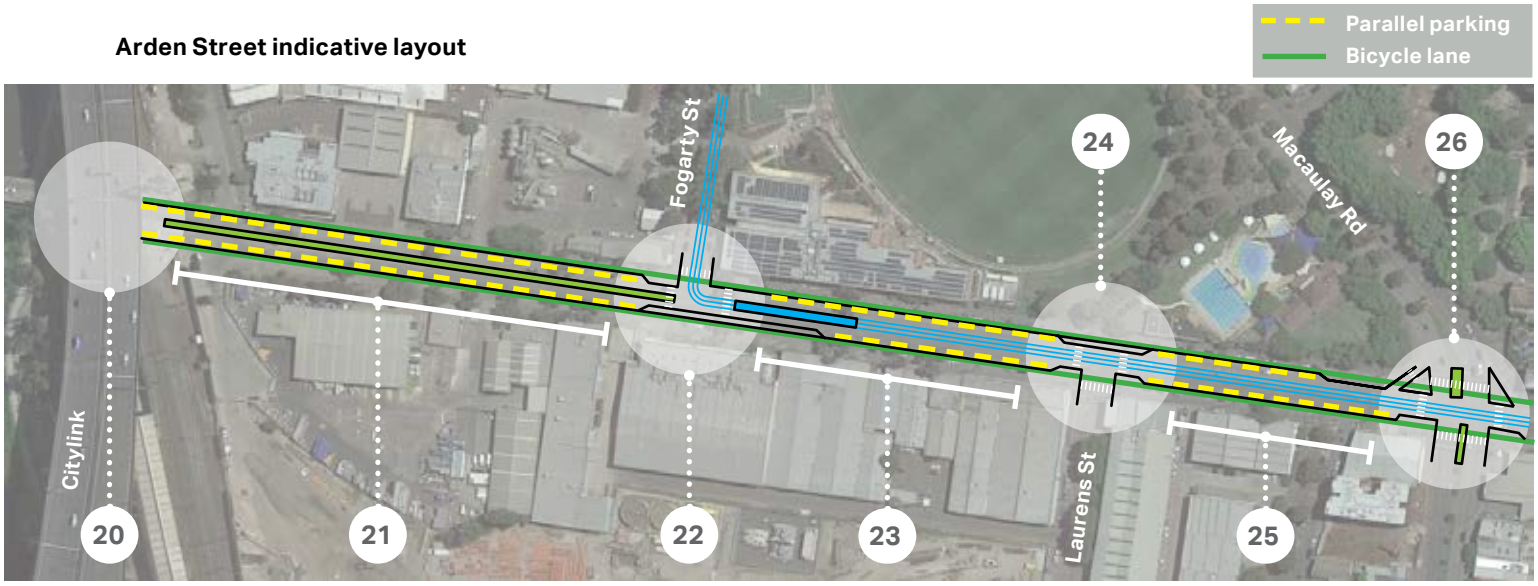
Arden Street Corridor

Example high amenity protected cycle lanes - Southbank Boulevard, Southbank

Source: https://www.melbourne.vic.gov.au/building-and-development/shaping-the-city/city-projects/southbank-boulevard/Pages/transforming-southbank-boulevard-dodds-street.aspx

Example pedestrian priority treatment - Southbank Boulevard, Southbank

Arden Street indicative layout



20 Formalised paths connecting to Capital City Trail

21 Typical cross section

22 Signalised intersection

23 Typical cross section with tram

24 Cyclist and pedestrian priority crossing

25 Typical cross section with tram

26 Signalised intersection with improved pedestrian connections and protected intersection for cyclists

Indicative only: These concepts are preliminary in nature and will require refinement upon further study to reflect a wider range of design considerations including parking removal impacts, traffic performance, road surface conditions, and general access requirements.

