North Sydney Bike Action Plan

Background Report

January, 2024

Institute for Sensible Transport

The Institute for Sensible Transport acknowledges the people of the Wurundjeri Woi Wurrung language group of the eastern Kulin Nation on whose unceded lands we work.

We respectfully acknowledge their Ancestors and Elders, past and present.

We also acknowledge the Traditional Custodians and their Ancestors of the lands and waters across Australia where we conduct our business.

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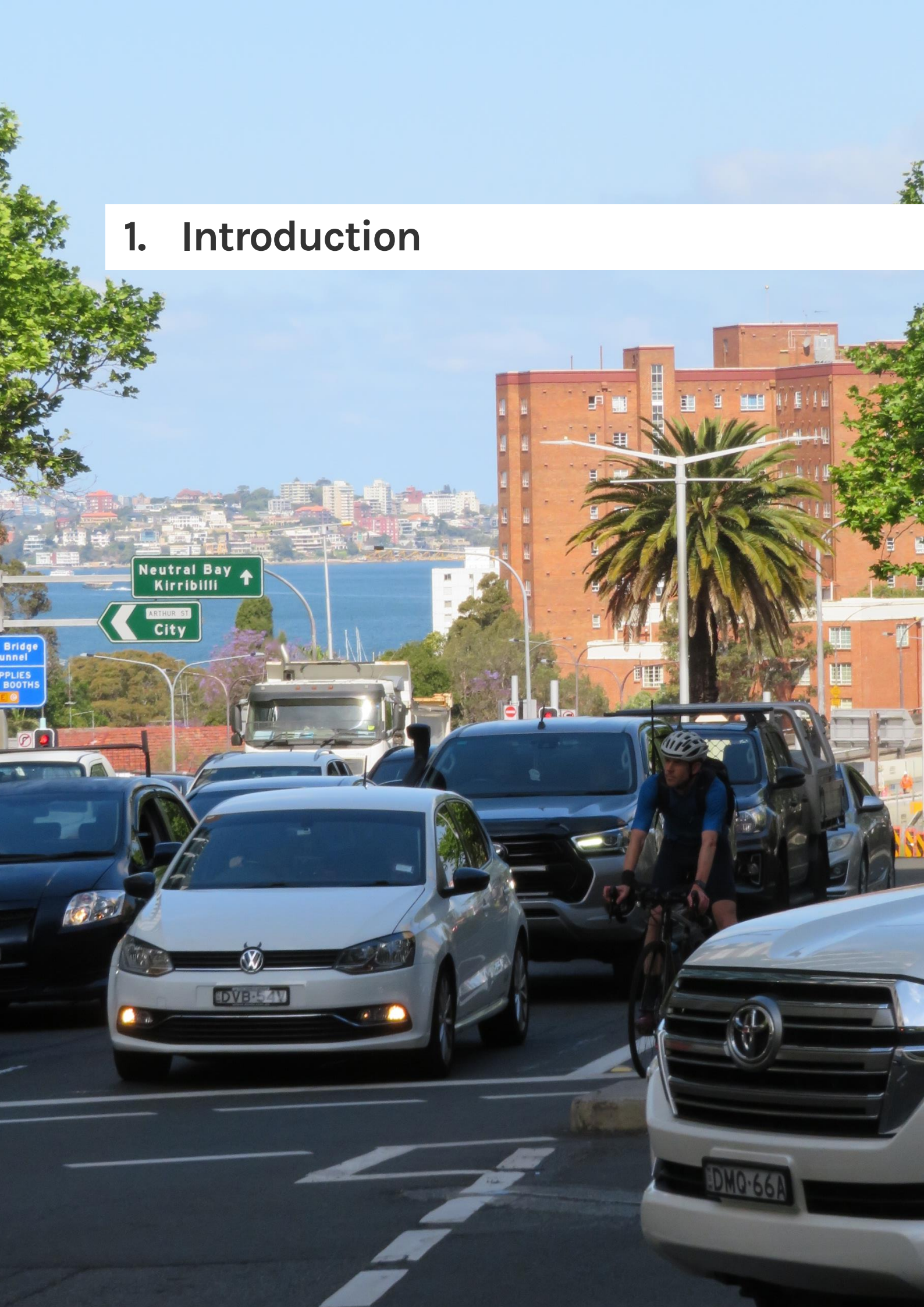

North Sydney Council have identified the need to review and update the North Sydney *Integrated Cycling Strategy 2014.* This is the first in a series of reports that will be developed as part of this project and is focused on background data analysis and benchmarking. This will provide a solid evidence based to embark on future stages, including network assessment and development. The three key project stages are captured in Figure 1.

Figure 1 Three main stages of project

The project's key components are identified in Figure 2. These are colour coded by project stage.

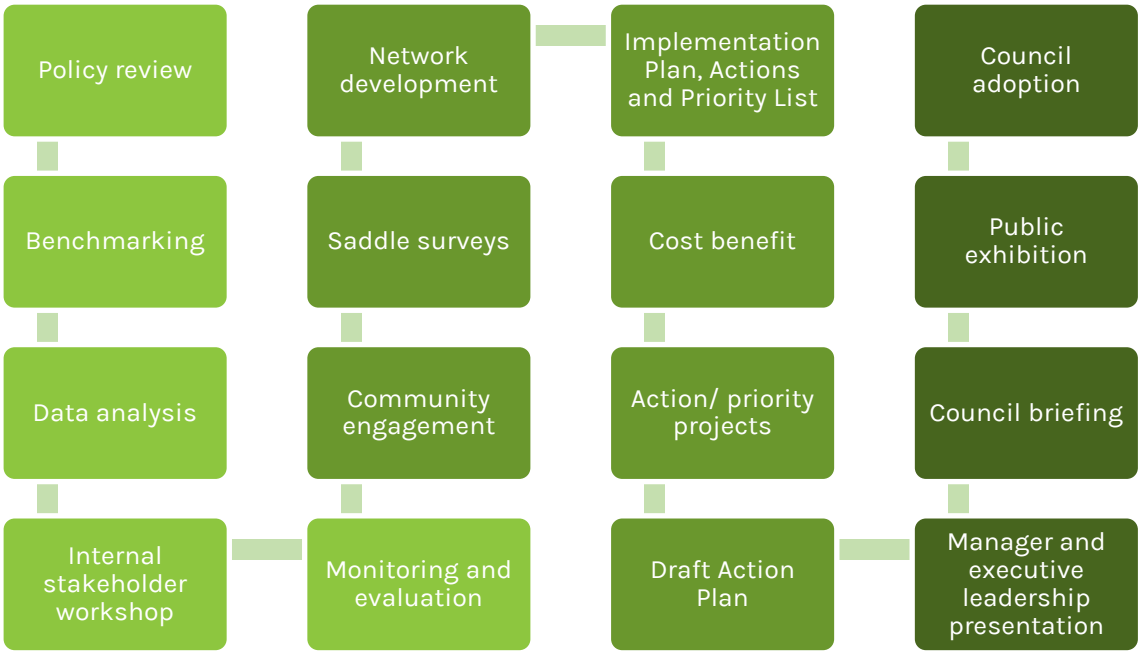

Figure 2 Key project components

The main areas this report covers are highlighted in Figure 3.

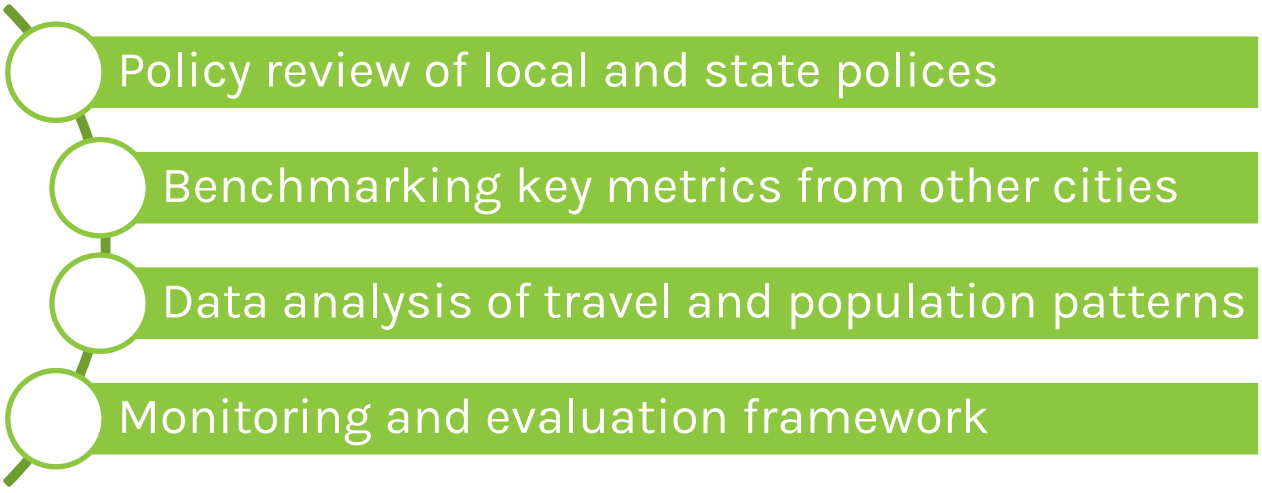

Figure 3 Overview of key components of this report

2. Policy review

This section provides a review of relevant policies, at both the local and state government level. The intention of this section is to identify insights relevant to the development of an enhanced bike riding experience in North Sydney.

2.1 Council policies and strategies

2.1.1 North Sydney Integrated Cycling Strategy, 2014

In 2014, North Sydney Council adopted the *Integrated Cycling Strategy.* The Strategy identified that cycling is limited by an incomplete and disconnected network. The intention of the 2014 Strategy was to create a more connected, safe, and cyclist-friendly environment in North Sydney.

The 2014 Integrated Cycling Strategy identified that cycling in North Sydney is limited by an incomplete and disconnected network.

The Strategy aims to promote cycling as a sustainable transport option to reduce traffic congestion, parking demand, air and noise pollution, and enhance community health and well-being. The goals of the Strategy are to:

- Deliver an accessible, safe and connected cycling network by 2020.
- Make cycling an attractive choice for short trips within the LGA
- Increase and diversify participation in cycling.

The Strategy identifies key issues with the network, including:

- Disconnected
- Barriers to Sydney Harbour Bridge cycleway
- Inconsistent and insufficient signage
- Insufficient bike parking.

Delivering an accessible, safe and connected cycling network by 2020 was a goal of the 2014 Integrated Cycling Strategy.

To address the above issues, the Strategy proposed a range of actions across a number of areas, including:

- Priority cycling routes
- Advocating for step-free access to key cycling pathways
- Updating existing routes
- Improving overall network quality
- Installing consistent wayfinding signage
- Providing ample bicycle parking
- Offering supporting infrastructure like public maps, bicycle pumps, and water refill stations
- Conduct communication efforts, events, and programs to promote cycling, enhance safety, and raise awareness.

Figure 4 shows existing cycling network and 5 priority routes which represent the “arterial routes” of bicyle network in North Sydney. Key considerations for theses routes are:

- Improve accessibility, safety, and connectivity.
- Address identified network issues
- Encourage more people to cycle
- Optimise service within budget constraints
- Provide access to important destinations
- Establish regional links
- Minimise impacts on pedestrians and public transport.

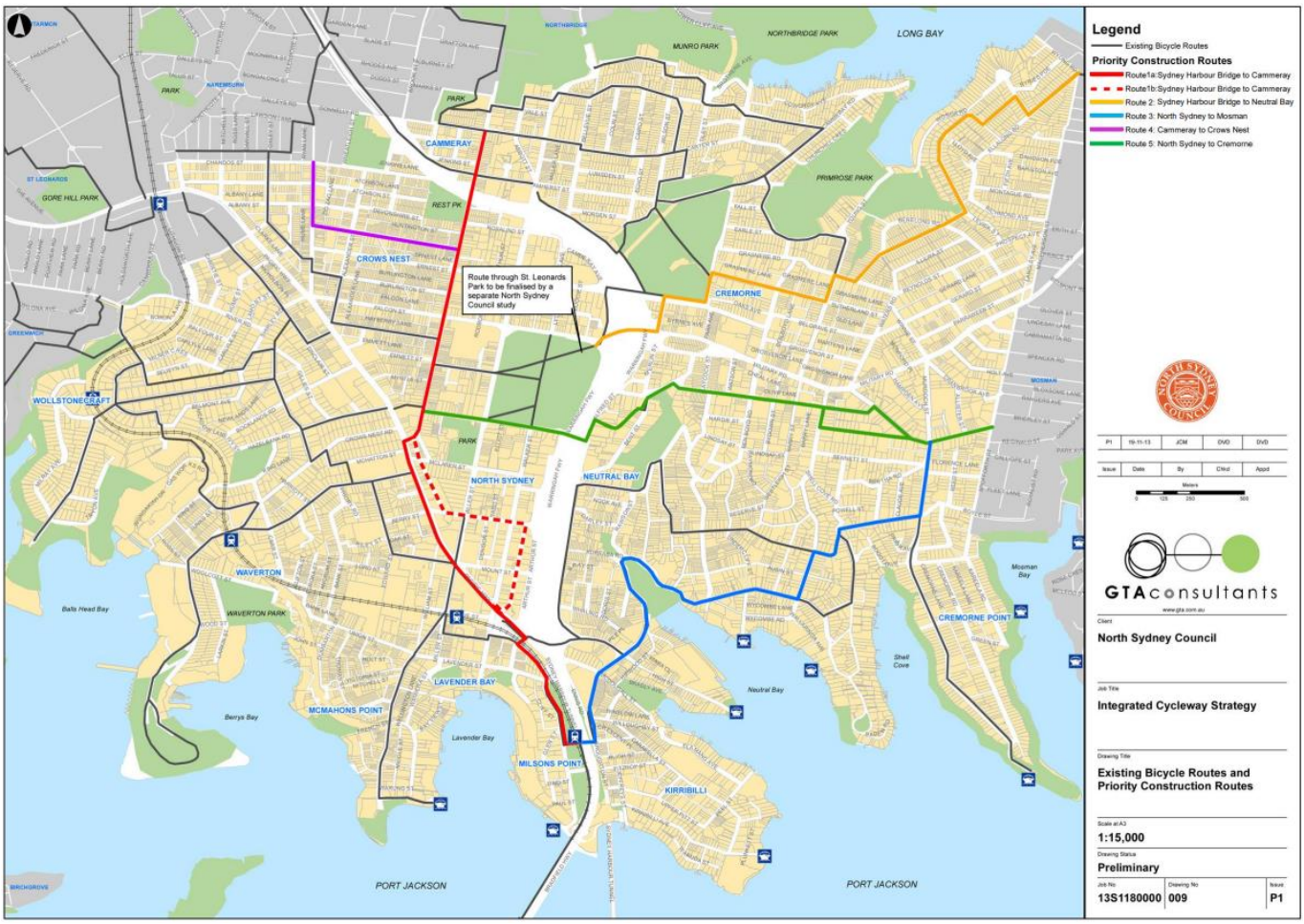

Figure 4 Existing cycling network and priority routes

Source: North Sydney Integrated Cycling Strategy

To complete North Sydney's bicycle network, the focus is not only on priority routes but also upgrading existing infrastructure. Specific improvements include:

- Fixing pinch points or hazards
- Replacing outdated facilities
- Upgrading various elements like bicycle lanes, stencils, shared paths, school routes, and merge points.

Bicycle parking in North Sydney prioritised at key locations:

- Train stations
- Ferry stops
- Major bus stops
- Employment centres

Figure 5 shows implementation plan to enhance North Sydney cycling network by installing new signage and updating existing ones.

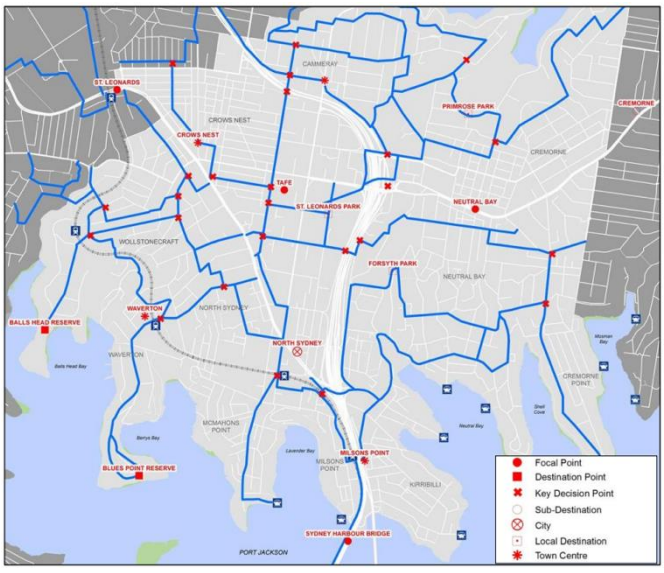

Figure 5 Signage implementation plan

Source: North Sydney Integrated Cycling Strategy

Community consultation found *'cyclists are forced to ride along high volume roads…without formal bicycle facilities'.*

Figure 6 provides an overview of the 2014 North Sydney Integrated Cycling Strategy, identifying *issues and goals* as well as what the Strategy will do and the monitoring and evaluation that will be undertaken to determine progress.

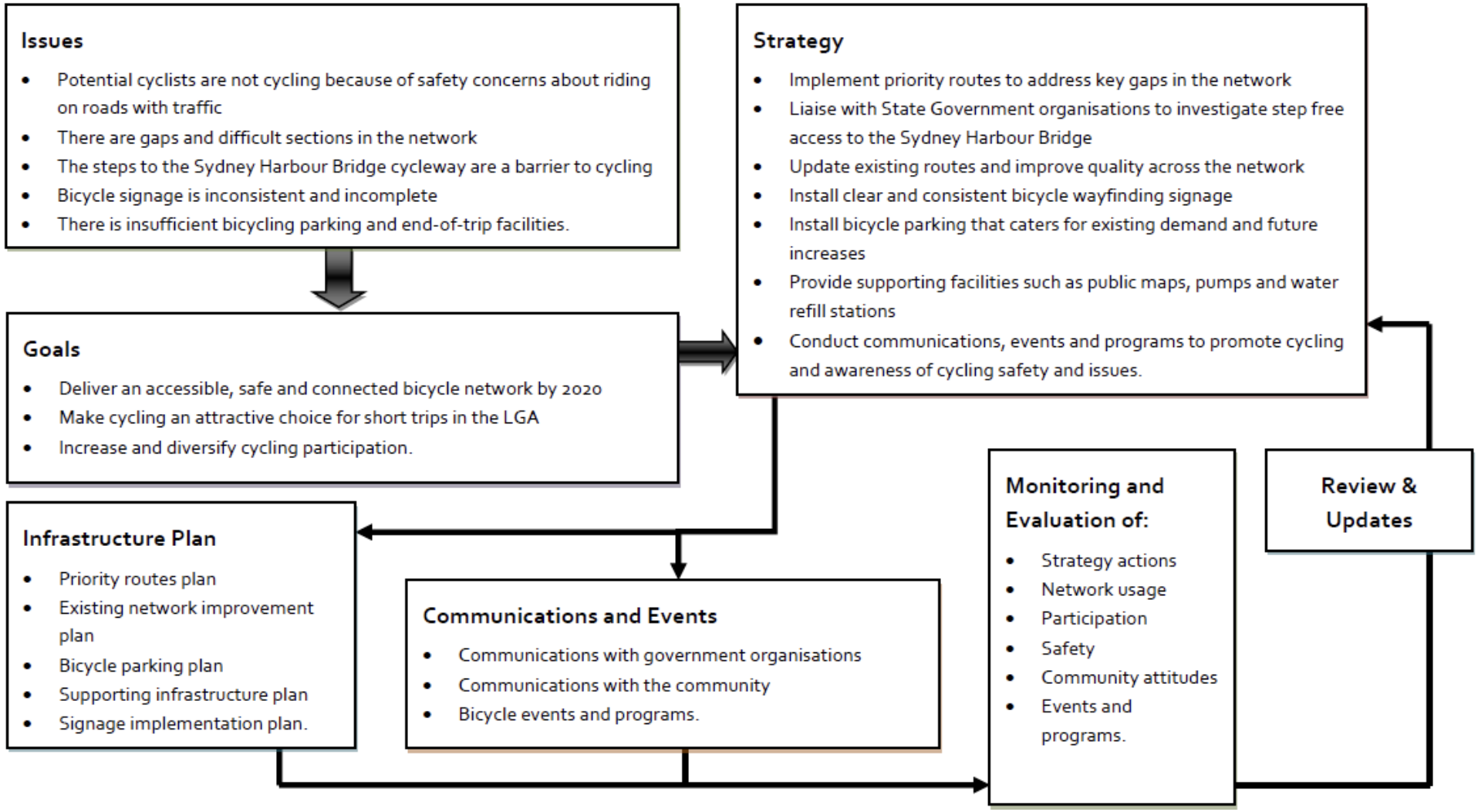

Figure 6 Integrated Cycling Strategy – Framework

Source: North Sydney Integrated Cycling Strategy

Table 1 provides a summary of the goals, strategies and indictors that the 2014 Strategy identified to monitor its performance in achieving Council's overall ambition to increase cycling in North Sydney. It would appear a number of the progress measures are yet to be met.