27 Typical cross section with tram

28 Cycling and pedestrian crossing treatments - protected intersection

29 Typical cross section

30 Cycling and pedestrian crossing treatments

31 Typical cross section

32 Pedestrian crossing treatments

33 Typical cross section

34 Typical cross section

35 Roundabout with cycling priority

Projects summary by site location: Canning Street corridor

	Location	Preliminary scope of works (pending detailed study)	Indicative cost*	Constraints	Opportunities for integration	Lower cost alternatives
	Canning Street to Queensberry Street					
1	Moonee Ponds Creek Trail junction	Cyclist and pedestrian awareness treatments	$200,000	Citylink structures; Macaulay station entrance		
2	Citylink to Macaulay Rd	Reorientation of road w/o north side parking 2x200m protected cycle lanes	$400,000			
3	Macaulay Rd intersection	1 expanded pedestrian refuge island 2 new striped pedestrian crossings 2 bike boxes Relocation of bus stop (~10m)	$150,000	Complex turn movements		
4	Macaulay Rd to Melrose St	1x200m protected cycle lane 1x125m protected cycle lane 1x75m off road cycle path 1 kerb bump-out (Vaughan Tce)	$375,000			Improved cycle lane striping
5	Melrose/Shiel St intersection	4 kerb bump-outs Enhanced island treatment	$150,000			Enhanced islands & striping
6	Shiel St to Dryburgh St	2x200m protected cycle lanes	$400,000			Improved cycle lane striping
7	Dryburgh St intersection	2 painted cycle crossings	$10,000			
8	Dryburgh St to Abbotsford St	1x150m 2-way cycle track	$300,000			Shared zones or striped lanes
9	Abbotsford St intersection	1 striped cycle crossing (2-way) 1 striped pedestrian crossing Tactile traffic calming / shared zone treatment Supporting signage	$440,000		Abbotsford St north-south cycling corridor	
10	Abbotsford St to Curzon St	1x250m 2-way cycle track Reorientation of parking (north side) Shared zone surface treatment (east end) 1x10m 2-way off road cycle path (at Curzon St)	$550,000			Shared zones or striped lanes
11	Curzon St intersection	New signal heads and wiring 2 striped cycle crossings 1 striped pedestrian crossing Intersection lane striping	$425,000			
12	Curzon St to Haines St	1x40m shared zone treatment	$50,000			
13	Molesworth/Haines St to Errol St	2x50m shared zone treatments 1x10m off road cycle path 1 striped cycle crossing	$200,000			
14	Errol St intersection	1x8m walking path with ramps 1x3m walking path with ramps	$20,000			
15	Courtney St: Haines St to Arden St roundabout	2x200m protected cycle lanes	$400,000			Retain or upgrade existing cycle lane
16	Arden St roundabout	Cycle lane resurface/repaint 150m Tactile separators 150m	$100,000	Constrained width	Arden St cycling corridor	
17	Arden St roundabout to Queensberry St	2x200m protected cycle lanes 1x50m shared zone	$450,000			
18	Queensberry/Peel St intersection	Enhanced cycle striping	$15,000			
19	Queensberry St: Peel St to Elizabeth St	2x150m protected cycle lanes (requires removal of a traffic or parking lane)	$300,000			
Plus 25% for preliminary works and traffic management			$1,233,000	*based on application of average costs and unit rates from similar projects sourced from City of Melbourne and elsewhere, not accounting for specific site investigation and pending further study & design. For indicative purposes only		
Plus 25% contingency			$1,233,000			
Preliminary estimated total*			$7,400,000			