Table 1 Next steps - Goals, strategies and indicators

GOAL	STRATEGY	INDICATORS
What do we want to achieve?	What we will do	How will we measure progress
Deliver an accessible, safe and connected network by 2020	• Implement priority routes that address key gaps in the network. • Liaise with State Government organisations to investigate step free access to the Sydney Harbour Bridge Cycleway. • Update existing routes and improve quality across the network. • Install clear and consistent signage.	• High priority routes identified in this strategy completed by 2016 with remaining priority routes completed by 2020. • A minimum of 80% of those using the network feel that safe and connected routes are a feature of the North Sydney cycle network. • Decrease in cycling related collisions/ injury rates over each year of the Strategy. • A minimum of 80% of those using the cycle network feel comfortable and safe.
Make cycling an attractive choice for short trips within the LGA.	As above plus: • Install new bicycle parking facilities that cater for current demand and future increases. • Provide supporting facilities (such as water refill stations, pumps or network maps).	• Short trips within the LGA being made by bicycle. • A majority of residents feel that everyday needs can reasonably be accessed using the cycling network.
Increased and diversify participation in cycling	As above plus: • Conduct communication, events and programs to promote cycling and awareness of cycling issues.	• A 50% increase in cycling trips to and from the LGA by 2020. • Short trips within the LGA being made by bicycle. • Increased representation of groups currently underrepresented in cycling

2.1.2 North Sydney Transport Strategy, 2016

The North Sydney Transport Strategy highlights key transport themes, with a focus on:

- Safe travel
- Transport security
- Social well-being
- Active health
- Environmental sustainability

The vision is: In 2030, transport will actively contribute to fostering the well-being and prosperity of the North Sydney community.

"In 2030, transport will play a positive role in supporting a happy, healthy and prosperous North Sydney community."

Majority of community's priorities, identified through consultation are related to active transport and they include:

- Safe travel
- Transport security
- Social well-being
- Active health
- Fair access to parking
- Environmental sustainability
- Local environments
- Transport affordability
- Congestion
- Business activity

Moreover, this Strategy considered walking, cycling, and public transport as highest priority in the modal hierarchy (over private vehicles).

Some of the key variables considered in principles for transport planning in the Strategy are:

- Land use density
- Land use diversity
- Walking and cycling infrastructure design
- Distance to transit
- Destination accessibility.

Key points related to cycling include:

- Promoting diverse local land uses
- Enhancing cycling infrastructure
- Planning cycle parking
- Collaborating on regional cycling networks
- Advocating for cycling on classified roads
- Defining maintenance regimes
- Establishing links between regional routes and local centres.

The North Sydney Transport Strategy focuses on safe, sustainable travel, giving priority to walking, cycling, and public transport. The strategy recognises cycling as vital for sustainable and healthy transport.

The North Sydney Transport Strategy focuses on safe, sustainable travel, giving priority to walking, cycling, and public transport.

2.1.3 North Sydney Development Control Plan, 2013

Development Control Plans (DCPs) support the implementation of land use zones and standards specified in the Local Environment Plans (LEPs). The DCP provide guidance on the different development aspects and have relevant transport-related objectives embedded into the document such as:

- Public transport, as well as active transport, are the main forms of transport.
- Car parking for residential flats and multi dwellings are to be located off-street and below ground.
- On-street parking for heritage listed attached dwellings.

The current North Sydney DCP establish a connection between car ownership and the increased demand on both on-street parking and traffic efficiency. The DCP highlights the impacts of through-traffic on pedestrian and cycling access as well as safety.

Bicycle storage rates are specified in Table B 10.4 of the DCP. There are two separate rates for usual occupants (residents or staff) and visitors. In residential developments, the minimum bike parking is one for every dwelling, and one visitor lot per five dwellings. The rates differ for each of the other 17 development types listed. Other facilities required are:

- One personal locker for each bike parking space;
- One shower and change cubicle for every 10 bike parking spaces.

Existing rates for bicycle parking in residential buildings are low and may act as a barrier to bicycle ownership. As will be highlighted in latter stages of this project, a minimum of one bicycle park per bedroom will lower barriers to bike ownership and therefore use for apartment dwellers.

2.1.4 North Sydney Vision 2040, Community Strategic Plan

The North Sydney Vision 2040 Community Strategic outlines the community's vision, guiding principles, and strategic directions for the future.

Guiding principles of the North Sydney Vision 2040 Community Strategic Plan are:

- Sustainability
- Inclusivity
- Integrity

Strategic directions for future include:

- Living environment
- Built infrastructure
- Innovative city
- Social vitality
- Civic leadership.

The built infrastructure direction prioritises sustainable and active transport and actions, which include:

- Infrastructure for sustainable transport.
- Connected walking and cycling network.
- Reduce traffic by improving active and public transport.
- Key challenges in North Sydney that are related to active transport are:
- Growing population
- Equitable access to open space and recreation
- Climate change
- Mobility options
- Financial sustainability.

Cycling and active transport is among the top 10 priorities identified for the community.

The plan has been informed by significant stakeholder engagement and cycling and active transport is among the top 10 priorities identified for the community.

2.2 State government policies and strategies

2.2.1 NSW Movement and Place Framework, 2023

Movement and Place is a framework has been adopted in NSW to help create a better balance between the movement and place function that different streets perform.

Movement and Place **recognises the disconnect that transport and land use planning pose and offers a method for reconciliation.**

At the heart of *Movement and Place* is a recognition of the dual role that streets perform in terms of being a *movement* corridor and a *place* in itself. Implicit in the Movement and Place framework is an acknowledgement that in past decades, the role of the motor vehicle and vehicle throughput has been the primary goal underpinning street design, and this can at times be to the detriment of the *place* function that many streets perform, as well as their ability to support walking and cycling.

A Practitioner's Guide to Movement and Place (NSW) describes the process of creating better built environments and streetscapes by collaborating across all stages of the design and delivery of street environments. Figure 7 presents the NSW Movement and Place matrix. It has *movement* on one axis and *place* on the other. Streets that have the potential for high *place* function and low *movement* function are identified as civic spaces. On the other end of the spectrum, areas with low place potential and high movement are where *transport* function should be the priority.

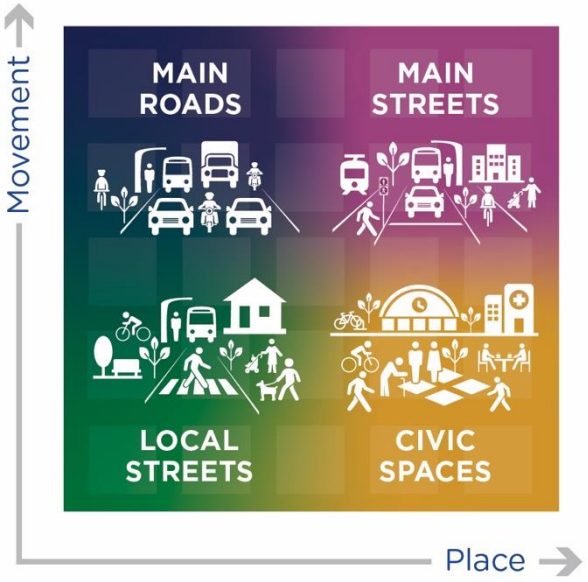

Figure 7 Movement and Place matrix for NSW
Source: NSW Government

The Guide provides a common framework for place-based transport and urban planning and is one component of the *NSW Government Movement and Place Toolkit*. Practitioners involved in planning, designing, delivering, and operating transport networks in NSW are the target audience. In particular, this Guide establishes a *Movement and Place* approach that evaluates where activity occurs and can be applied to a wide range of project scales and stages. Moreover, workshops are used to lead the core processes and prepare the analysis for discussion and refinement.

Six steps encompass the core processes:

- Step 1 - Vision and evaluation criteria
- Step 2 - Understand a place
- Step 3 - Understand movement
- Step 4 - Overlay and discuss conflicts, issues, and opportunities
- Step 5 - Develop options
- Step 6 - Choose the preferred option.

Of direct relevance to this project, Steps 2 and 3 can be used to develop *Active Transport Strategies*. In Step 2, the project team, government project partners, and whether external consultants or experts are necessary are considered considering the location and size of the place or project priority. Meanwhile, Step 3 examines existing, planned, and

desired transport networks to prepare future network intent.

This Guide highlights the need to incorporate the aspirations of local and state government agencies, as well as the communities, businesses, and other organisations relevant to a particular place. Some of these aspirational characteristics are shown in Figure 8.

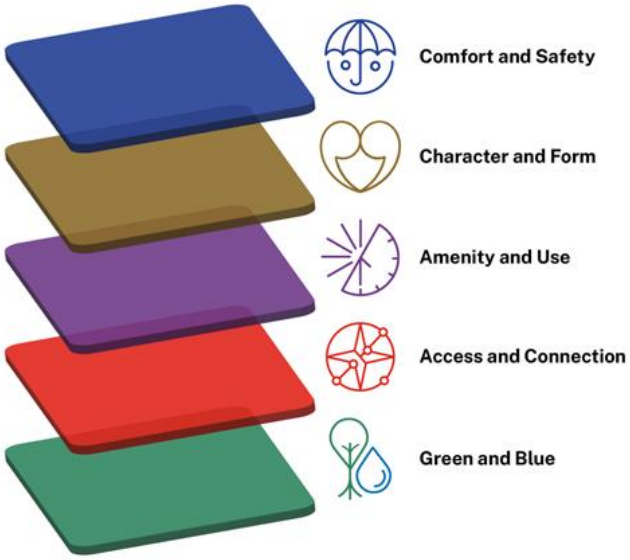

Figure 8 Ideal place characteristics
Source: A Practitioner's Guide to Movement and Place

2.2.2 Transport for NSW Active Transport Strategy, 2022

The Active Transport Strategy aims to double walking and cycling trips in NSW within 20 years. The stated purpose of the NSW *Active Transport Strategy* is to double active transport trips in 20 years. Some 1.5 billion walking and bike riding trips are taken per year currently. When accounting for population growth, a doubling would effectively result in the mode share rising from 18.3% in 2021 to 30.4% by 2041.

The NSW Government has a target to double active travel in the next two decades. This requires mode to increase from 18.3% to 30.4% by 2041.

The Active Transport Strategy identifies that it will:

- Develop continuous and connected cycling networks.
- Enhance safety and comfort for walking and cycling.
- Improve options for children's independent mobility to and from school.
- Integrate active and public transport for multimodal journeys.
- Promote a shift to walking and cycling through the development of improved infrastructure.
- Embrace emerging technologies like e-bikes and micro mobility devices.

The key focus areas include:

- Creating 15-minute neighbourhoods
- Expanding cycling networks
- Enhancing safety
- Encouraging behaviour change
- Collaborating with partners.

The Strategy addresses health concerns, congestion, and environmental issues, tailoring approaches for both Greater Sydney and regional NSW. Priority moves include neighbourhood trials, cycling infrastructure development, safety programs, and partnerships, all contributing to a sustainable and healthier future.

The Active Transport Strategy highlights the need to improve real and perceived safety levels. This is especially important for women, who report feeling unsafe, especially at night.

2.2.3 Road User Space Allocation Policy and Procedure, 2022

The TfNSW Road User Space Allocation (RUSA) Policy aims to reduce private vehicle trips in built-up areas, prioritising efficient movement and enhancing the amenity of places.

It sets principles for space allocation, considering place and movement functions, safety, strategic outcomes, and adaptability to specific circumstances. The order of considerations (Figure 9) is outlined, emphasising avoiding adverse impacts on safety, barriers to access, loss of space for walking or cycling, loss of amenity, and increasing lanes for private vehicles.

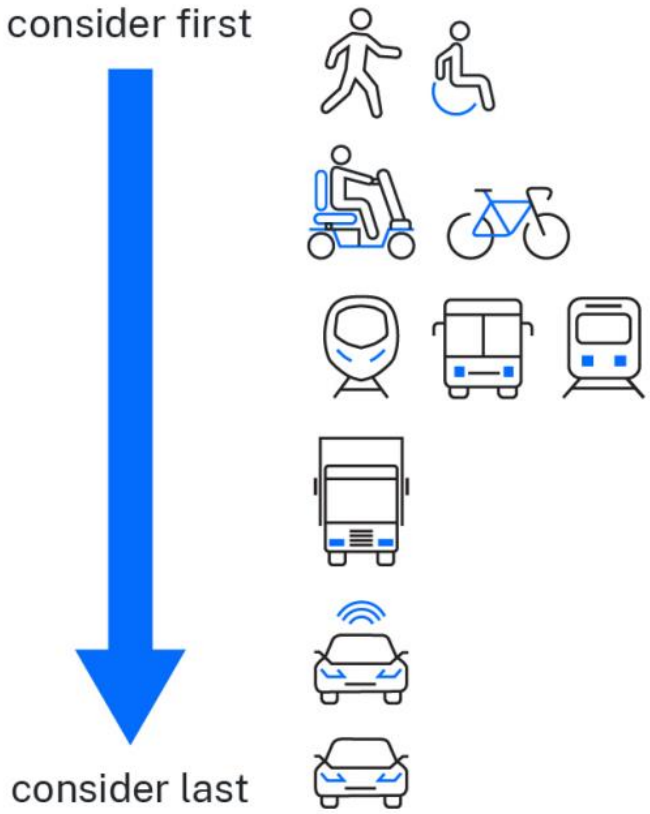

Figure 9 Order of road user space consideration

Source: Road User Space Allocation Policy and Procedure

The policy encourages a shift to more efficient travel modes like walking, cycling, and public transport in the long term. Supported by the TfNSW RUSA Procedure, it involves network planning, precinct and corridor planning, and street and road design phases, ensuring consistency and informed decision-making throughout the process.

The policy aligns with the ambition of the North Sydney Bike Plan by prioritising road space allocation towards cycling and discouraging an increase in lanes for private vehicles.

2.2.4 Transport for NSW Cycleway Design Toolbox, 2020

Design principles for cycling friendly infrastructure include(NSW Government, 2020):

- Safe
- Connected
- Direct
- Attractive
- Comfortable
- Adaptable

These principles include a variety of different customer needs, and movement and place outcomes. By implementing these principles in the design of cycling networks, a greater proportion of the population will have the opportunity to cycle for more trips.

In order to have inclusive cycling infrastructure, they should be not only safe but also *perceived* as safe, for a diverse cross section of the community.

The Toolkit identifies four levels of traffic stress, as highlighted in Figure 10. It is important to be cognisant of the intended user, to ensure the cycling environment is commensurate with the level of stress tolerable by the user.

Figure 10 Characteristics of stress level rating

Source: Cycleway Design Toolbox, NSW Government

Where separation is not possible, slow down traffic and reduce volume for safer roads, using measures like filtered permeability or traffic calming can improve condition for all road users.

Some of the elements that can improve safety in cycleway design are:

- Ensure cycling infrastructure is safe and perceived as safe
- Prioritise separation from motor traffic when feasible
- Address hazards like obstructions and poor visibility
- Consider reallocation of road space for dedicated cycling areas

- Implement measures such as filtered permeability and traffic calming

A cycle route is only as effective as its weakest link.

Direct routes are identified in the Toolbox as providing people the shortest path (distance and time) to their destination. This encourages more people to choose cycling as their mode of transport.

Cycling give people opportunity to be more immersed in their surroundings. Therefore, the Toolbox identifies the importance of environmental attractiveness such as trees, shade, open spaces, artworks, and cafes play an important role in enhancing the experience of people riding a bike.

To encourage more people to cycle, designers need to consider comfort for all users including more vulnerable users such as children, older people, and people with disability. The Toolbox highlights the need for sufficient width, avoiding steep gradients, and minimise interaction with vehicles.

To use space efficiently and to have a response to changing needs and demands, design an adaptable infrastructure to accommodate changes in needs and demands of users over time is necessary. Table 2 summarise different strategies, approaches, and design implication for each strategy.

Table 2 strategies, approaches, and design implications for walking and cycling

Strategy	Approach	Design implications
Assess and prioritise movement and place functions for all modes	Prioritise people walking and cycling	• Reduce number of traffic or parking lanes • Introduce one-way flows for motorised traffic. • Reduce traffic lane widths
	Adjust road space allocation	• Allocate more road space to pedestrians and people cycling, to align with strategic priorities
Reduce traffic flow	Reduce traffic flow	• Close off streets to through traffic, while maintaining connectivity for people walking and cycling
	Introduce one-way flows for motorised traffic	• Allow contraflow cycling
Reduce traffic speed	Traffic calming devices	• Flat-top speed humps with gentle ramp gradients • Speedometer
	Road diet - intersections	• Reduce intersection size. • Reduce crossing distance at intersections. • Protected intersections. • Provide lead time for people cycling and walking
	Road diet - roads	• Reduce road width (physically, or with linage) • Install kerb blisters / kerb extensions
Improve crossings for people walking and cycling	Prioritise pedestrian and cycling movements over motorised traffic	• Raised top pedestrian and cycling crossings at unsignalised crossing points • Provide lead time and / or automated signals for people cycling and walking at signalised crossing points
	Remove slip lanes	• Reduce traffic speed and offer additional space to store waiting pedestrians (increasing safety)
Reduce speed limit to 30 km/h or below	Adjust environment and infrastructure to provide	• Introduce traffic calming measures. • Install kerb buildouts

Strategy	Approach	Design implications
	visual cues on appropriate speeds	

Source: Cycleway Design Toolbox(2020)

3. Benchmarking

This section examines cycling strategies from a range of cities, in order to benchmark cycling conditions and participation levels across a diverse set of cities. A selection of European, North American and Australian cities has been selected. These include Copenhagen, New York City, the City of Sydney, Newcastle, the Northern Beaches and the Gold Coast. The aim of this section is to understand their objectives, actions, and targets. This provides a solid foundation for helping to inform the North Sydney Bike Action Plan.

3.1 Tracking Australian capital city progress

Prior to embarking on the benchmarking of individual cities, it is important to identify the magnitude of the challenge in boosting cycling mode share. Figure 11 uses Census data to identify mode share between 2006 and 2021. What is remarkable about this data is that despite the wide range of policies and interventions intended to increase cycling participation (and ostensibly mode share), figures have generally been stable. For example, in Greater Sydney, the percentage of people travelling to work by foot and bicycle has consistently been 5% and 1%, respectively, in the ~15 years from 2006. This highlights that increasing cycling levels and mode share is difficult and a wide variety of factors influence overall participation levels. The transport research literature highlights that people do not make transport choices in isolation; they weigh the pros and cons of different modes and make decisions based on a combination of journey time, cost, convenience and safety.

The implication stemming from the above finding and the data shown in Figure 11 is that a holistic approach is required when seeking to increase levels of active transport. To be most effective, this needs to encompass initiatives to encourage cycling, and measures to discourage excessive levels of car travel.

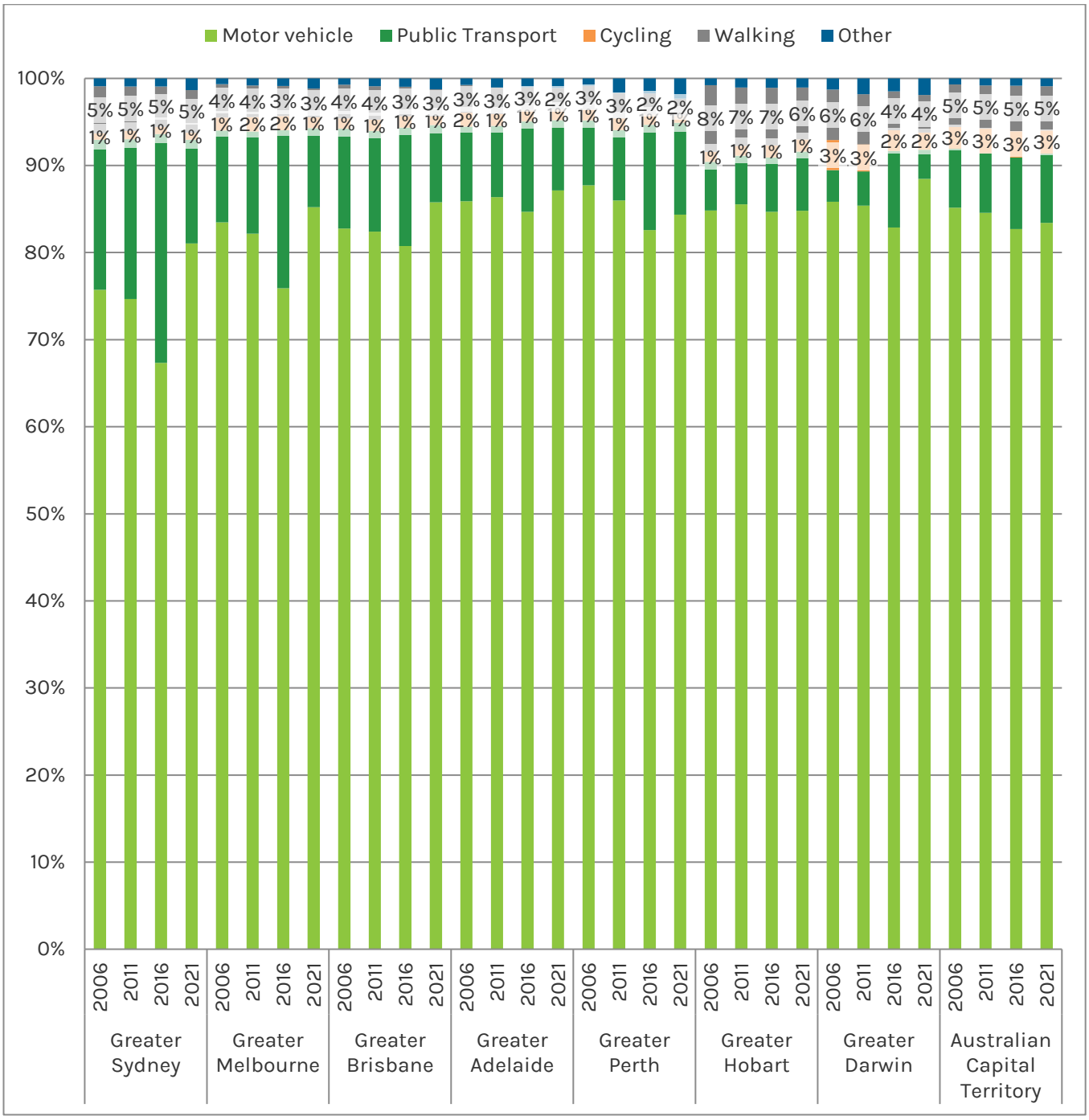

Figure 11 Mode share for journeys to work, 2006 – 2021

Source: Australian Bureau of Statistics, 2021

3.2 Summary

Common themes across the cities covered in this section include:

- A focus on bicycle infrastructure development that prioritises safety, convenience and attractiveness.
- One of the consistent themes to emerge from the benchmarking exercise is that the cities that have made the most progress on increasing levels of cycling have also been the most willing to reduce car parking and motor vehicle traffic lanes were they are required for a contiguous, high quality bicycle corridor.
- Cities are motivated by a desire to provide a more sustainable set of transport options for their population and reduce car dependence.

Each city tailors its plan to its unique context (Table 3), emphasising collaboration with local communities, businesses, and government agencies to create comprehensive and inclusive

cycling networks. The diversity of approaches reflects the adaptability of cycling strategies to meet the specific needs and challenges of different urban environments.

Currently, New South Wales is not committed to a numerical target for increasing mode share for cycling. Instead, TfNSW aims to deliver:

- More than 1000 kilometres of new cycleways and supporting infrastructure
- Reduce serious injuries and fatalities by 30% for pedestrians and bike riders
- Double the number of children walking or riding to school in all six cities and major centres across NSW.

The Six Cities include the Lower Hunter and Greater Newcastle City, the Central Coast City; Illawarra-Shoalhaven City; the Western Parkland City; the Central River City and the Eastern Harbour City.

When compared to other local and global cities, the Active Transport Strategy for NSW currently lacks a numerical target for increasing cycling mode share for journey to work trips and/or all trips. Organisations including the NSW peak advocate body for people who ride, Bicycle NSW, have stated defining a specific numerical target will be demonstrate a meaningful commitment to increasing active travel across the state.

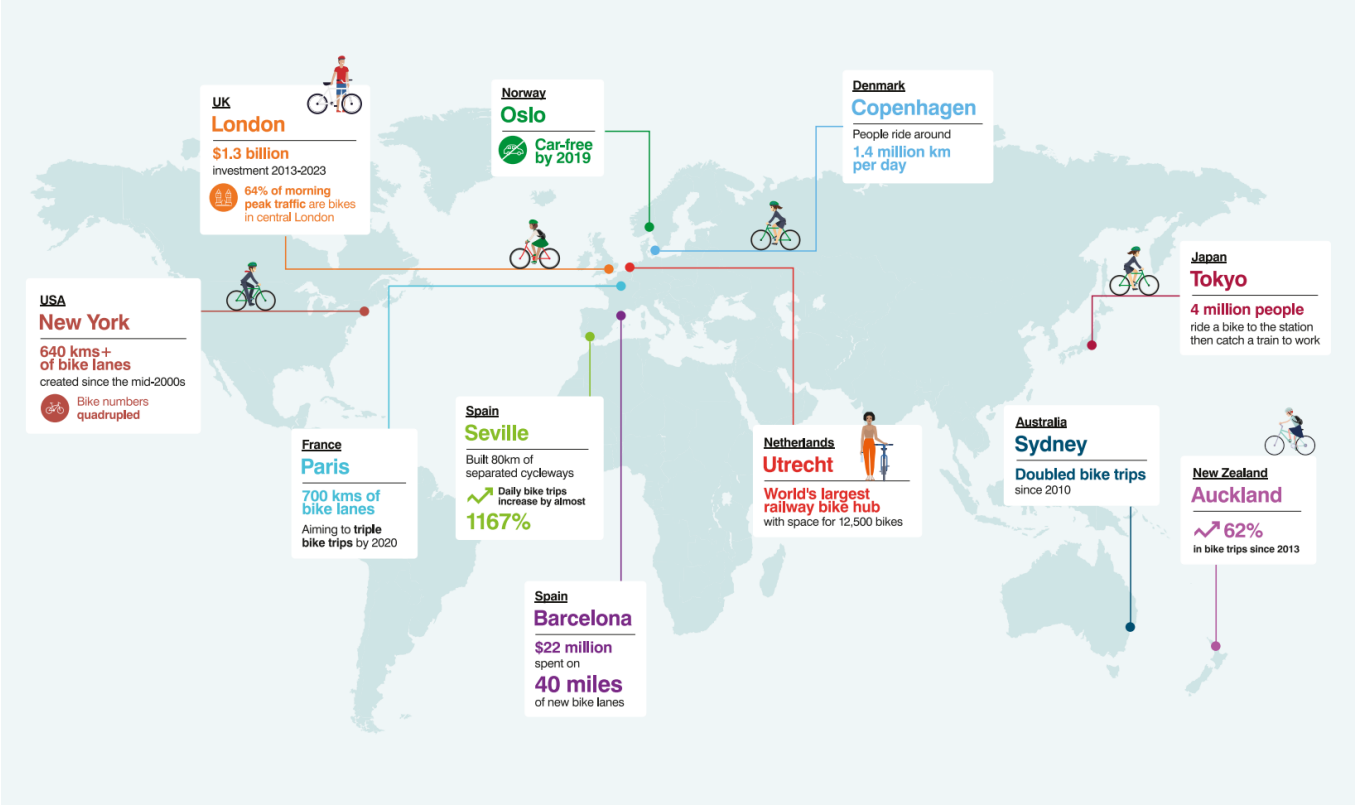

Figure 12 Cycling in global cities

Source: City of Sydney's – Cycling Strategy and Action Plan

Table 3 Summary of cycling strategies in different regions and their context

Region	Pop. Density	Current bike mode share	Key mode share targets	Infrastructure interventions	Behavioural and policy interventions
Northern Beaches (Sydney)	1,035 persons/km^2	1.2% (2016)	By 2038: • 100% increase in active travel trips • 30% reduction in car trips	• Deliver a Safe Cycling Network and a Road Cycling Network. • Apply bicycle infrastructure treatments determined by a route network hierarchy. • Provide and maintain end-of-trip facilities, where bicycle parking is a priority.	• Deliver cycle training and awareness programs. • Promote new bicycle infrastructure and cycling for transport to work, school, and Council events. • Raise awareness of the benefits of cycling
City of Newcastle	918 persons/km^2	2.2% (2016)	By 2030: • Increase the proportion of residents who ride a bike in a typical week from 16% to 30% • Double bike mode share for journeys to work to 4%	• Deliver a network of principal routes and low stress streets. • Apply bicycle infrastructure treatments determined by a route network hierarchy. • New cycle routes must meet specific bicycle safe design requirements. • Prioritise cyclists and road space allocated for bikes where possible. • Provide bicycle parking at key attractors and consistent wayfinding signage	• Educate people on safe road and path user behaviour and the benefits of cycling. • Provide cycling resources (e.g., cycling maps, safe routes, website updates etc.) • Engage with organisations that support people to ride and support bike riding programs and events
City of Sydney	8,173 persons/km^2	3.4% (2016)	By 2030: • Bike mode share of 10% for all trips	• Complete the local bike network and deliver 11 regional routes. • Provide end-of-trip facilities, including quality bike parking, in high demand locations. • Apply bicycle infrastructure treatments determined by a route network hierarchy.	• Integrate cycling throughout Council's policies, operations, and planning. • Support people to ride through information sharing, safe road and path use programs, and opportunities to build riding confidence.
Gold Coast	485 persons/km^2	1.0% (2016)	By 2026:	• Apply bicycle infrastructure and safety treatments responsive to a road network hierarchy.	• Develop a Safe Routes to School program to encourage students to walk or ride to school

Region	Pop. Density	Current bike mode share	Key mode share targets	Infrastructure interventions	Behavioural and policy interventions
			• 12% of all trips to be made by active transport (4.5% cycling, 7.5% walking). By 2031: • 14% of all trips to be made by active transport (6% cycling, 8% walking).	• Deliver green bridges to increase active travel connectivity • Focus investment around major destinations and public transport nodes • Investigate opportunities for high-quality, high-speed bikeways	• Investigate opportunities for a bike share scheme • Work with government partners to investigate the potential to allow bikes on public transport
City of Copenhagen	7,263 persons/km^2	28% (2019)	By 2025: • Achieve 50% bicycle mode share for trips to work and school	• Bicycle parking for all types of bikes • Deliver a bike share system (integrated in the public transport network) • Fill gaps in the bike network (shortcuts, bridges, underpasses) • Cycling infrastructure maintenance • Improve cycling priority (road space re-allocation, dynamic streets, responsive traffic signals) • Bike-thru shopping • Safe road design for cyclists, particularly at intersections	• Safe road user behaviour campaigns • Reduced speed limits • Congestion charges for motor vehicles • Information and resources for cycling (e.g., real time traffic updates and travel planning for people who ride)
New York City	10,712 persons/km^2	2% (2019)	By 2050: Achieve a bicycle mode share of 10% for all trips in New York City	• Implement new design standards to enhance safety, particularly at intersections • Fill gaps in the network, particularly in underserved areas, and improve on-street connections to bridges/paths and greenways.	• Education and outreach initiatives • Legislation and policy changes • Law enforcement

Note: for Northern Beaches, Sydney, Newcastle, and Gold Coast mode shares are based on work trips.

Source: .id, Australian Bureau of Statistics, Statistics Denmark, and U.S Census Bureau

3.3 Local case studies

3.3.1 Northern Beaches Bike Plan, 2020

The *Northern Beaches Bike Plan* aims to encourage the community to choose cycling for *transport*, and to create a safer environment for all road and path users.

In 2018, 40% of Northern Beaches residents rode a bicycle in the past year, compared to 25% for Greater Sydney. This Plan sets out actions to double the amount of cycling and walking trips in the region, and to achieve a 30% reduction in car trips by 2038.

This Plan aims to encourage the community to choose cycling for *transport*, and to double the amount of cycling and walking trips by 2038.

The Bike Plan highlights the need to cater for different types of cycling (i.e., commuting or recreation), and for cyclists of *all* ages and abilities. The Plan proposes two cycling networks to achieve this:

- Safe Cycling Network: This network is largely separated from motor vehicle traffic. It aims to encourage cycling for transport with a focus on short trips. The network includes a three-tier route hierarchy that aligns with the TfNSW cycling network hierarchy, as shown in Table 4.
- Road Cycling Network: This network contains the major routes for road cycling and people commuting long distances by bicycle. Making these areas safer for all road users is a priority in the Plan.

Table 4 Safe Cycling Network Route Hierarchy

Tier	Description
Tier 1 – Regional Routes	Provides connections between strategic centres, with high quality cycling facilities to provide direct and efficient connections. Facilities should consider lighting and be prioritised over driveways and minor road intersections. Aligns with TfNSW Principal Bicycle Network Tier 1 Routes.
Tier 2 – District Routes	Connect major destinations, and strategic and local centres, with quality cycling facilities. Facilities should consider lighting and be prioritised over driveways and minor road intersections.
Tier 3 – Local Connections	Provides connections to and between Regional and District routes, allowing safe connectivity and distribution into residential areas.

3.3.1.1 Directions

The Plan outlines four key directions:

1. Expand, improve and maintain the Safe Cycling Network
2. Improve and maintain the Road Cycling Network
3. Provide and maintain end-of-trip facilities
4. Promote and encourage cycling.

Cycling infrastructure that will form part of the Safe Cycling Network include safe road crossings, quiet local streets (40km/h), up-to-date wayfinding signage, and features shown in Figure 13. Other notable actions include seeking funding opportunities for future Safe Cycling projects, and ensuring the proposed expansion of the network is incorporated into major projects and future plans.

An example of local infrastructure built to the Plan's standard includes connectivity within Warriewood Valley, and the integration of this network with public transport connections and the wider regional cycling route.

Figure 13 Safe Cycling Network treatments

Source: Northern Beaches Bike Plan 2020

Typical treatments for the Road Cycling Network will include marked bicycle lanes, traffic calming, road shoulder improvements, and treatments shown in Figure 14. Improvements to the Road Cycling Network is carried out progressively as funding is allocated and as resurfacing works occur.

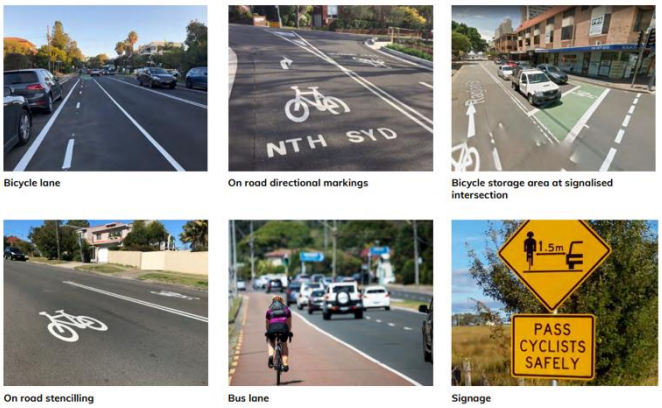

Figure 14 Road Cycling Network treatments

Source: Northern Beaches Bike Plan 2020

Expected treatments to roads and paths on both networks depend on the road type as shown in Table 4.

Table 5 Road Hierarchy Treatments

Road Type	Safe Cycling Network	Road Cycling Network
State Road	Off road cycling facility on both sides of road due to difficulty of safe crossing. Separated cycleway or shared path.	Bicycle lane, bus lane, wide kerbside lane, road shoulder, advisory/warning signage, directional signage, stencilling
Regional Road	Off road cycling facility on both side of road due to difficulty of safe crossing. Separated cycleway or shared path.	Bicycle lane, bus lane, wide kerbside lane, road shoulder, advisory/warning signage, directional signage, stencilling
Primary Collector	Generally off-road cycling facility on one side of road. Off road cycling facility on both sides of road where safe crossing is difficult. Separated cycleway or shared path.	Bicycle lane, bus lane, road shoulder, advisory/warning signage, directional signage, stencilling
Local Connector	Off road cycling facility on one side of road. Separated cycleway or shared path.	Bicycle lane, bus lane, wide kerbside lane, road shoulder, advisory/warning signage, directional signage, stencilling
Local Access	Off road cycling facility on one side of road or on road facility. Separated cycleway or shared path, traffic calming, shared zone, contraflow.	Advisory/warning signage, directional signage, stencilling
Laneway	Generally on road facility due to lack of road verge. Traffic calming, shared zone, and contraflow.	Advisory/warning signage, directional signage, stencilling
Cul de sac	Generally on road facility due to low vehicle traffic. Traffic calming and shared zone.	Advisory/warning signage, directional signage, stencilling

Source: Northern Beaches Bike Plan 2020

The Plan identifies parking as a key factor across all modes of transport in influencing transport choice.

Availability and convenience of parking for all modes is a key factor in influencing transport choice.

Council aims to deliver and maintain quality parking infrastructure, end-of-trip facilities, and other facilities shown in Figure 15, in *convenient* locations and key destinations including:

- Strategic centres
- Transport hubs
- Local centres and villages
- Major destinations, such as beaches and employment hubs

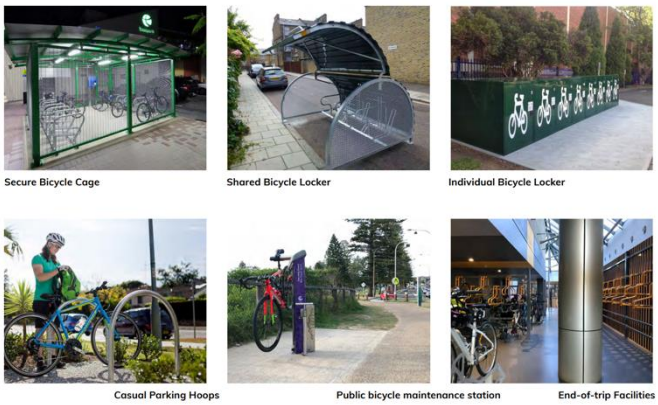

Figure 15 End of trip facilities

Source: Northern Beaches Bike Plan 2020

Non-infrastructure actions involving the promotion and education around cycling has an important role in increasing cycling participation in the Northern Beaches. Key actions in the Plan to encourage cycling participation include:

- Promote cycling as a transport option to work, schools, Council events
- Raise awareness of the benefits of cycling
- Promote new bicycle infrastructure
- Improve cyclist safety through cycling training and awareness programs.