Projects summary by site location: Arden Street corridor

	Location	Preliminary scope of works (pending detailed study)	Estimated cost*	Constraints	Opportunities for integration	Lower cost alternatives
	Arden Street (west to east)					
20	Junction with Moonee Ponds Creek Trail	Pathway realignment and formalisation	$200,000	Citylink structures Train maintenance access		
21	Citylink to Fogarty St	Lane reduction (2 to 1 each way) 2x250m protected cycle lanes 1x200m landscaped island	$600,000		Water management	
22	Fogarty St intersection	New traffic signal 2 kerb bump-outs 3 striped pedestrian crossings	$450,000		Tram/train integration	
23	Fogarty St to Laurens St	Lane reduction (2 to 1 each way) 2x150m protected cycle lanes	$300,000	Future tram terminus stop		
24	Laurens St intersection	3 kerb bump-outs 3 painted pedestrian crossings	$100,000	Future tram alignment	Arden precinct integration	
25	Laurens St to Dryburgh St	Lane reduction (2 to 1 each way) 2x150m protected cycle lanes	$300,000	Future tram alignment		
26	Dryburgh St intersection	Lane reconfiguration to suit cross section 3 kerb bump-outs 4 expanded pedestrian refuge islands	$250,000	Future tram alignment High volume turn movements	Build on current plan	
27	Dryburgh St to Abbotsford St	Lane reduction (2 to 1 each way) 2x150m protected cycle lanes	$300,000	Future tram alignment		
28	Abbotsford St intersection	4 painted pedestrian crossings 4 painted cycle crossings 2 bike boxes Lane reorientation and re-striping	$100,000	Future tram turn location	Abbotsford St enhancements	
29	Abbotsford St to Curzon St	Lane reduction (2 to 1 each way) 2x200m protected cycle lanes	$400,000	Angled parking removal		Bi-directional path
30	Curzon St intersection	2 kerb bump-outs 2 expanded pedestrian refuge islands 2 bike boxes	$125,000	High current turn volumes		
31	Curzon St to Errol St	Lane reduction (2 to 1 each way) 2x100m protected cycle lanes	$200,000	Angled parking removal		Bi-directional path
32	Errol St intersection	2 kerb bump-outs	$60,000			
33	Errol St to Leveson St	Lane reduction (2 to 1 each way) 2x100m protected cycle lanes	$200,000	Angled parking removal		Bi-directional path
34	Leveson St to Courtney St	2x100m protected cycle lanes	$200,000			
35	Courtney St roundabout	Cycle lane resurface/repaint 150m Tactile separators 150m	$100,000	Constrained width		
36	Wreckyn St: Courtney St to Flemington Rd	2x200m protected cycle lanes	$200,000			Retain/upgrade existing lanes
37	Flemington Rd intersection	Left turn lane removal (2) 2 kerb bump-outs	$175,000			
38	Grattan St: Flemington Rd to Royal Pde	2x150m protected cycle lanes	$300,000		Parkville station construction	
39	Grattan St: east of Bouverie St	2x150m protected cycle lanes	$300,000			
Plus 25% for preliminary works and traffic management			$1,215,000	*based on application of average costs and unit rates from similar projects sourced from City of Melbourne and elsewhere, not accounting for specific site investigation and pending further study & design. For indicative purposes only		
Plus 25% contingency			$1,215,000			
Preliminary estimated total*			$7,300,000			

Project prioritisation

The project prioritisation framework has been designed to capture the relative criticality and deliverability of each of the proposed upgrades as shown at an indicative level in this report. As there are many related and interdependent parts to these proposals, the numerical score of each specific project represents just one component of a wider decision making framework for prioritising these actions, along with considerations of dependencies and physical contiguity as noted below.

The following table uses a colour grading scheme to identify the factors which most support the prioritisation of certain sub-projects, with the darker colours representing the highest possible score for each category.

The four main scoring elements included:

- **Safety priority,** reflecting the severity of existing safety deficiencies
- Level of **coordination** required, particularly with respect to additional organisations
- High level **cost,** as determined through indicative application of unit rates
- **Complexity** of implementation, pertaining mainly to the degree to which other street elements would need to be reorganised to accommodate the proposed changes.

Scores of 0 to 2 were assigned for each category, with the highest score of 2 representing the *highest* safety priority and the *lowest* levels of coordination, cost and complexity. Cost ratings are relative to the length of route affected.

As the **safety priority** category best represents the overall need for the project, its scores have been weighted by a factor of 3 to balance the other three categories (all pertaining to the challenges of implementation) and to reflect its primary importance. As such, the highest possible overall score was 12, exhibited by only the Arden Street/Courtney Street roundabout.