3.3.1.2 Prioritisation and delivery criteria

The Plan is implemented through a structured approach that summarises:

- Key directions;
- Goals;
- Actions;
- How Council will achieve the action; and
- the Responsible Business Unit.

Table 6 provides an example of the approach taken to expand, improve, and maintain the Safe Cycling Network (Direction 1). This approach is taken for each direction[1].

[1] The complete action tables can be viewed in the Northern Beaches Bike Plan 2020.

Table 6 Northern Beaches Bike Plan Direction 1

Action Table - Direction 1

Direction	Goal	Action		How will we achieve this?	Responsible Business Unit
1. Expand, improve and maintain the Safe Cycling Network	1.1 Expand the Safe Cycling Network	A1	Seek NSW Government funding for Safe Cycling Network projects	Prioritise projects and funding applications and project manage the delivery of the network	Transport Network
		A2	Prepare designs for Safe Cycling Network to be construction ready for RMS and other funding opportunities.	Prioritise projects in accordance with delivery schedule	Transport Network Capital Projects
		A3	Construct Safe Cycling Network connections	Construct connections in accordance with delivery schedule	Transport Network Capital Projects
		A4	Ensure Safe Cycling Network is incorporated in TfNSW and RMS major projects	Communicate proposed Safe Cycling Network to TfNSW & RMS with regards to major projects	Transport Network T&CI Assets
		A5	Ensure new developments are assessed and conditions applied in line with the proposed Safe Cycling Network mapping	Review the Safe Cycling Network mapping to determine proximity to the development and potential upgrades	Development Engineering Transport Network
		A6	Ensure proposed Safe Cycling Network is incorporated in future Place Plans	Review proposed Safe Cycling Network mapping in conjunction with developing plans	Strategic and Place Planning Transport Network
		A7	Ensure proposed Safe Cycling Network is incorporated in future Parks & Reserves Master Plans	Review proposed Safe Cycling Network mapping in conjunction with developing plans	Parks Assets - Planning Design and Delivery Transport Network
	1.2 Improve the existing Safe Cycling Network	A8	Seek NSW Government funding for Safe Cycling Network projects	Prioritise projects and funding applications and project manage the delivery of the network	Transport Network
		A9	Audit existing Safe Cycling Network	Conduct audit and data collection of existing network	Transport Network
		A10	Improve existing Safe Cycling Network	Prioritise projects in accordance with delivery schedule	Parks Assets - Planning Design and Delivery Transport Network
				Prioritise works based on audit of existing network	
		A11	Review and update wayfinding signage	Develop and implement wayfinding signage program to ensure a consistent approach and include new technology to improve the customer experience	Transport Network
	1.3 Maintain the existing Safe Cycling Network	A12	Maintain path infrastructure to provide a safe cycling environment	Maintain the infrastructure in accordance with Council's asset management program	Transport Network Parks Operations Construction & Maintenance
				Develop and maintain online reporting tool for path maintenance requirements	Transport Network Transport and Civil Infrastructure - Assets
				Respond to customer requests for path maintenance	Transport Network Parks Operations Construction & Maintenance

Source: Northern Beaches Bike Plan 2020

Routes are allocated priority scores based on reasonable assumptions of the importance of destination and land use in relation to cycling. This includes proximity to public transport, playgrounds, schools, community facilities, business and industrial parks, and activity centres. Density of built form is also considered.

For example, routes that provide connection between neighbourhood centres have a higher priority score of 25, whereas routes between residential areas have a lower priority score of 5 to 10.

The prioritisation of works on routes in the Safe Cycling Network is shown in Figure 16. The map illustrates the existing network, and the proposed network, categorised by the following:

- Programmed for Delivery
- High priority
- Medium priority
- Low priority

Figure 16 Safe Cycling Network Prioritisation

Source: Northern Beaches Bike Plan 2020

The Road Cycling Network identifies the most popular roads that people are currently using (Figure 17), indicating higher priority than other roads for safety treatments.

Figure 17 Road Cycling Network Route Mapping

Source: Northern Beaches Bike Plan 2020

3.3.1.3 Operational budget for Council

Funding for project and works comes from Council's capital works and operational budget, developer contributions (Section 7.11), voluntary planning agreements, and National and State funding. Table 7 identifies Council's allocated budget for managing *all* road and transport projects. This includes works for:

- Local roads, traffic, bus stops, and parking areas
- Wharves, jetties and tidal pools
- New footpaths, cycleways, and bike facilities
- Transport planning and road safety education.

It is not clear how much of the transport budget is dedicated to cycling related projects and programs.

Table 7 Northern Beaches road and transport budget

Year	Proportion	Total budget
2019/20	8%	$36.3 million
2020/21	8%	$36.1 million
2021/22	7%	$33.1 million
2022/23	8%	$37 million
2023/24	10%	$50.7 million

Source: Northern Beaches Council

3.3.2 City of Newcastle – On Our Bikes, 2021

This Plan outlines initiatives in the City of Newcastle, with a goal to establish a safe and well-connected cycling network by 2030 consisting of:

- Principal routes
- Low stress streets.

The City identifies that Newcastle has the potential to be a great cycling city and aims to make riding and walking the *natural* choice for short trips. This includes increasing cycling for recreation *and* for transport.

3.3.2.1 Key actions and targets

The Plan sets the following 2030 targets:

- Increase the proportion of residents who ride a bike in a typical week from 16% to 30%
- Double the mode share (of bikes) for journeys to work to 4%

To achieve these goals, the Plan is structured around four key themes:

- Improve safety and comfort
- Connect and improve the network
- Support people to ride
- Facilitate active transport in centres.

The Council identifies that poor perceptions of safety remains the key barrier for people to ride in Newcastle. The Plan identifies cycling infrastructure upgrades should cater to the needs of people of all ages and abilities, and an increasing diversity of mobility devices to increase cycling participation.

The Council identifies that poor perceptions of safety remains the key barrier for people to ride in Newcastle.

Work completed as part of the development of the *Cycling Plan* found the overwhelming majority of the population considered it necessary for cycleways to be separated from motorised traffic. This is generally consistent with numerous other studies, from in Australia and abroad.

A survey conducted by Council found an overwhelming majority of respondents felt cycleways should be separated from motorised traffic.

Key infrastructure design standards in the Cycling Plan include:

- A minimum width of 1.5 metres for new footpaths
- A minimum width of 3 metres for shared paths
- A minimum width of 1.5 metres for cycle lanes, with a metre buffer between motorised traffic
- Reducing speed limits to 30km/h, in appropriate locations
- Trial limited access (for motorised traffic) streets and areas
- Apply treatments and review road space allocation based on a functional road hierarchy
- Ensure cycling environments are bike safe (e.g., upgrade stormwater grates, trim vegetation, install bicycle ramps etc.).

The Cycling Plan highlights that new cycle routes will be separated from motorised traffic, or achieve a low speed, low traffic environment.

While increasing safety for cyclists is a priority, the Plan also sets a standard for cycling infrastructure to be *coherent*, *direct*, *comfortable*, and *attractive*.

The Plan will implement a principal bike network that delivers convenient connections between centres, key destinations, homes, and to a regional cycling network. This will involve conducting feasibility studies for route alignments to cover key gaps in the network, and to identify sections that require significant upgrades, including possibilities to reclaim road space from cars for riders and pedestrians. Figure 18 shows the existing network, and proposed routes and major upgrades in a part of Newcastle.

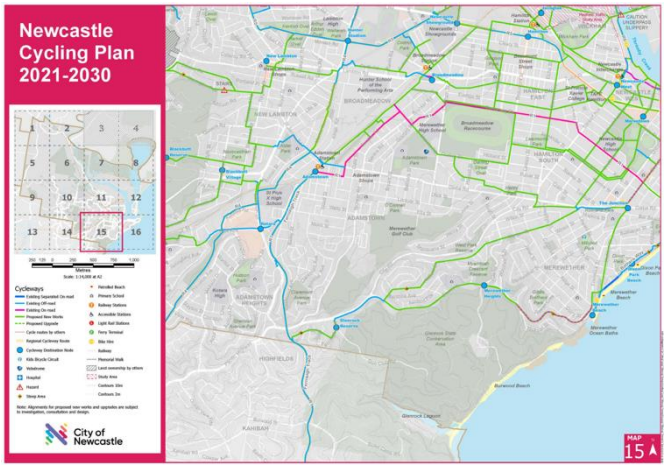

Figure 18 Existing and proposed cycling network, Newcastle

Source: Newcastle Cycling Plan 2021-2030

A key action in the Plan is to investigate opportunities to reclaim road space from cars, for cyclists and pedestrians.

Other actions include providing bicycle parking at local centres and other attractors, and installing coherent and consistent bicycle wayfinding signage to support people to ride.

Soft measures defined in the Plan to increase cycling participation in Newcastle include:

- Providing information about cycling in Newcastle
- Promoting the benefits of cycling
- Informing people about safe routes and cycling infrastructure through website updates and publishing cycling maps
- Deliver and support bike riding programs and events (e.g., National Ride2Work Day, NSW Bike Week, Biketober etc.)
- Engage with organisations that support people to ride (e.g., Heart Foundation, Love to Ride)
- Educate people on safe and respectful behaviour as a road and path user.

3.3.2.2 Prioritisation and delivery criteria

Works will prioritise low-cost measures that can be readily implemented to improve safety and connectivity in the short term. Further, routes and projects that align with the following will be prioritised:

- Address key gaps and/or safety issues
- Align with objectives of grant programs
- Offer benefits to multiple user groups
- Align with major drainage or road projects
- Align with major public domain, local centre and/or local area traffic management works
- Support a mix of planning, design and delivery of projects of varying scales.

The City of Newcastle prioritises low-cost, readily implementable measures that can improve safety and connectivity in the short term.

While the majority of works in recent years have involved the construction of shared paths, riders and pedestrians have indicated a preference for separated bike paths. Delivering physically separated on road cycle routes is an example of cycling infrastructure that scores high on the Plan's prioritisation criteria.

3.3.2.3 Operational budget for Council

Since 2014, the City of Newcastle has invested $14 million in cycleway upgrades. Almost $5 million was allocated to cycleways projects under the 2020-21 capital works budget, including $3.1 million for the first stage of the City Centre to Merewether cycleway. Other notable projects include:

- Watkins Street Cycleway works from The Junction to Merewether ($3.6 million)
- $2 million cycleway upgrades in 2021/22
- $4.7 million on traffic management and cycleway and footpath works in 2022/23

3.3.3 City of Sydney's – Cycling Strategy and Action Plan, 2023

The City of Sydney has the highest cycling participation rates and the most ambitious bicycle network plan of any LGA in NSW. The City of Sydney's *Cycling Strategy and Action Plan* presents the blueprint to increase cycling trips in the City of Sydney by making bicycle transport easier and safer. It builds on progress made over the last 10 years to achieve a bike mode share target of 10% for all trips in Sydney by 2030.

3.3.3.1 Key actions and targets

To deliver a safe and attractive cycling network, the Plan identifies the following actions relating to cycling infrastructure:

- Complete the local bike network and 11 regional bike routes. Figure 19 shows the existing and proposed bicycle network in the municipality.

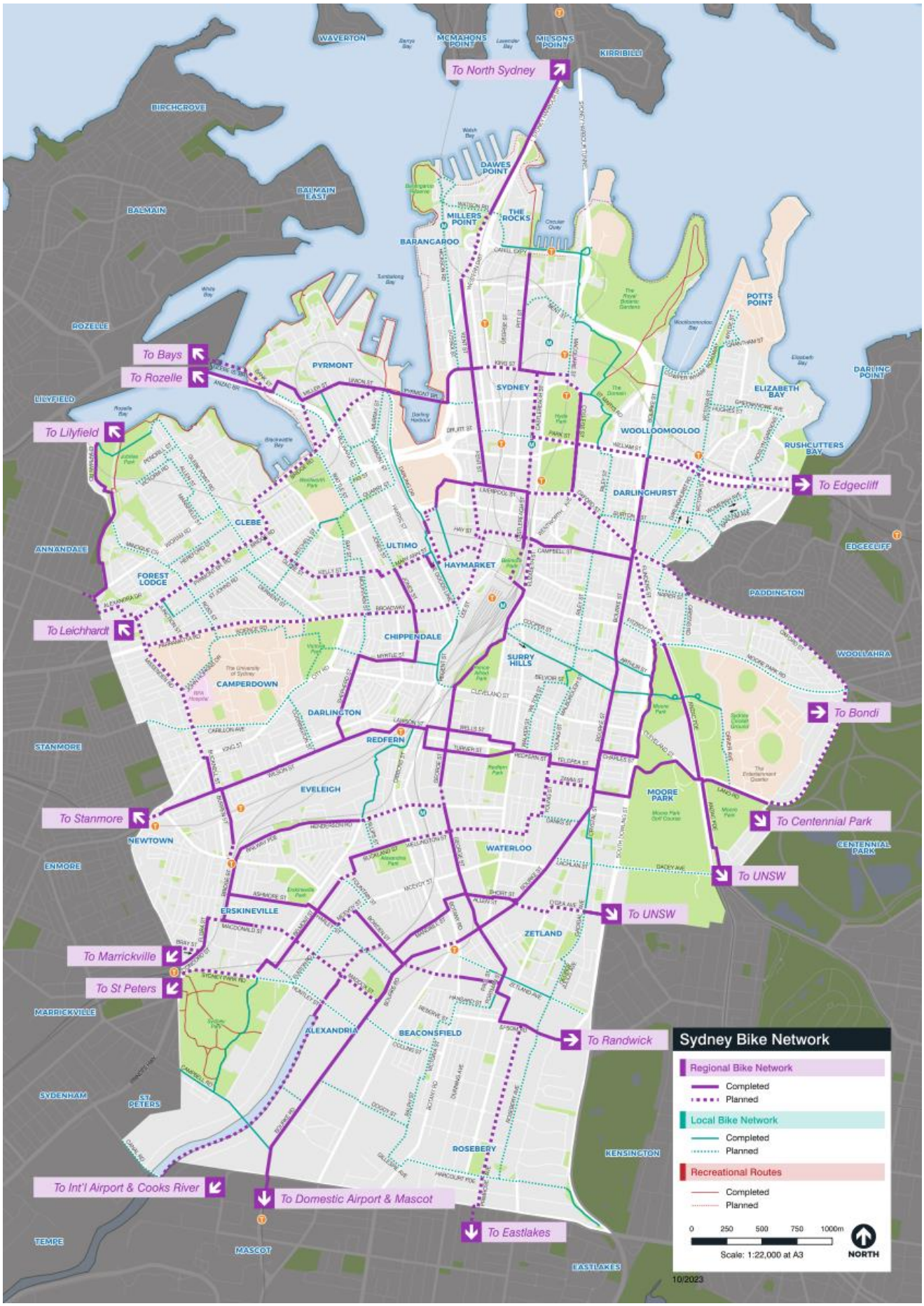

Figure 19 Sydney Bike Network

Source: City of Sydney 2023

- Add local wayfinding signage
- Apply treatments to improve safety and access where appropriate:
  - Replace bicycle shoulder lanes
  - Add new contraflow provisions
  - Reduce traffic on local streets and lower speeds
  - Install kerb ramps at road closures
  - Upgrade stormwater grates to be bike safe
  - Maintain road surfaces, signs, and street environments.

  Figure 20 shows treatments that will be applied based on the traffic volume and environment.

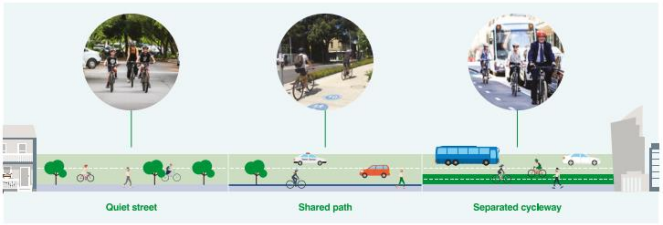

Figure 20 Treatments to different road environments

Source: City of Sydney 2023

- Provide end-of-trip facilities, including quality bike parking, in high demand locations (e.g., activity centres, schools, workplaces etc.).

The City's approach to soft measures take shape through the following actions:

- Leading by example by encouraging Council staff to ride to work and for work trips, and integrating cycling throughout Council's policies, operations, and planning.
- Supporting people to ride through:
  - Information sharing (i.e., cycling network maps and navigation resources)
  - Programs to improve relations between road users
  - Providing opportunities for people to build their riding skills and capabilities (particularly for children and women)
- Partnering with workplaces and businesses to encourage workers and visitors to cycle to their destination. This includes supporting a bicycle friendly workplace accreditation scheme, and bike-based or related enterprises and activities.
- Working with community to understand key barriers for people riding, including identifying areas in the bike network that require improvements to safety, access, and/or comfort for cycling.
- Partnering with state government agencies and neighbouring councils to close gaps in the wider network and provide greater active transport capacity.
- Advocating to the broader community and the NSW Government for changes to practices, legislation, training and technical guidance to improve and increase cycling.

City of Sydney recognises the importance of partnering with businesses, government agencies, and the community.

Table 8 summarises a series of target indicators that will track the City's progression towards achieving a bike mode share target of 10% for all trips by 2030.

Table 8 Progress indicators for the City of Sydney

Indicator	Baseline	Interim Target	2030 Target	Data Frequency
Proportion of journeys to work by bike for city residents	1.9% (2006) 3.4% (2016)	5% (2021)	10%	Every 5 years
Proportion of journeys to work by bike for people working in the city	1.01% (2006) 1.8% (2016)	3% (2021)	10%	Every 5 years
Proportion of people who ride who feel somewhat and very safe riding in inner Sydney (within 10km of city centre)	53% (2017)	60% (2023)	80%	Every 3 years
Crashes involving people riding in our council area	108 (2015)	85 (2021)	50	Annual
Number of bikes counted at intersections in our council area	TBC (2018)	+50% (2024)	+100%	Twice yearly from October 2018
Number of bikes at key counter sites in our council area	August 2018 daily averages	+50% (2024)	+100%	Monthly
Proportion of City residents who rode a bike in the past week/past year	20% (2017) 32% (2017)	25% (2021) 40% (2021)	30% >50%	Every 2 years
Percentage of regional routes completed*	50%	80% (2024)	100%	Annual
Percentage of local network completed*	16%	35% (2024)	60%	Annual
Proportion of residents living within 250m of completed bike network	62%	72% (2024)	94%	Every 5 years

*Based on the NSW Government providing full level of funding for projects which are eligible, and the City achieving cost efficiencies of 10-30% (route dependent).

Source: Sydney Cycling Strategy and Action Plan 2018-2030

3.3.3.2 Prioritisation and delivery criteria

The Plan prioritises cycling infrastructure delivery and upgrades in high demand areas, including high volume cycling routes and major destinations, and high crash or injury sites in the transport network.

3.3.3.3 Operational budget for Council

Between 2007 to 2017, the City of Sydney invested an average of $11 million per annum for cycling infrastructure projects and initiatives. The Plan advocates for TfNSW to continue part-funding the City's cycling projects.

The Plan also supports partnering with the private sector to deliver end-of-trip facilities. City employers have invested over $30 million the city centre in the last three years alone.

3.3.4 City of Gold Coast – Gold Coast Active Transport Plan, 2017-2027

The Gold Coast Active Transport Plan outlines strategies for transforming the city into a walkable and cycle-friendly environment and increase active travel over the next 10 years.

3.3.4.1 Key actions and targets

The Active Transport Plan works towards a mode share target of 12% of all trips to be made by active transport by 2026 (4.5% cycling, 7.5% walking). This is an interim target to achieve the 2031 mode share target set out in the Gold Coast's Transport Strategy shown in Figure 21.

The City of Gold Coast aims to achieve a cycling mode share target of 4.5% by 2026.

Mode share proportion (total daily trips)	Baseline 2011	Active Transport Plan targets 2026	Transport Strategy targets 2031
Walking	7.1%	7.5%	8%
Cycling	1.9%	4.5%	6%
Active transport (total)	9%	12%	14%
Public transport	3.1%	9%	12%
Motor vehicle	87.9%	79%	74%

Figure 21 Gold Coast mode share targets

Source: Gold Coast Active Transport Plan 2017-2027

Key infrastructure actions in the Plan include:

- Completing the city-wide active transport network. This involves establishing a network hierarchy defining principal, district, and network routes. The standard of infrastructure (such as the level of separation from motor vehicles and/or availability of end-of-trip facilities) will be determined by the route environment and traffic volumes.
- Deliver infrastructure that maximises safety for all road and path users. Improvements to street lighting is a key action in the Plan.
- Focus investment around major destinations (e.g., employment centres, parks, education) and public transport nodes.
- Deliver *green bridges* to address connectivity barriers in the pedestrian and cyclist network. Figure 22 shows an example of a green bridge constructed in Burleigh Waters which deliver the second highest benefit-cost ratio when comparted to eight different cycleways across Brisbane and the Gold Coast.
- Investigate opportunities to construct high-standard, high-speed bikeway facilities, separated from pedestrians and vehicles.
- Deliver consistent wayfinding signage

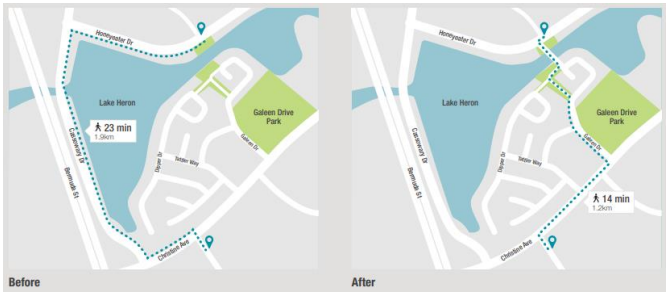

Figure 22 Galeen-Honeyeater green bridge, Burleigh Waters

Source: Gold Coast Active Transport Plan 2017-2027

Key non-infrastructure actions in the Plan are:

- Develop a Safe Routes to School program that identifies opportunities to improve walking and cycling infrastructure and encourage students to walk to school.
- Investigate the demand and likely uptake of a bike share scheme in the Gold Coast (the Gold Coast is now part of the LIME bike share program).
- Work with government partners to investigate the potential to allow bikes on public transport.

3.3.4.2 Prioritisation and delivery criteria

The City developed a prioritisation criteria to guide the delivery of the active transport around major destinations and public transport. The criteria assign a priority level to an active transport link, which can then be compared to other links across the network.

Priority levels are assigned based on the following:

- Does the proposed link fall within a 5km radius of an activity centre?
- Does the link fall within a 3km radius of an educational facility?
- What is the residential population within 500m of the link?
- Does the proposed link fall within a 5km radius of key public transport stations or stops?
- Does the proposed link represent an identified project in the SEQ Principal Cycle Network Plan?
- Does the link include active transport crash black spots?
- Is active transport infrastructure already provided along this proposed link?

- Does the link fulfil a gap in the active transport network?

Proximity to activity centres, major destinations, and public transport is a key criterion for delivery prioritisation.

An example of an active travel infrastructure that is prioritised in the Plan is along the coastal corridor where there are gaps in connectivity along a popular route for transport and recreation.

3.3.4.3 Operational budget for Council

The 10-year active transport capital works program currently totals approximately $50 million – with approximately $20 million allocated within the first four years.

To deliver regional and major link projects (for example, green bridges), additional funding is required. Opportunities to access alternative funding streams, through private sector, state, and federal government partnerships, will continue to be reviewed by Council to address this funding gap.

3.4 International case studies

3.4.1 City of Copenhagen's Bicycle Strategy, 2011-2025

Copenhagen is one of world's best performing cities in terms of its growth in cycling participation over the last four decades. This has occurred via a multipronged approach of building separated bicycle infrastructure *and* progressively reducing car parking by 2 – 3% per year since the early 1980s.

The City of Copenhagen's Bicycle Strategy outlines the city's plan to become the world's best bicycle city by 2025. This Strategy is designed to support the City's goal of becoming carbon neutral by 2025.

The Strategy works towards increasing trips for shopping, work, and school completed by bike through four key themes: Safety, Speed, Comfort, and City life.

3.4.1.1 Key actions and targets

Notable interim and 2025 targets set in the Strategy are summarised in Table 9.

Table 9 Copenhagen Bicycle Strategy targets

Target	2015	2020	2025
Share of all trips by bicycle to work and school in Copenhagen	50%	50%	50%
Share of the network where 3 people can ride comfortably together	40%	60%	80%
Relative to 2010, cyclists' travel time is reduced by	5%	10%	15%
People that feel safe cycling in traffic	80%	85%	90%
Relative to 2005, the number of seriously injuries to cyclists is reduced by	50%	60%	70%
Cyclists who find the cycle tracks well maintained	70%	75%	80%
Residents who think bicycle culture positively affects the city's atmosphere	70%	75%	80%

Source: Copenhagen Bicycle Strategy 2011-2025

By 2025, the City of Copenhagen aims to achieve 50% bicycle mode share for trips to work and school.

Delivering new cycling infrastructure and upgrade and maintenance of existing infrastructure will have a significant role in achieving these targets. Key actions in the Strategy relating to cycling infrastructure include:

- City wide bicycle parking for all types of bikes, including cargo bikes, outside homes, institutions, and shops. Adequate parking for cargo bikes is particularly important as they are integrated in the City's logistics system.
- Deliver a bike share system that is integrated into the public transport system.
- Fill gaps in the bike network - increase bike access (e.g. contraflows, tunnel and bridge shortcuts, as shown in Figure 23, access across squares etc.), maximise green and blue connections, and deliver missing links on main arteries.

Figure 23 Bridge in Cirkelbroen provides cyclist shortcut over Christianshavns Kanal

Source: Copenhagen Bicycle Strategy 2011-2025

The Strategy will deliver 200-400 small shortcuts, 5-8 large shortcuts (i.e., bridges/underpasses), 30-40km of new cycle tracks and lanes, and 10-30km of wider cycle tracks.

- Regularly maintain cycle paths and lanes to ensure road surfaces are smooth and free of obstructions.
- Improve cycling priority - increase cycle lanes to allow for *conversational cycling* (i.e., 3 people may ride abreast comfortably), implement an Intelligent Traffic System (ITS) to allow for dynamic streets where priority can be adjusted by network location and time of day (see Figure 24),

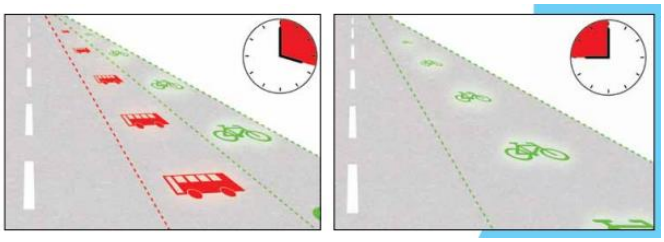

Figure 24 New infrastructure technology allows for *dynamic streets*

Source: Copenhagen Bicycle Strategy 2011-2025

- Embed sensors in the network to provide real-time traffic information where traffic signalling is responsive to cycling levels. For example, large bike volumes will trigger a green light.
- Work with businesses and shops to deliver bike-thru shopping.
- Improve road design, particularly at intersections, to increase cyclist safety. Figure 25 shows line markings at an intersection where the stop line for cars is pulled back to increase visibility of cyclist.

Figure 25 Line markings at intersection increases cyclist visibility

Source: Copenhagen Bicycle Strategy 2011-2025

Other key measures focus on:

- Promoting courteous behaviour through behavioural campaigns
- Reducing speed limits for cars where appropriate
- Implementing congestion charges to deter car use
- Providing a strong information and resource base for network information, real time traffic updates available through digital platforms and smartphone applications.

3.4.1.2 Prioritisation and delivery criteria

This map shows the PLUSnet network – a network of green routes, bicycle superhighway and the most

congested bicycle routes. Routes identified in Figure 26 are approved works of high priority in the Strategy. Exact routes and capacity are adjusted based on traffic and city development on an ongoing basis.

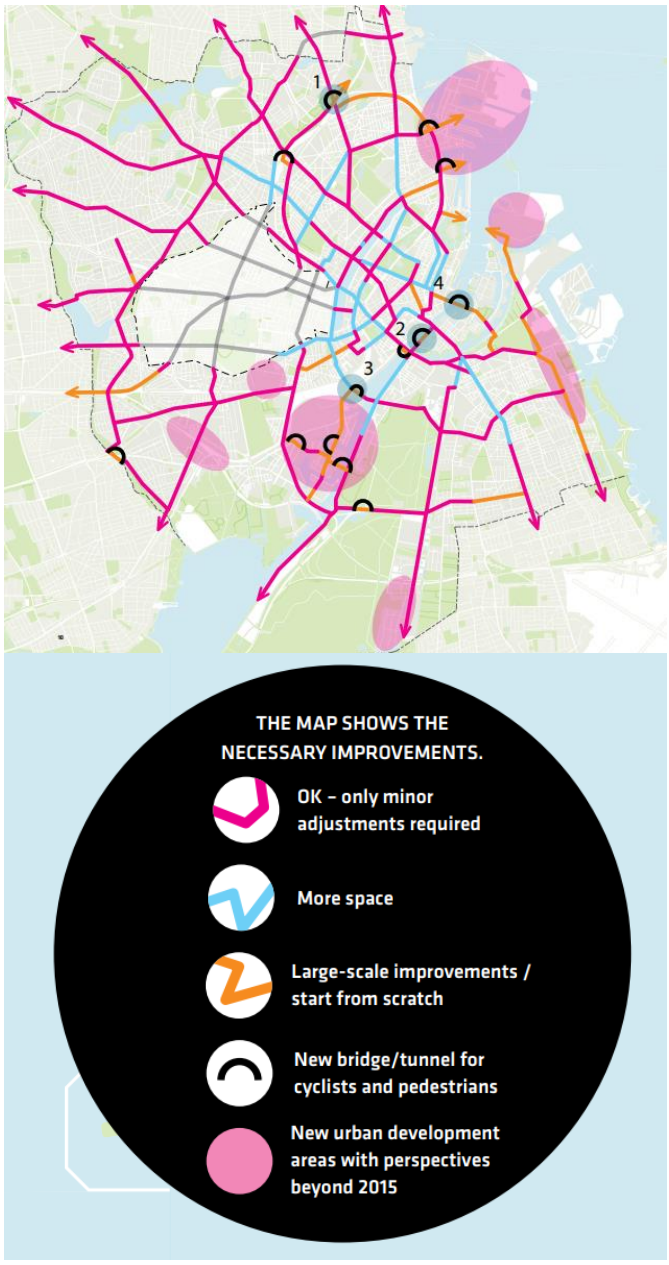

Figure 26 PLUSnet Network approved works until 2025

Source: Copenhagen Bicycle Strategy 2011-2025

3.4.1.3 Operational budget for Council

While the total budget for Council is unclear, investment in cycle track maintenance reports an increase of €1.3 million per year. Figure 27 provides expected cost examples for specific traffic measures, where bicycle works are significantly cheaper than for other modes.

TRANSPORT FORM	COST EXAMPLES	
BICYCLE	1 km cycle track (both sides) Network of bicycle super highways (300 km) in the capital region.	DKK 16 mio. (€2.2M) DKK 900 mio. (€2.2M)
CAR	Nordhavnsvej Motorway expansion from Roskilde-Fløng	DKK 1.8 billion (€242.2M) DKK 2 billion (€269.1M)
METRO	1 km of the Metro City Ring	DKK 1 billion (€134.5M)
TRAIN	Extra track for overtaking between Holte-Bernstoffsvej	DKK 1.5 billion (€201.8M)
BUS	City of Copenhagen's annual bus subsidy	DKK 400 mio. (€53.8M)

Figure 27 Cost examples for specific traffic measures

Source: Copenhagen Bicycle Strategy 2011-2025

3.4.1.4 Monitoring change – The Bicycle Account 2022

The Bicycle Account is a report published every two years by the City of Copenhagen presenting the changes and progress made towards reaching the goals set in the Bicycle Strategy. Before the COVID-19 pandemic, the report found car mode share gradually declined to 30% of all trips, while cycling and walking increased to 28% and 20%, respectively. As shown in Figure 28, the COVID-19 had significant impact on the share of bicycle trips. Surprisingly, walking mode share increased to 35%. The reason for this significant growth is to be determined.

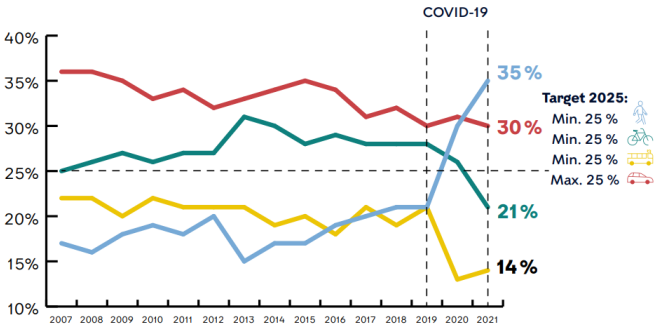

Figure 28 Mode share change for all trips, 2007-2021

Source: The Bicycle Account 2022, City of Copenhagen

For trips to and from work and education in Copenhagen, Figure 29 shows 35% of these trips were completed by bike in 2021. The target for 2025 is 50%.

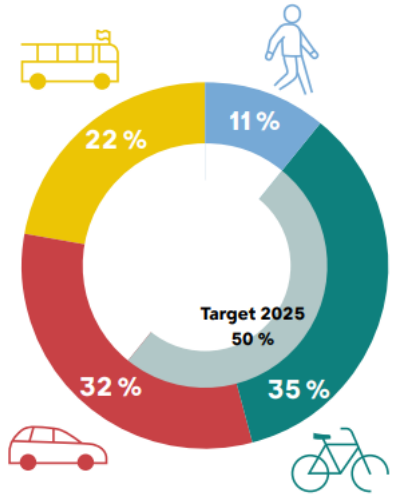

Figure 29 Mode share for trips to work and education in 2021

Source: The Bicycle Account 2022

The report also presented the following key figures:

- 48% of Copenhageners say the bicycle is their preferred mode of transport
- 97% of people who ride in Copenhagen are satisfied with the city's cycling infrastructure
- 78% feel cycling culture has a positive impact on urban life
- 79% of people who ride in Copenhagen feel safe cycling in traffic – the target is 90% by 2025
- 47% of Copenhageners are satisfied with bicycle parking overall. Figure 30 shows how satisfaction varies between key locations.

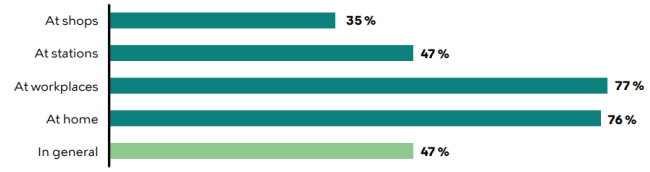

Figure 30 Bicycle parking satisfaction by location, 2022

Source: The Bicycle Account 2022

The following tables are used to track and monitor change over time from the adoption of the Strategy, and the city's progress towards reaching its 2025.

Table 10 tracks cycling targets. Travel time in 2020 and 2021 was not calculated. A new method is currently under revision to calculate travel time change and will be available in the 2024 report.

Table 10 Copenhagen cycling targets tracker

	2012	2018	2020	2021	Target 2025
Share of all trips by bicycle (%)	27	28	26	21	>25
Share of trips to work/education in Copenhagen by bicycle (%)	36	49	42	35	50
Serious cyclist casualties (number per year)	102	131	78	-[1]	0
Share of PLUS network with three lanes (%)	17	20	20	20	80
Reduction in traveling time by bicycle compared to 2012 (%)	0	9	-[2]	-[2]	15

Source: The Bicycle Account 2022

Table 11 and Table 12 provide examples of how Copenhagen tracks the sense of security and satisfaction of people who ride in Copenhagen, and the city's progress in delivering cycling infrastructure.

Table 11 Monitoring sense of security and satisfaction

	2012	2018	2020	2021[3]	Target 2025
Perceived safety while cycling (%)	76	77	79	79	90
Satisfaction with cycle track maintenance (%)	61	73	73	68	80
Satisfaction with cycling culture's impact on urban life (%)	73	72	75	75	80
General satisfaction with bicycle parking (%)	29	37	44	47	70
General satisfaction with Copenhagen as a bicycle friendly city (%)	95	97	97	97	-

Source: The Bicycle Account 2022

Table 12 Monitoring cycling infrastructure delivery

	2012	2018	2020	2021	Planned 2025[4]
Cycle tracks (km)	359	382	386	388	423
Cycle lanes (km)	24	33	33	33	18
Green Cycle Routes (km)	43	63	64	65	115
Cycle Superhighways in the City of Copenhagen (km)	2	30	30	35	145
Cycle Superhighways in the capital region of Denmark (km)	17	162	169	177	877
Cycle tracks renovated/reestablished (km)	-[5]	-[5]	7.0	5.8	-
Bicycle parking spaces built (number per year)	1,000	600	2,600	1,800	37,000-72,000[6]
Collected abandoned bicycles (number per year)	8,230	14,533	20,140	11,670	-

Source: The Bicycle Account 2022

3.4.2 New York City's Green Wave: A Plan for Cycling in New York City, 2019

New York City has, over the last 10 - 15 years become a leading North American cycling city. It has developed the largest network of protected bicycle infrastructure in North America and has the largest and most well used bike share program in the United States. The Green Wave Cycling Plan aims to increase the number of people cycling in New York City, with a focus on improving cycling safety to encourage people to ride. The development of the cycling network in New York is illustrates in Figure 31, in which the under developed network of 1997 is contrast with the 2019 network.