Project prioritisation assessment

No.	Location	Safety priority	Coordination	Cost	Complexity	Dependencies (unscored)	Score
	Canning Street to Queensberry Street	**3x weight**	**1x**	**1x**	**1x**		**total 12**
1	Junction with Moonee Ponds Creek Trail	1-medium	1-moderate	2-low	2-low	none	8
2	Citylink to Macaulay Rd	1-medium	1-moderate	1-moderate	1-moderate	none	6
3	Macaulay Rd intersection	1-medium	0-high	1-moderate	0-high	none	4
4	Macaulay Rd to Melrose St	0-low	2-low	1-moderate	2-low	none	5
5	Melrose/Shiel St intersection	0-low	2-low	1-moderate	2-low	none	5
6	Shiel St to Dryburgh St	0-low	2-low	1-moderate	2-low	none	5
7	Dryburgh St intersection	0-low	2-low	2-low	2-low	project 8	6
8	Dryburgh St to Abbotsford St	0-low	2-low	1-moderate	2-low	none	5
9	Abbotsford St intersection	2-high	0-high	1-moderate	1-moderate	project 8	8
10	Abbotsford St to Curzon St	1-medium	2-low	1-moderate	1-moderate	none	6
11	Curzon St intersection	2-high	0-high	1-moderate	1-moderate	none	8
12	Curzon St to Haines St	0-low	2-low	2-low	2-low	project 11	6
13	Molesworth/Haines St to Errol St	0-low	2-low	2-low	2-low	none	6
14	Errol St intersection	1-medium	2-low	2-low	2-low	none	9
15	Courtney St: Haines St to Arden St	0-low	2-low	2-low	2-low	none	6
16	Arden St roundabout	2-high	2-low	2-low	2-low	none	12
17	Arden St roundabout to Queensberry St	0-low	2-low	2-low	2-low	none	6
18	Queensberry/Peel St intersection	1-medium	1-moderate	2-low	2-low	none	8
19	Queensberry St: Peel St to Elizabeth St	2-high	0-high	1-moderate	1-moderate	none	8
	Arden Street (west to east)						
20	Junction with Moonee Ponds Creek Trail	1-medium	1-moderate	1-moderate	1-moderate	none	6
21	Citylink to Fogarty St	2-high	0-high	1-moderate	1-moderate	none	8
22	Fogarty St intersection	1-medium	1-moderate	1-moderate	2-low	projects 21,23	7
23	Fogarty St to Laurens St	2-high	0-high	1-moderate	0-high	none	7
24	Laurens St intersection	1-medium	1-moderate	1-moderate	1-moderate	projects 23,25	7
25	Laurens St to Dryburgh St	2-high	0-high	1-moderate	1-moderate	none	8
26	Dryburgh St intersection	2-high	0-high	1-moderate	0-high	projects 25,27	7
27	Dryburgh St to Abbotsford St	2-high	0-high	1-moderate	1-moderate	none	8
28	Abbotsford St intersection	1-medium	1-moderate	2-low	2-low	projects 27,29	8
29	Abbotsford St to Curzon St	2-high	1-moderate	1-moderate	2-low	none	10
30	Curzon St intersection	2-high	0-high	1-moderate	2-low	projects 29,31	9
31	Curzon St to Errol St	2-high	1-moderate	1-moderate	2-low	none	10
32	Errol St intersection	0-low	2-low	2-low	2-low	projects 31,33	6
33	Errol St to Leveson St	1-medium	1-moderate	2-low	2-low	none	8
34	Leveson St to Courtney St	0-low	2-low	2-low	2-low	none	6
35	Courtney St roundabout	2-high	2-low	2-low	2-low	none	12
36	Wreckyn St: Courtney St to Flemington Rd	0-low	2-low	2-low	2-low	none	6
37	Flemington Rd intersection	1-medium	0-high	2-low	2-low	none	7
38	Grattan St: Flemington Rd to Royal Pde	2-high	0-high	1-moderate	1-moderate	reconstruction	8
39	Grattan St: Bouveri to Swanston St	2-high	0-high	1-moderate	1-moderate	Metro Tunnel	8

Staging: Canning Street

The Canning Street route is comprised of a diverse set of street cross sections that vary on a block by block basis, each segment of which has a different baseline condition in terms of its existing levels of safety and comfort.