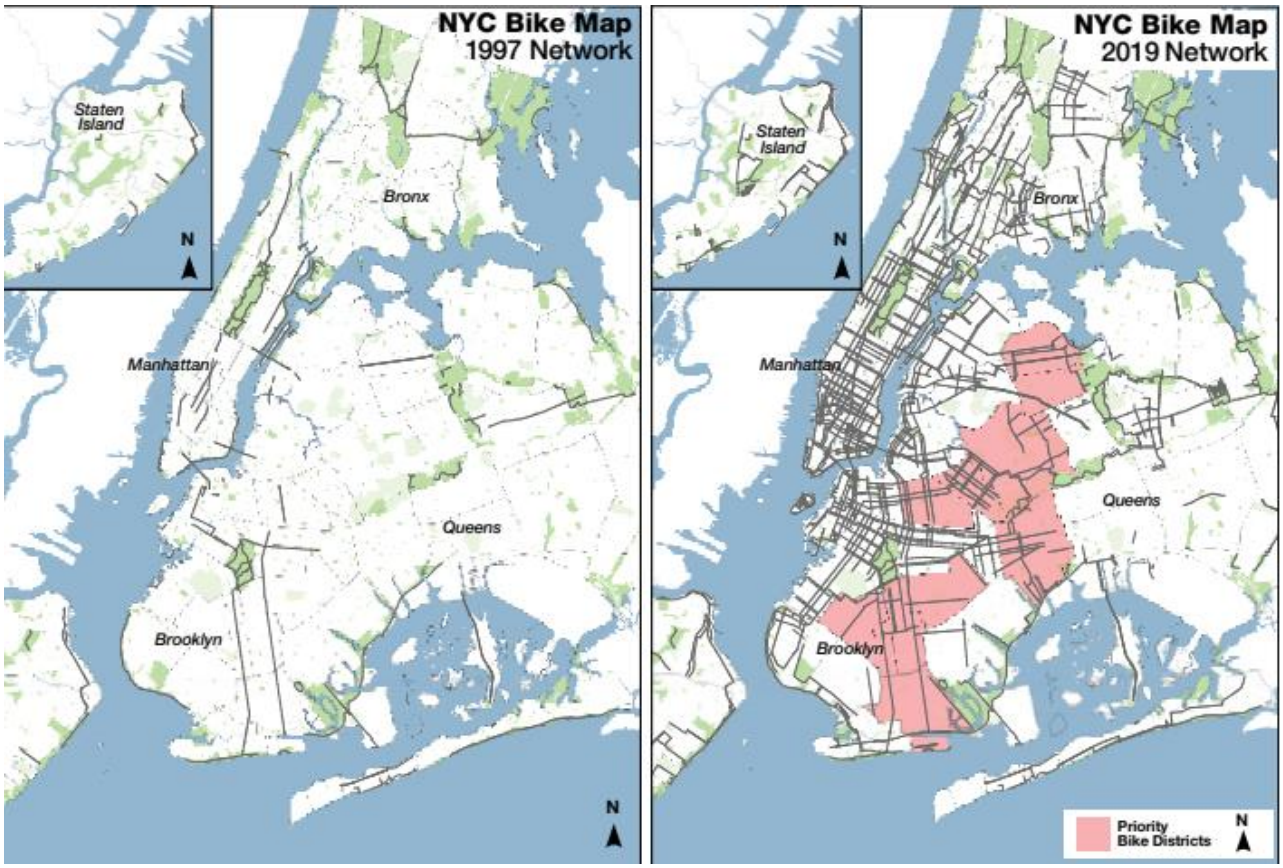

Figure 31 New York City bicycle network 1997 to 2019

Source: NYC's Green Wave Cycling Plan 2019-2022

3.4.2.2 Key actions and targets

Key targets of the Plan include delivering:

- 30 miles of protected bike lanes annually
- 10% of all trips in NYC to be taken by bicycle by 2050
- 75 miles of both conventional and protected bicycle infrastructure in 10 Bicycle Priority Districts (BPD) by 2022.

  BPDs are community districts with high risks of cyclists being killed or severely injured and low bicycle network coverage.
- Increase the city's bikeshare program, Citi Bike, service area by 35 miles by 2019, and triple the number of bikes to 40,000 by 2023.
- Install 2,000 bike parking space, including bike corrals (generally referring to on street bike parking replacing on street car parking), annually.

Key infrastructure actions are summarised below:

- Implement new design standards based on best practice to enhance safety at intersections
- Increase physical protection of bicycle lanes (i.e., increased safety bollards)
- Fill gaps in the network, reaching under-served neighbourhoods
- Improve on-street connections to/from existing bridge paths, and build out greenway connections
- Improve road design and treatments that prioritise cyclist safety. Figure 32, Figure 33, and Figure 34 show examples of safe, intuitive and contextual treatments.

Figure 32 Offset crossing intersection treatment

Source: NYC's Green Wave Cycling Plan 2019-2022

Figure 33 Traffic diverter provide safe bike access and limits vehicle through lane

Source: NYC's Green Wave Cycling Plan 2019-2022

Figure 34 Protected bicycle lane with green paint design

Source: NYC's Green Wave Cycling Plan 2019-2022

This Plan includes a comprehensive set of non-infrastructure actions. These include:

- Education and outreach initiatives
- Legislation and policy changes
- Law enforcement

Cycling participation grew 55% between 2012 and 2017.

The Plan identifies non-infrastructure actions as an important aspect in increasing cycling participation and mode share. Two key approaches include education and outreach initiatives, legislation and policy change, and law enforcement.

Education and outreach

- Promote safe driving and riding behaviours through safety campaigns and messaging. Figure 35 is an example of this material.

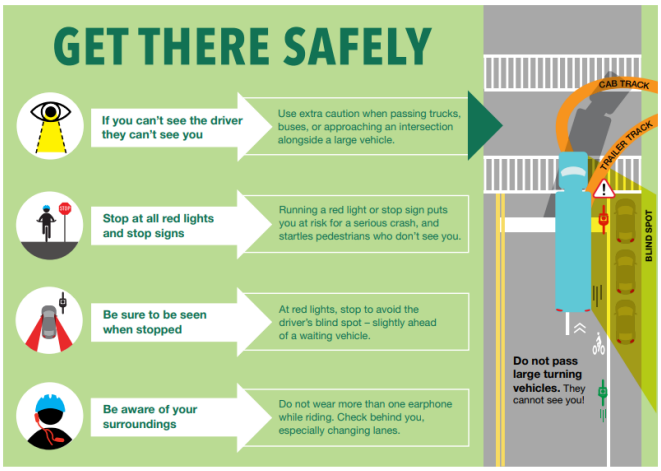

Figure 35 "Get There" palm cards

Source: NYC's Green Wave Cycling Plan 2019-2022

- Provide services and materials to driving schools, high schools, for-hire vehicle app companies, and new licensees to education road users of safe road conduct. A targeted truck program aims to reduce bike fatalities involving trucks (Figure 36).

Figure 36 "Trucks Eye View" education program raises safety awareness for cyclists

Source: NYC's Green Wave Cycling Plan 2019-2022

- Engage community for their input on new projects
- Deliver cycling encouragement programs
- Promote helmet use.
- Deliver a bike parking program that features an interactive bike parking suggestion portal and updated maps of existing bike parking.

Legislation and policy changes:

- Allow cyclists to proceed on the pedestrian signal. This head start for cyclists was found to offer effective protection to cyclists at 50 intersections in an observational study.
- Require chute closure devices on all concrete mixing trucks to prevent concrete spillage on roadways.
- Vehicles overtaking a cyclist must allow at least three feet where a bike lane is not present.
- Increase fines and caps on penalties for dangerous driving.

Law enforcement

- Increase enforcement against obstructed bike lanes and hazardous driving violations, particularly at the 100 most hazardous location in the city.
- Investigate capabilities of existing and emerging technologies to keep bike lanes clear, as well as enforce truck route and oversize truck restrictions.

3.4.2.3 Prioritisation and delivery criteria

Actions outlined in the Plan focus infrastructure works in the Priority Bike Districts (see Figure 31), while soft measures are carried out city-wide.

3.4.2.4 Operational budget for Council

DOT has committed $US58.4 million over a five-year period in support of bike lane infrastructure. This includes nearly a 75% increase in DOT staff who will work on delivering bike lane infrastructure.

3.5 Implications for North Sydney

These case studies create solid foundation to shape the North Sydney Bike Action Plan. While all of these cities demonstrate useful benchmarks for developing key actions and targets, and prioritisation and delivery criteria, the City of Sydney, the Northern Beaches and the City of Newcastle are most similar to North Sydney in terms of population density (6,608 person/km^2), bicycle mode share (2%), and the policy and legislative context.

4. Data analysis

This section provides an analysis of existing transport data, with a particular focus on data relevant to current or future cycling in North Sydney. Our analysis includes a review of Census and NSW Household Travel Survey. This section includes an assessment of potential to grow cycling participation in North Sydney by examining short distance car trips and demographic variability across North Sydney via a scan of variables predictive of *propensity to cycle.*

4.1 Journey to Work

The Census provides a question on what mode of transport people use to travel to work. This is the only transport mode choice question in the Census. The results of this question provide valuable insights into commuting patterns and helps identify opportunities for cycling. By developing a picture of the mode share for different modes of transport, the Bike Action Plan will be able to provide guidance on suitable infrastructure improvements, and behaviour change strategies. As the Census is conducted every five years, Council can use the results from future years to monitor their progress in achieving their mode share targets for growing active travel levels. Finally, it is important to recognise that the journey to work only constitutes around 20% of all trips. The remaining ~80% are for other purposes, such as shopping visiting friends etc.

4.1.1 Mode share

Figure 37 shows the change in journey to work mode share for North Sydney and greater Sydney over the last decade. Like the rest of Sydney, the car is the most dominant mode of transport in North Sydney. Despite policies described in Section 2 that commit to achieving a more sustainable transport system, Census data indicates limited growth in cycling participation. While the car accounts for substantially less journey to work trips in North Sydney compared to the wider metropolitan region, car use has remained high, with significant growth recorded following the COVID-19 pandemic. The proportion of journey to work trips in 2021 completed by car increased by 45% from 2016 levels.

The proportion of journey to work trips completed by car increased from 40% in 2016 to 58% in 2021.

Prior to the pandemic, public transport patronage was high in North Sydney, with more than 40% of journey to work trips completed by either bus or train, compared to Greater Sydney at 21%. While public transport patronage remains higher than Greater Sydney, the train patronage has fallen by 48% and journey to work trips by bus has reduced by 50%, from 2016 levels.

Walking to work for North Sydney residents is substantially more common than for the rest of Greater Sydney. Journey to work by foot has remained relatively stable over the last decade, at 14% to 16%. This is more than three times the proportion of walking trips for Greater Sydney. Conversely, cycling is consistently among the least common mode of travel to work in North Sydney. Only 2% of journey to work trips in North Sydney were cycled. This is double the proportion of work trips cycled for the rest of Greater Sydney.

Only 2% of journey to work trips in North Sydney were cycled. This is double the proportion of work trips cycled for the rest of Greater Sydney.

Other modes, including the ferry, tram, ride-share/taxi services, and motorbike/scooter account for a small proportion of work trips in North Sydney; however, this is twice the proportion of trips completed by other modes in Greater Sydney.

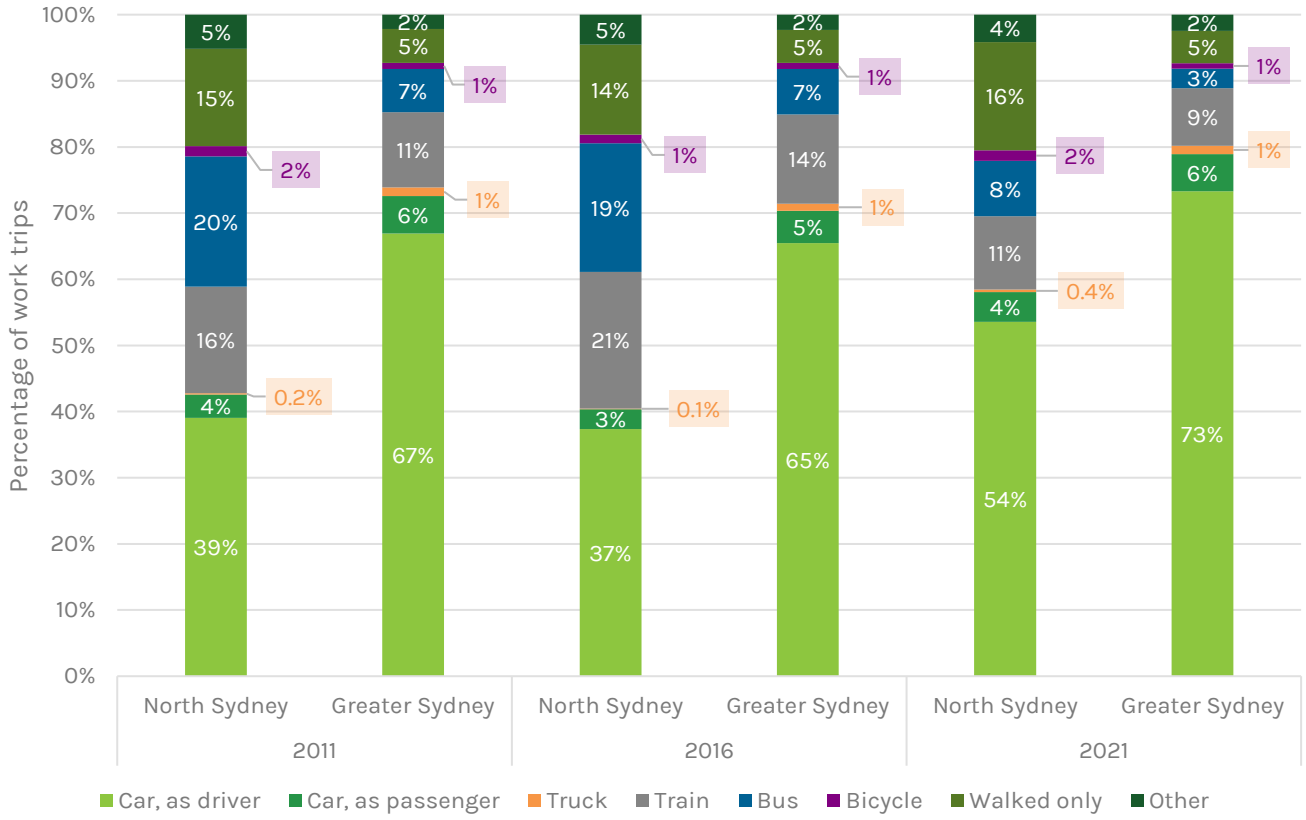

Figure 37 Journey to work mode share, North Sydney and Greater Sydney

Source: ABS Census Data

The proportion of journey to work trips walked in North Sydney (16%) is more than three times that of Greater Sydney.

4.1.1.1 Gender

Gender analysis of mode share in 2021 is presented in Figure 38. It is noteworthy that the car remains the primary mode of transport for both female and male individuals. However, it is observed that women's participation in car trips is less pronounced. It is evident that women exhibit a higher usage of public transport in comparison to men, with a respective mode share of 22% against 19%. Women also demonstrate a greater prevalence of 'walked only' trips.

Women's involvement in cycling is half that of men. This trend is similar to that found across Greater Sydney.

Women's involvement in cycling is half that of men.

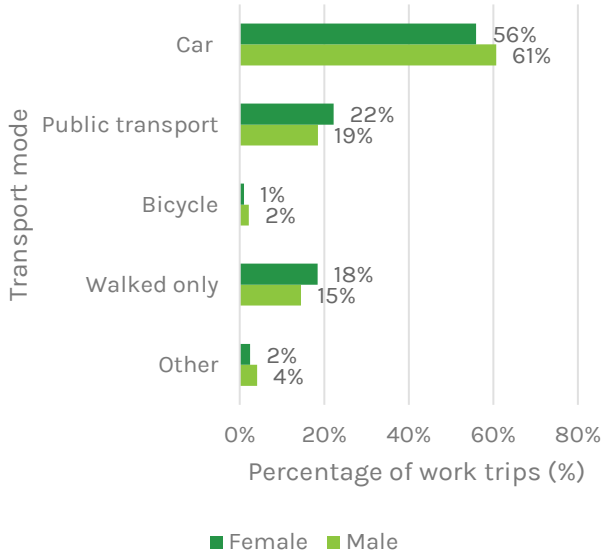

Figure 38 Mode share by sex

Source: ABS 2021

4.1.1.2 Work from home

Unsurprisingly, there have been significant changes to the *work from home* population in North Sydney. Figure 39 shows that the work from home population in North Sydney prior to the COVID-19 pandemic was slightly larger than the rest of Greater Sydney. In 2021, the proportion who worked from home increased dramatically, rising from below 7% to 66.8% among North Sydney workers. It is expected this figure will reduce somewhat by the 2026 Census but remain higher than 2016.

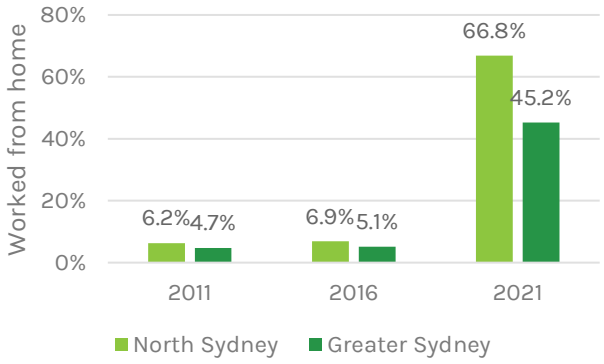

Figure 39 Work from home population

Source: ABS 2021

4.1.1.3 Spatial and distance patterns

The mode of transport used by commuters from points of *origin* in North Sydney is shown in Figure 40. The car is the most common mode of transport used by residents living across the municipality. Approximately 48.2% of all trips to work within a cyclable distance (short trips less than 7 km) *and* were completed by car.

Approximately 48% of all trips to work less than 7 km were completed by car.

The high number of short distance car trips in North Sydney offers an indication of the potential for growing the number of cycling trips in North Sydney.

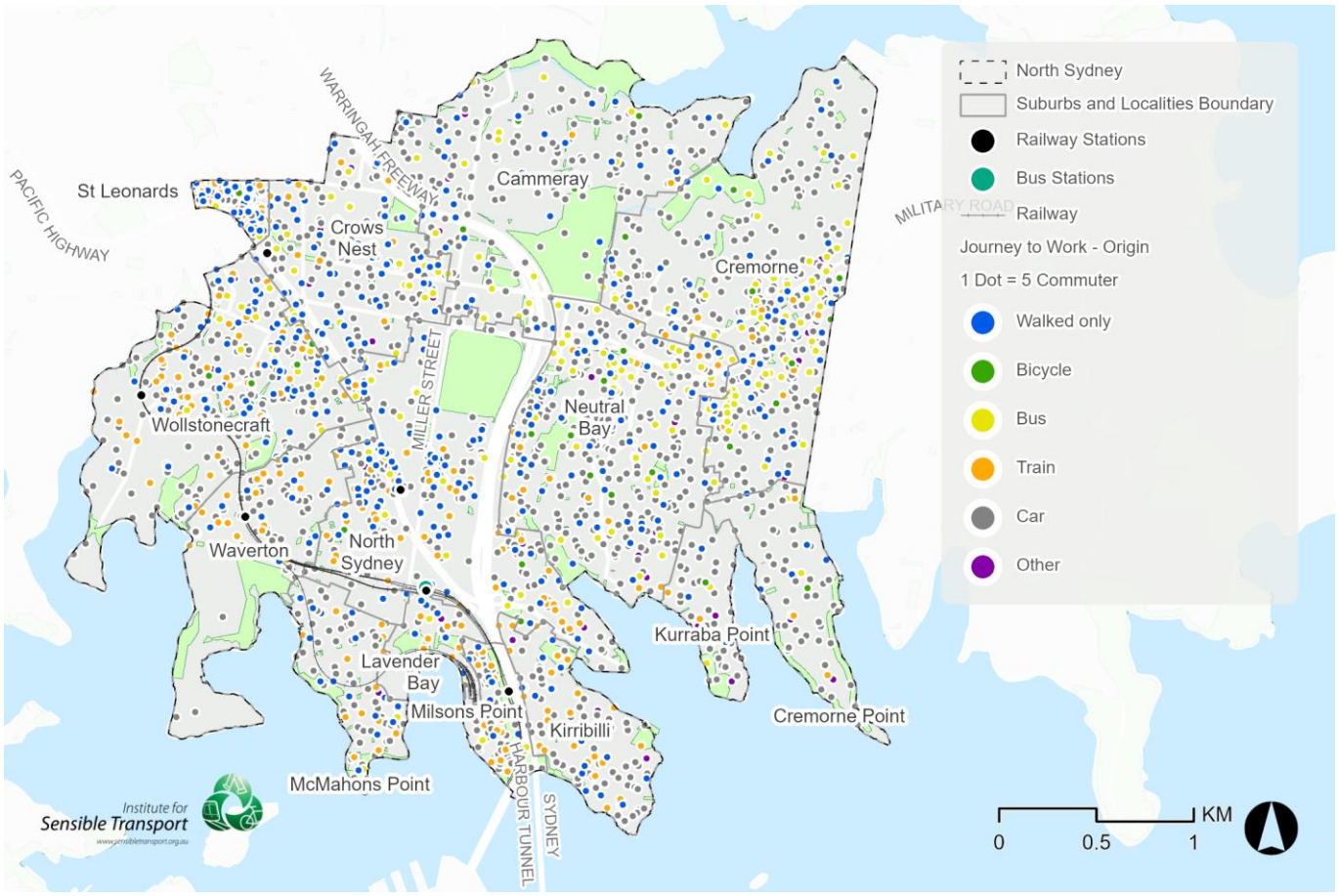

Figure 40 Journey to work from North Sydney

Source: ABS 2021

For those who did *not* use the car, Figure 41 shows the mode of transport for those travelling to work from North Sydney. This map shows *walking* was the most common *non-car* mode of transport across the municipality in 2021. Almost twice as many residents west of the Warringah Freeway walked to work, at 20% to 23%, than those who live east of the freeway.

Taking the train to work is more concentrated in the western region of North Sydney where the Bankstown Railway Line is located. This is particularly true for those residing in St Leonard and Naremburn where almost a quarter of all journeys to work trips were completed by train.

More residents living west of the Warringah Freeway reported walking or taking the train to work.

Bus trips are most concentrated in the eastern area of North Sydney, particularly around Military Road in Cremorne, Cammeray and Neutral Bay. Around 1 in 10 residents in these suburbs rode the bus to work.

Cycling is the least used mode of transport across the city. Most work trips completed by bike originated from the Cremorne-Cammeray and Neutral Bay-Kirribilli areas, where approximately 1.5% of residents rode to work.

Cycling is the least used mode of transport across the city. Cremorne-Cammeray and Neutral Bay-Kirribilli reported the highest level of cycle use.

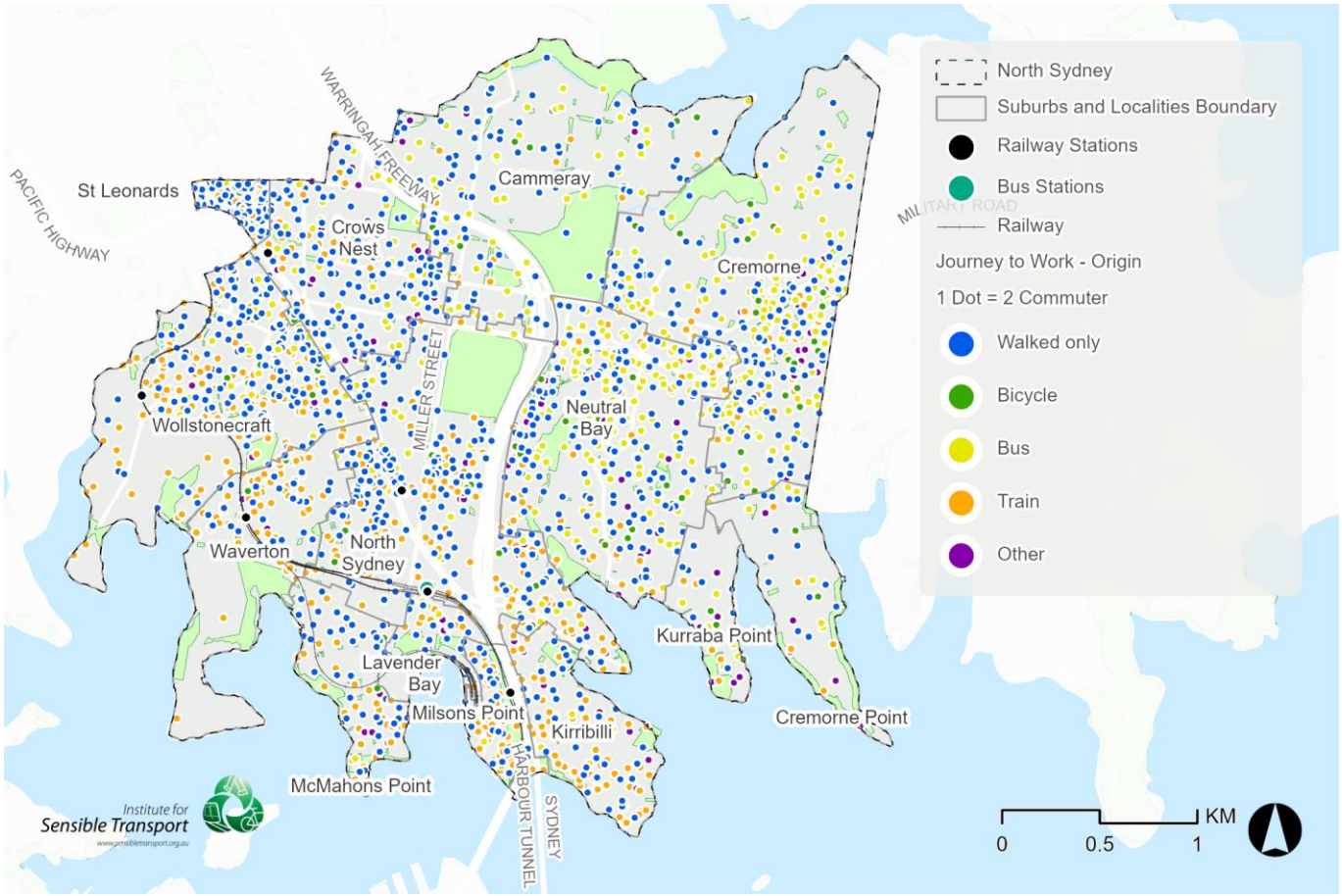

Figure 41 Journey to work excluding cars, from North Sydney

Source: ABS 2021

4.1.1.4 Destination based travel data for Journey to Work

It can be helpful to understand travel patterns for trips to work not only by looking at trip origins, but also from the perspective of where the trip ends. Figure 42 provides an illustration of the density of trip destinations by mode of transport. Each dot represents five commuters. This shows that for many work destinations across North Sydney, the car is the dominant mode of travel.

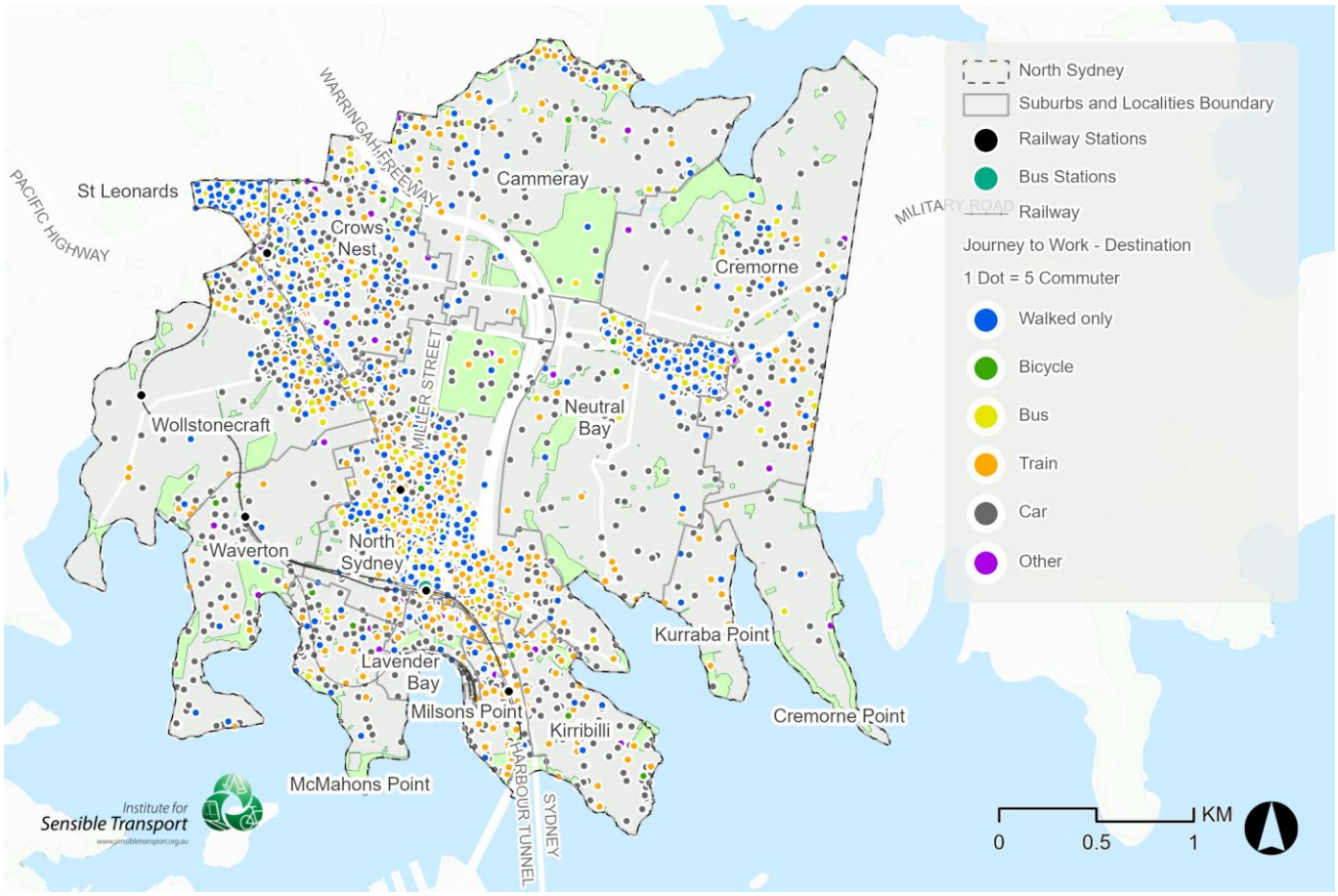

Figure 42 Transport mode, destination in North Sydney

Source: ABS 2021

For trips ending in North Sydney, the mode of transport to work of those who did *not* use a car is shown in Figure 43.

Public transport is the most used non-car mode to get to work in North Sydney. Levels of commuting via train or bus are higher in the western area of North Sydney where there are connections to the metropolitan Bankstown Line and bus network. Areas of North Sydney-Lavender Bay, and St Leonards-Naremburn have the highest levels of commuting via public transport in the municipality, at 37% and 27%, respectively. The majority of these trips were completed by train.

There are higher levels of walking to work for residents near Military Road in Neutral Bay and Cremorne, and residents near Pacific Highway in St Leonards, Crows Nest, and North Sydney. Cycling is the least used mode of transport from a destination perspective in North Sydney.

Cycling was the least used mode of transport for those with North Sydney as their place of work destination.

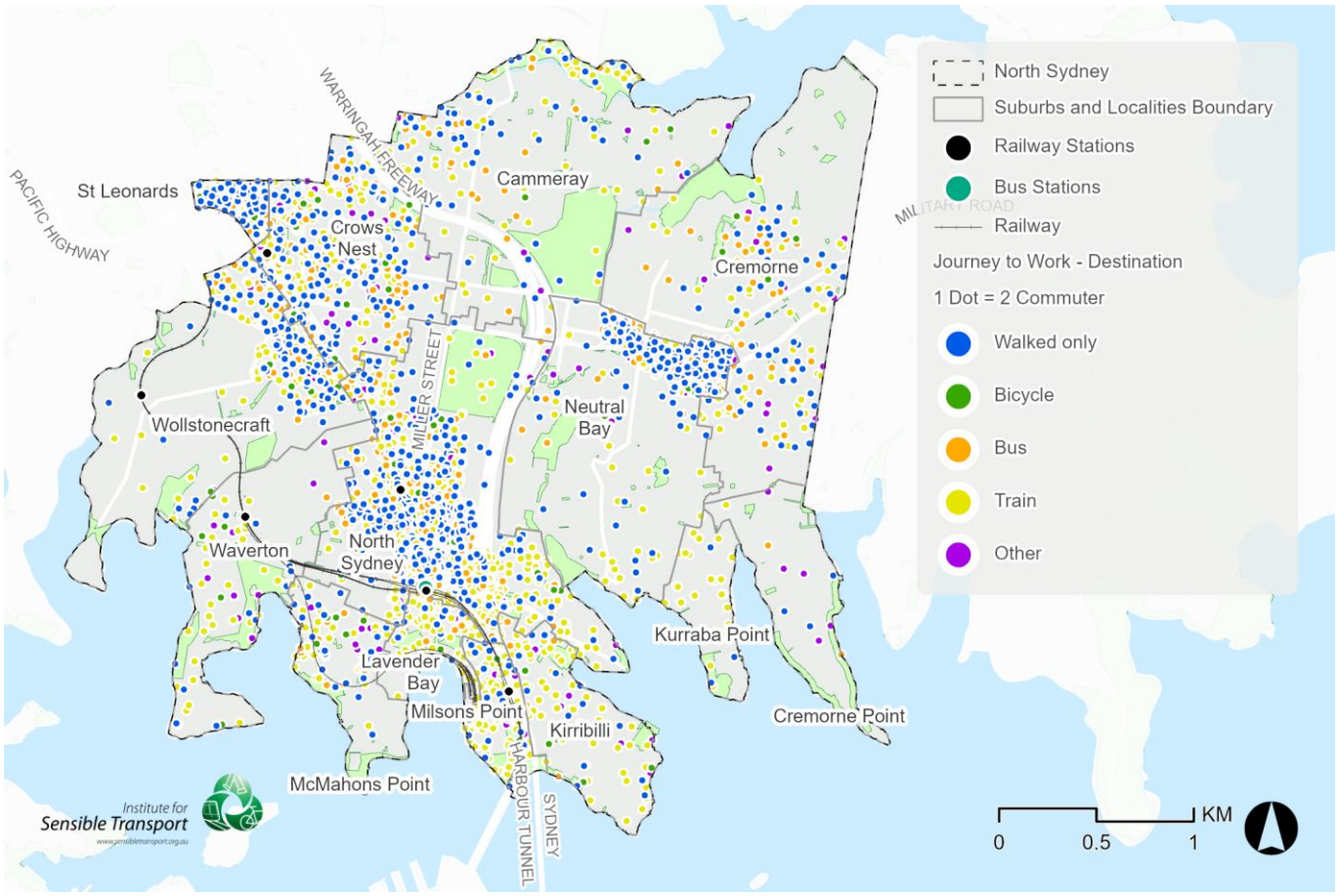

Figure 43 Place of work excluding cars, to North Sydney

Source: ABS 2021

4.1.2 Origin Destination Analysis

The relationship between origin and destination for commuters travelling to and from North Sydney is important for understanding the need for future cycling network upgrades.

Table 13 provides a snapshot of the top 10 work destinations for North Sydney residents. Sydney is the most reported destination for work (38.7%), as shown in Table 13. This is followed by North Sydney (26%), Willoughby (6.9%), Ryde (3.8%), and the Northern Beaches (3.7 %).

Approximately 65% of North Sydney residents work in the inner north of Greater Sydney, where 39% work in the CBD.

Table 13 Top 10 work destinations for residents

LGA	Number of people	Percent
Sydney	15,914	38.7%
North Sydney	10,707	26.0%
Willoughby	2,822	6.9%
Ryde	1,563	3.8%
Northern Beaches	1,505	3.7%
Parramatta	848	2.1%
Mosman	735	1.8%
Lane Cove	613	1.5%
Ku-ring-gai	534	1.3%
Inner West	531	1.3%

Source: ABS Census 2021

Table 14 identifies where people who work in North Sydney live. A significant proportion of the municipality's workforce live in the northern greater metropolitan area of Sydney (38.3%). North Sydney residents make up the largest proportion of

workers (13.3%), followed by the Northern Beaches (8.1%), Sydney (6.3%), Parramatta (5.2%), and Willoughby (4.6%).

Table 14 Top 10 LGAs where North Sydney workers live

LGA	Number of people	Percent
North Sydney	10,707	13.3%
Northern Beaches	6,527	8.1%
Sydney	5,064	6.3%
Parramatta	4,226	5.2%
Willoughby	3,727	4.6%
Inner West	3,656	4.5%
Blacktown	3,598	4.5%
Ku-ring-gai	3,576	4.4%
Hornsby	3,383	4.2%
Ryde	2,995	3.7%

Source: ABS Census 2021

More than 1 in 4 North Sydney residents work locally within the municipality.

4.1.3 Trip distance to work

An understanding of trip distance is critical for assessing the potential growth in cycling participation for trips to work. ABS Census data helps us to develop a picture of how far people travel to work, and how many car trips are within a cyclable distance. A significant proportion of North Sydney residents who travelled to work travelled over 7km (42.4%). Trip distances between 2 to 7km were the next most reported, at 37.5%. Moreover, 12.2% of commuters travelled 1 to 2km and 7.8% of trips is less than 1 kilometre.

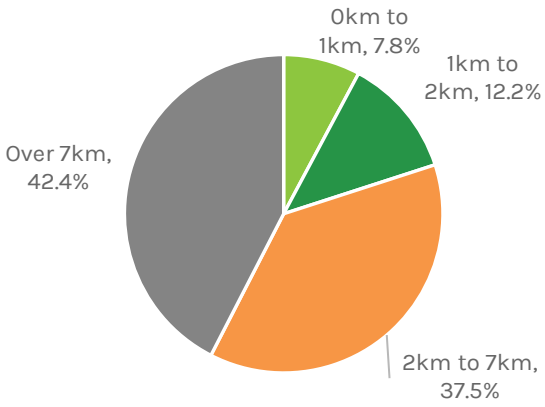

Figure 44 Trip distance for those who travelled to work, North Sydney

Source: ABS 2021

The data show in Figure 45 highlights the potential for achieving a shift towards more sustainable modes of transport. The maximum comfortable range of most walking trips is around 1 – 2km, while people will use a bike for trips up to around 5 – 7km. Some 58% of trips to work in North Sydney are short enough that people could walk or cycle, providing the conditions were safe, attractive, and convenient.

Even for these shorter trips, the car is dominant, with 45% of people using a car, either as a driver or passenger. Walking is the next highest mode share (28.2%).

Even for trips under 7km, some 45% of people used a car, either as a driver or passenger.

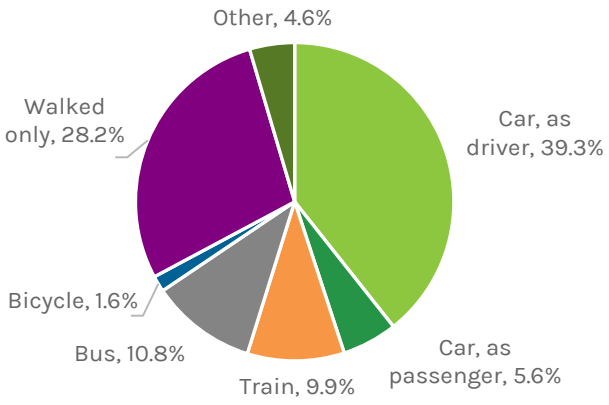

Figure 45 Mode share of trips under 7km to work

Source: ABS Census 2021

Some 58% of trips to work in North Sydney are short enough that people could walk or cycle, providing the conditions were safe, attractive, and convenient.

The most common distance travelled to work by bike is 5 – 6km for North Sydney residents.

4.1.3.1 Cycle distances

The distances people cycle is an important input into the North Sydney Bike Action Plan This section describes what the data from the 2021 Census tells us about the distances people cycle when travelling to work. This is a useful for understanding cycling behaviour and what trips currently conducted by other modes might reasonable be considered as possibilities for conversion to cycling. For example, a journey to work that is above 10km is less likely to be mode-shifted to bike, compared to a 5km trip.

Figure 46 provides an analysis of the proportion of all trips to work by bike by SA2 areas in North Sydney, by distance. This shows that for municipality, the common distance to travel to get to work is around 5 - 6km.

However, there is some variation across SA2 areas across North Sydney. All longer trips over 8km were completed by residents in the northern perimeter of the municipality, in Crows Nest-Waverton (62%) and Cremorne – Cammeray (38%). Over half of cycled trips (53%) in Crows Nest – Waverton were over 8km. Conversely, *all* cycling trips from Neutral Bay – Kirribilli were under 7km. and 27% rode between 5 – 6km to get to work.

All cycling trips from Neutral Bay – Kirribilli were short trips under 7km, while 46% were under 5km.