As the corridor itself is mostly characterised by low traffic volumes, the key safety concerns in need of addressing occur at the crossings of busy transport corridors, in particular Curzon Street and Abbotsford Street, the resolution of which would also rely on the realignment of paths on either side of these junctions. Based on the evaluation framework presented above in conjunction with these additional considerations, the following projects have been identified as high priority for near term implementation:

- Abbotsford Street crossing (project 9) plus adjacent projects on Canning Street and Molesworth Street (projects 8 and 10)
- Curzon Street crossing (project 11) plus adjacent projects on Molesworth Street and Haines Street (projects 10, 12 and 13)
- Errol Street intersection walking paths (project 14)
- Arden Street/Courtney Street roundabout (project 16).

Given that Canning Street between Dryburgh Street and Macaulay Road, along with Courtney Street, currently exhibit relatively comfortable conditions for walking and cycling, the completion of the above subset of eight projects would achieve a consistent attractive active transport connection for the full stretch of the route between the Macaulay Road/Melrose Street activity centres and the Arden/Courtney Street roundabout (where it joins the Arden Street priority corridor as discussed below) via North Melbourne Primary School, residential areas, and a series of community greens.

South east of the Arden/Courtney Street roundabout, projects 17 to 19 would depend on the longer term traffic outcome of Queensberry Street following completion of construction works for Parkville station, for which it currently serves as a traffic relief corridor.

Projects between Macaulay Road and Moonee Ponds Creek Trail could be implemented at any time pending approval to the changes required to parking in Canning Street west. Similarly, additional levels of upgrade between Dryburgh Street and Macaulay Road to provide a continuous protected cycle lane along the corridor could also be implemented in the medium term as the opportunity presents.

Staging: Arden Street

The Arden Street corridor enhancements are largely dependent on the approval of traffic changes from two lanes to one lane in each direction between Citylink and Leveson Street, consistent with the current configuration of Arden Street further east and west.

The prioritisation framework suggests that the largest degree of benefit in the near term could occur between the key north-south cycling connection at Abbotsford Street and the junction with the Canning Street priority corridor (as discussed above) at the Arden/Courtney Street roundabout. This section consists of multiple complex junctions and is largely removed from complications associated with additional proposed infrastructure projects as occurs west of Abbotsford Street.

As such, the recommended first stage projects for this corridor would include:

• Abbotsford Street to Curzon Street (project 29) – Traffic lane reduction and protected cycle lanes

• Curzon Street intersection (project 30) – Kerb bump-outs, expanded islands and striping improvements

• Curzon Street to Errol Street (project 31) – Traffic lane reduction and protected cycle lanes

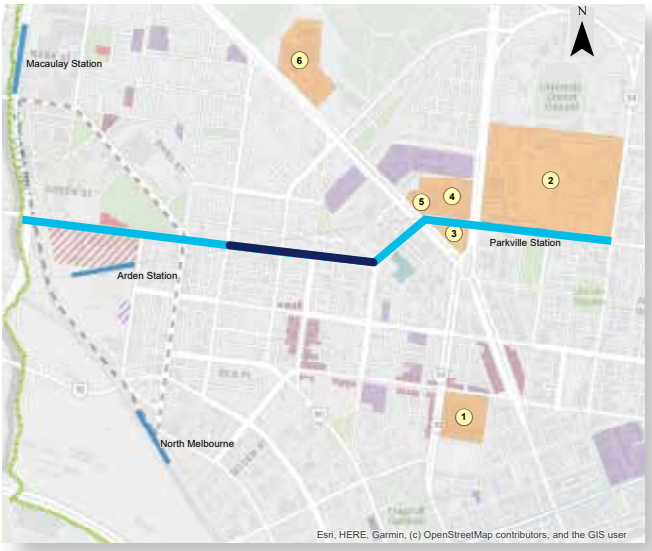
• Errol Street intersection (project 32) – Kerb changes to support protected cycle lanes

• Errol Street to Leveson Street (project 33) – Traffic lane reduction and protected cycle lanes

• Leveson Street to Courtney Street (project 34) – Protected cycle lanes

• Arden/Courtney Street roundabout (project 35) – Enhanced striping and tactile separator treatments.

Onward from the Arden/Courtney Street roundabout, the existing Wreckyn Street buffered cycle lanes already provide a relatively satisfactory level of service for cyclists, while Grattan Street is currently subject to temporary closures and traffic diversion associated with construction of Parkville station. As such, these components of the Arden Street active transport corridor could reasonably be deferred to a later time frame.



West of Abbotsford Street, any enhancements would be dependent on coordination with several corresponding planning efforts including a proposed tram extension to Arden station and urban greening/drainage upgrades particularly between Fogarty Street and Citylink. Whilst the active transport upgrades would not need to be deferred until these proposals are implemented, their design should be coordinated with these projects to ensure consistency and alignment with the ultimate vision for this portion of the Arden Street corridor. As such coordination is dependent on the advancement of the tram and drainage/greening concepts, they have been identified indicatively in this report as medium term projects.

Staging summary

The following table highlights the proposed staging by project segment as discussed in the preceding pages. This proposal is based on addressing the key immediate concerns in the short term whilst deferring less critical segments and those requiring coordination with other initiatives to later stages.

No.	Location	MCA score	Short term	Medium term	Long term
	Canning Street to Queensberry Street				
1	Junction with Moonee Ponds Creek Trail	8			
2	Citylink to Macaulay Rd	6			
3	Macaulay Rd intersection	4			
4	Macaulay Rd to Melrose St	5			
5	Melrose/Shiel St intersection	5			
6	Shiel St to Dryburgh St	5			
7	Dryburgh St intersection	6			
8	Dryburgh St to Abbotsford St	5			
9	Abbotsford St intersection	8			
10	Abbotsford St to Curzon St	6			
11	Curzon St intersection	8			
12	Curzon St to Haines St	6			
13	Molesworth/Haines St to Errol St	6			
14	Errol St intersection	9			
15	Courtney St: Haines St to Arden St roundabout	6			
16	Arden St roundabout	12			
17	Arden St roundabout to Queensberry St	6			
18	Queensberry/Peel St intersection	8			
19	Queensberry St: Peel St to Elizabeth St	8			
	Arden Street (west to east)				
20	Junction with Moonee Ponds Creek Trail	6			
21	Citylink to Fogarty St	8			
22	Fogarty St intersection	7			
23	Fogarty St to Laurens St	7			
24	Laurens St intersection	7			
25	Laurens St to Dryburgh St	8			
26	Dryburgh St intersection	7			
27	Dryburgh St to Abbotsford St	8			
28	Abbotsford St intersection	8			
29	Abbotsford St to Curzon St	10			
30	Curzon St intersection	9			
31	Curzon St to Errol St	10			
32	Errol St intersection	6			
33	Errol St to Leveson St	8			
34	Leveson St to Courtney St	6			
35	Courtney St roundabout	12			
36	Wreckyn St: Courtney St to Flemington Rd	6			
37	Flemington Rd intersection	7			
38	Grattan St: Flemington Rd to Royal Pde	8			

06

CONCLUSION

6. CONCLUSION

This study has been tasked with identifying the two highest priority corridors for walking and cycling enhancement in the North Melbourne study area stretching from Arden to Parkville. The comparative evaluation used to identify these key corridors has considered the existing conditions along each route, their strategic importance with respect to the goals of this study, and the degree of enhancement that could be realistically achieved.

The conclusion of this comparison was that the Arden Street and Canning Street corridors would represent the optimal combination of routes for both walking and cycling. Whilst Arden Street would be the main 'commuting' corridor with its very direct connection between the Arden and Parkville precincts, the Canning Street corridor offers a community centric 'green' connection amongst residential areas, neighbourhood centres and educational facilities. Upgrade of this route (particularly the intersections) would address existing critical safety issues and attract larger numbers of pedestrians and cyclists in the future.

Whilst several sub-segments of each of these corridors have been identified as priority projects suited to near term implementation, other segments are dependent on associated infrastructure initiatives and could appropriately be deferred to the medium or longer terms to ensure suitable coordination across planning, design and construction tasks.

The prioritisation of walking and cycling in North Melbourne can help to manage the degree to which significant projected development within the Arden and Parkville precincts will generate new car trips, particularly given the synergies between them, and therefore help protect residents and visitors from growth in traffic volumes. The proposals generated in this study are intended to ensure that the character of the key street corridors within the study area reflect the functionality of a single integrated campus style environment, supporting walking and cycling as the transport modes of choice for trips to, from and between the diverse set of trip origins and destinations of North Melbourne.

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