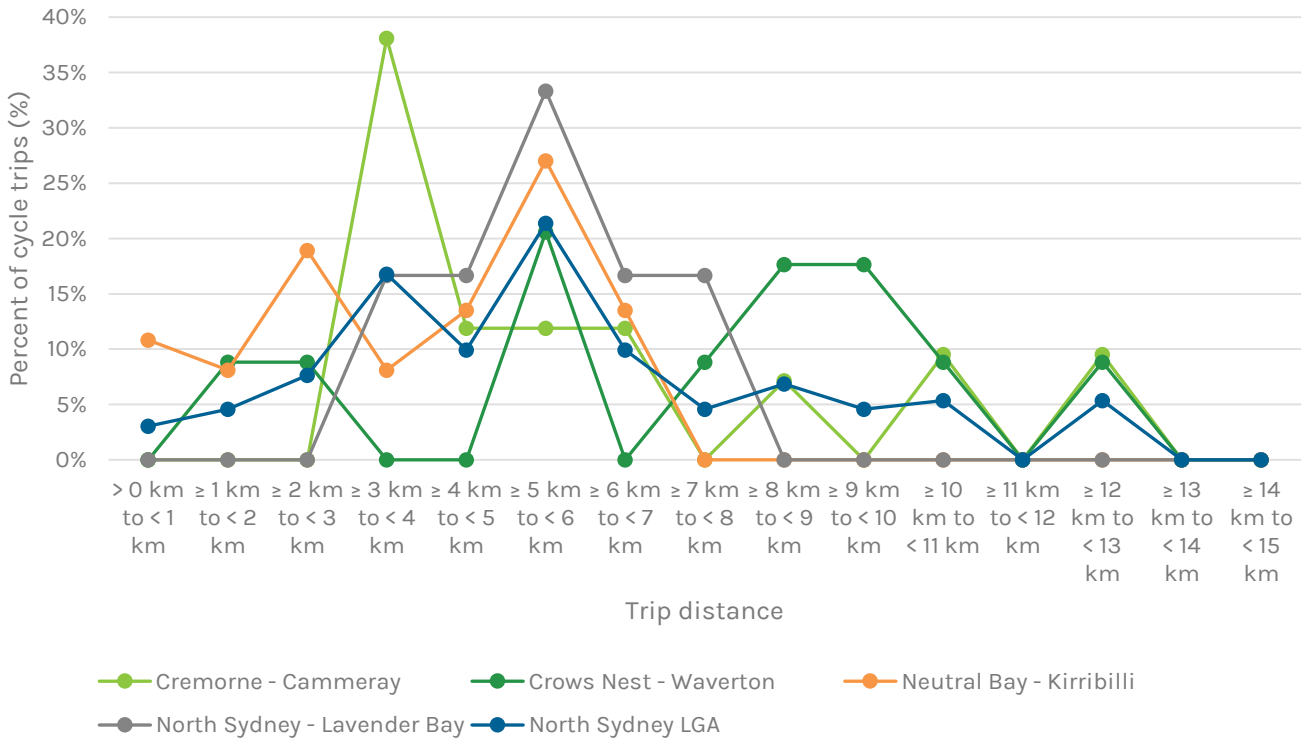

Figure 46 Percentage of cycle trips by distance, North Sydney SA2s

Source: ABS Census 2021

Figure 47 provides an indication of the distance cycled to work for the SA2 areas in North Sydney, expressed cumulatively. This shows that for most suburbs within North Sydney, around 75% of cycle trips are between 4 and 6km. Over 73% of cycle trips are under 7km. This insight will be used in future stages of the project, especially in terms of modelling future cycling estimates.

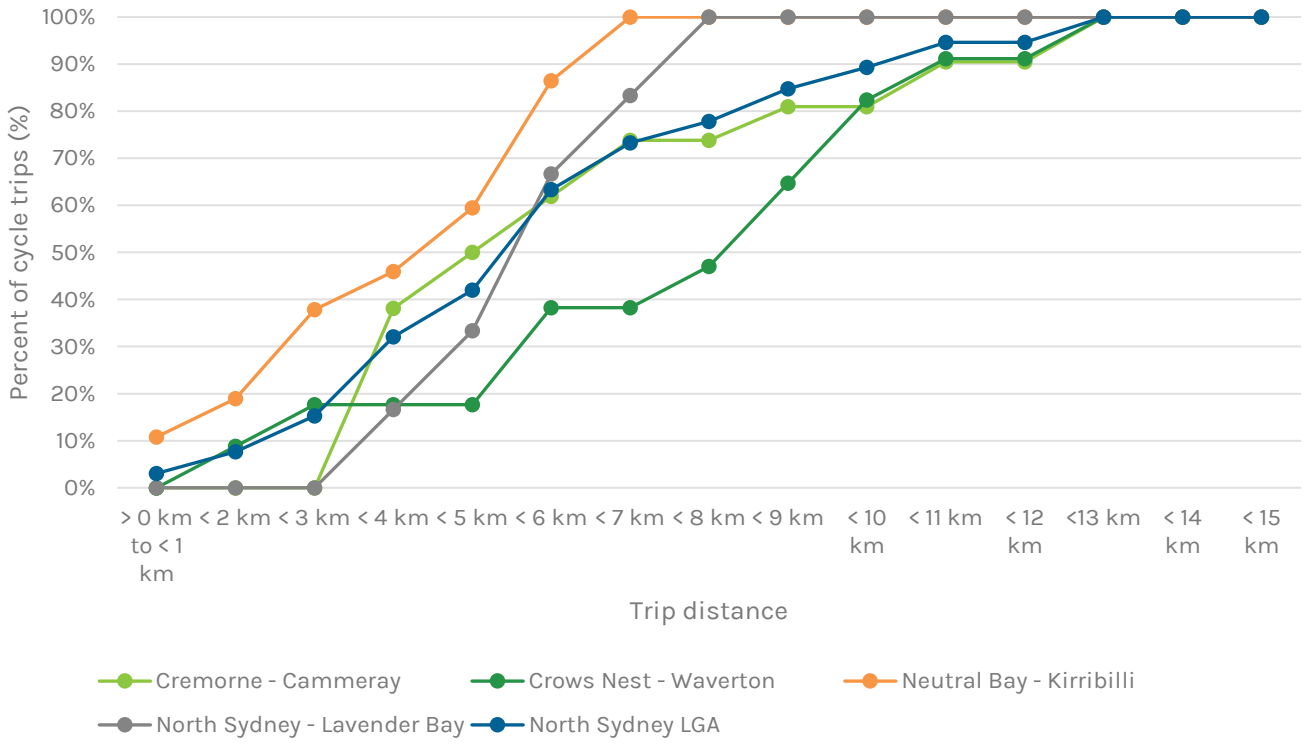

Figure 47 Cumulative cycle distances, North Sydney SA2s

Source: ABS Census 2021

4.1.4 Understanding the potential – short trips

Short commute trips under 7km and under 2km were analysed and shown in Table 15. These trip distances reflect distances people currently walk and cycle. As the ABS SA2 geographical boundary is the smallest common geographic parcel of land for Usual Residents and Place of Work data, areas in and part of North Sydney were examined.

There were approximately 11,955 journey to work trips for residents in North Sydney in 2021. Short commute trips under 7km made up more than half of all trips (58%), while commute trips under 2km accounted for 20% of all trips. The area of North Sydney – Lavender Bay had the highest proportion of commute trips under 7km at 60%. All SA2's in the municipality recorded between 57 - 60% of all commute trips under 7km.

Short commute trips under 2km were greatest in St Leonards – Naremburn (27%) and Crows Nest – Waverton (27%). This was followed by North Sydney – Lavender Bay (22%). Only 15% of work trips were under 2km in Neutral Bay – Kirribilli.

For North Sydney residents, 58% of commute trips were under 7km, while 20% were under 2km.

Approximately 25% of North Sydney residents who travelled for work, live and work in the same SA2 area. Of those who travelled for work, North Sydney – Lavender Bay had the largest local workforce (51%), followed by Crows Nest – Waverton (19%), and Neutral Bay – Kirribilli (19%). Cremorne – Cammeray has the largest workforce outside of their local area, at 86%.

Table 15 Residents who work locally

Area	Total work force*	Works locally*	Trips < 7km	Trips < 2km
North Sydney – Lavender Bay	2,268	51%	60%	22%
Crows Nest – Waverton	3,268	19%	59%	27%
Neutral Bay – Kirribilli	2,268	19%	57%	15%
Cremorne - Cammeray	3,312	14%	55%	17%
North Sydney LGA	11,955	25%	58%	20%

*Only includes those who travelled for work.

Source: ABS 2021

A quarter of North Sydney residents who travel to work, live and work in their local area. North Sydney – Lavender Bay has the largest local workforce, at 51%.

4.1.4.1 Short car trips

An analysis of short distance car trips is important in supporting Council's ambition for lowing levels of motor vehicle use in North Sydney. The data from the Census reveals that short car commutes account for a significant proportion of all commute trips in North Sydney.

Figure 48 shows the percentage of car commuter trips that were short (under 7km or under 2km). For all trips to work, approximately 1 in 4 residents use the car to travel to work less than 7km. Similarly, 5 - 7% of commute trips in the LGA are within a walkable distance (2km) *and* completed by car.

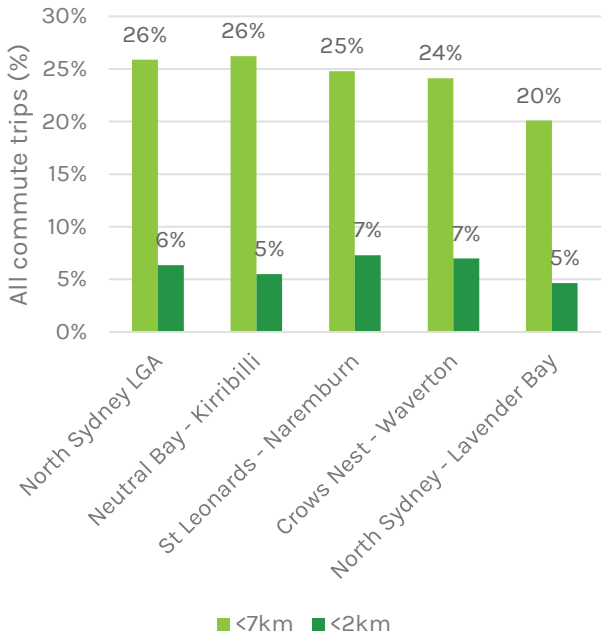

Figure 48 Commute trips completed by car, North Sydney

Source: ABS Census 2021

26% of all residents who travelled to work used the car, despite travelling less than 7km. Similarly, 7% used the car and travelled under 2km.

Figure 49 shows the graphical distribution of car trips to work between SA2s. It shows a diverse travel pattern, with strong travel numbers for non-CBD trips. The circles shown in Figure 49 indicate trips that begin and end within the same SA2. Balgowlah – Clontarf – Seaforth (outside of North Sydney) contains the strongest concentration of these intra-SA2 trips.

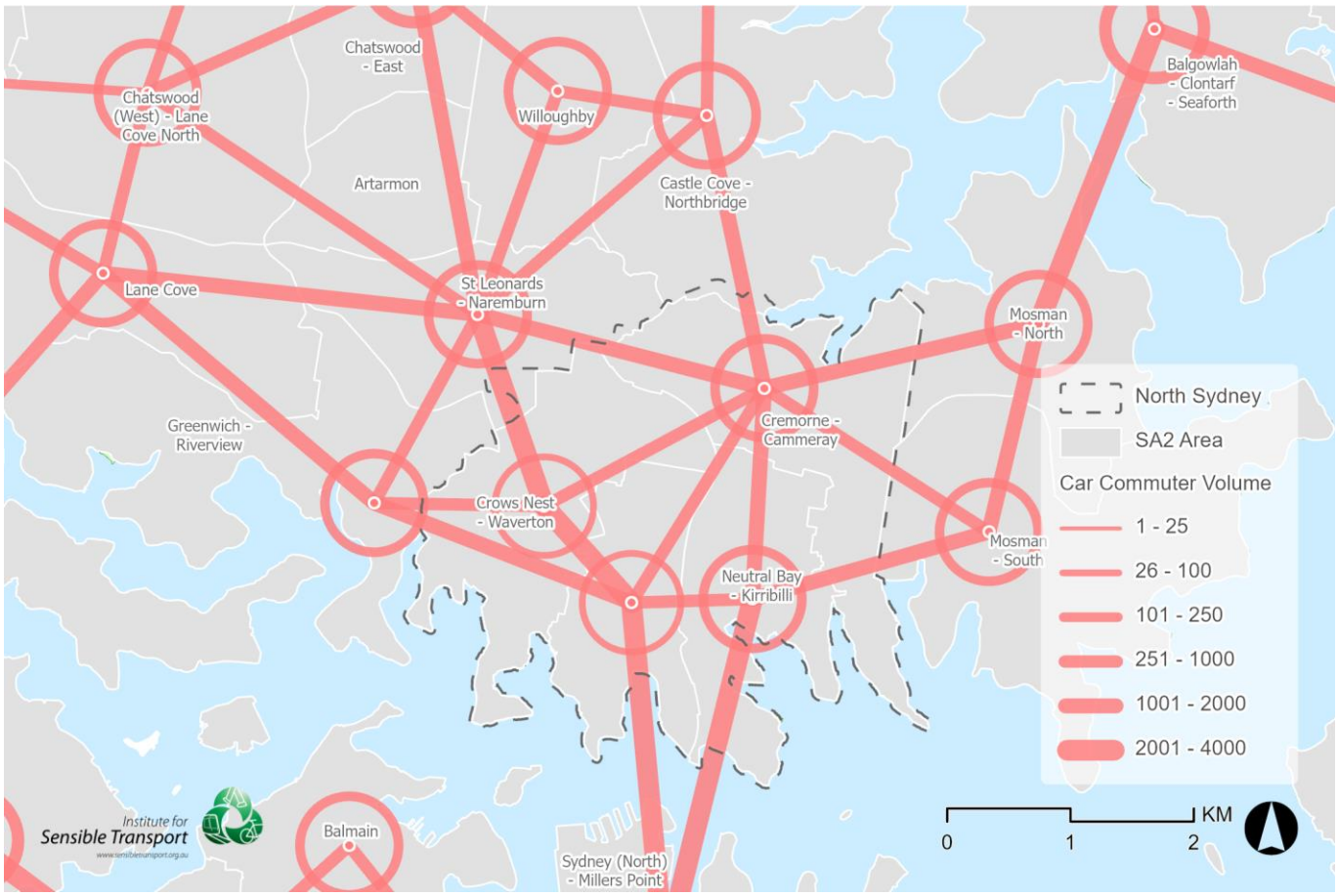

Figure 49 Short car trips less than 7km

Source: ABS Census 2021

4.1.4.2 Short bike trips

Figure 50 shows the graphical distribution of bicycle trips to work between SA2s. It shows a less diverse travel pattern, with strong travel numbers into the Sydney CBD. There are few bicycle trips that start and end within the same SA2 area in North Sydney and the surrounding region. There were no bicycle trips that start and end in Cremorne-Cammeray, and in North Sydney-Lavender Bay.

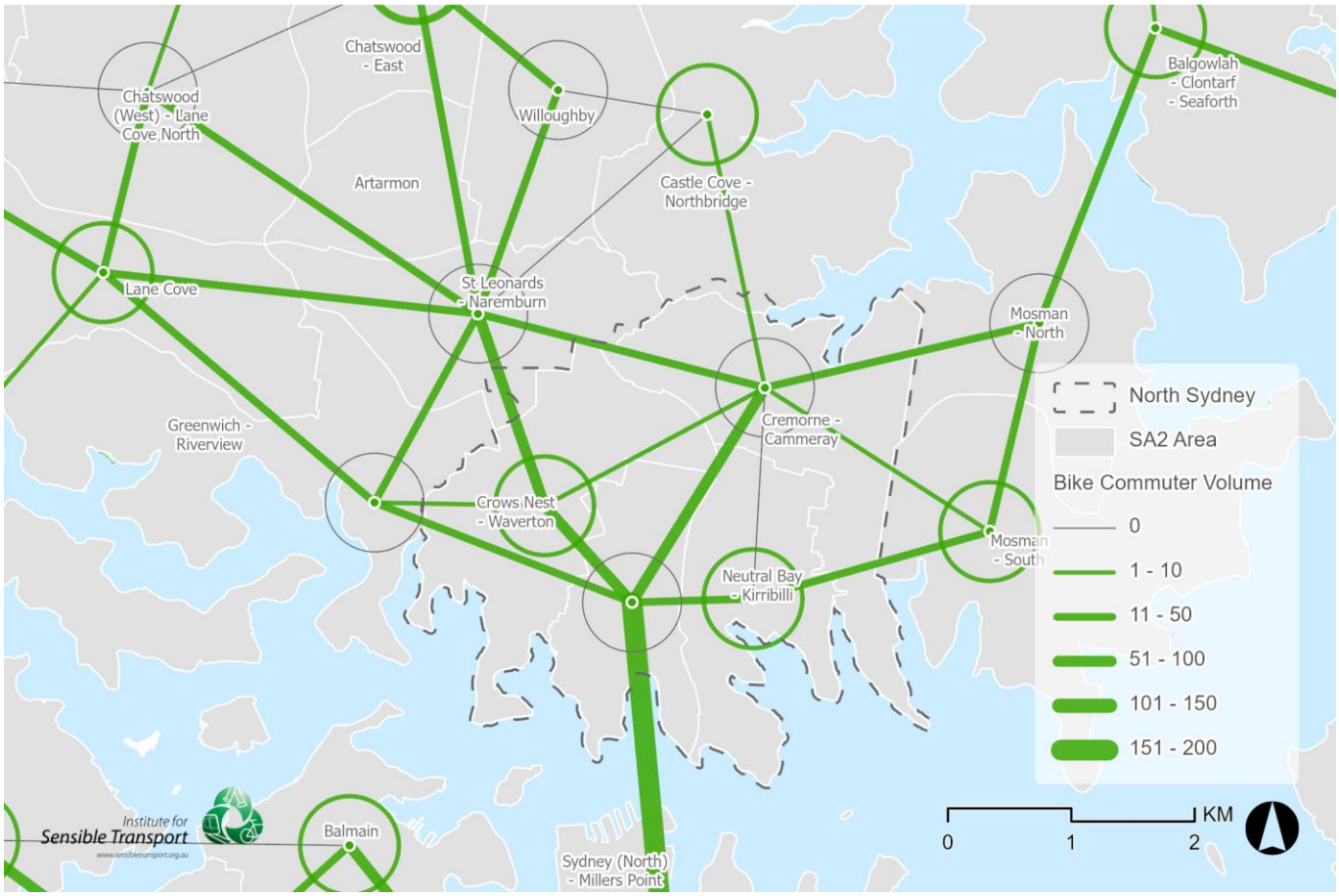

Figure 50 Short bike trips less than 7km

Source: ABS Census 2021

The analysis of ABS Census data for commute trips reveals that cycling is the least common mode of transport but that there is considerable potential for growth. This is based on the high number of trips that are currently completed by other modes but within a cyclable distance (2 – 7km). While it is not suggested that all these current short distance trips can be converted to cycling, it is reasonable to suggest a proportion could be transferred to bike in the future. Future stages of this project will focus on the interventions Council and other agencies can consider to increase the value proposition cycling offers to those in North Sydney. Significant improvements to the cycling network will be a core element of future stages of this project, and will seek to maximise the participation in cycling, both for work trips and trips for other purposes. Additionally, ensuring strong active transport connections to public transport will help people travelling outside of North Sydney for work to do so without the current level of dependence on motor vehicles.

4.2 NSW Household Travel Survey

The NSW Household Travel Survey (HTS) offers a richer set of trip purposes than the Census. Unfortunately, the HTS lacks data on cycling. As a result, an alternative approach involves estimating cycling trends over time by comparing and analysing data pertaining to other transport options included in the survey. This methodology allows for an indirect assessment of changes and patterns in cycling behaviour, enabling insights into the evolving dynamics of transport preferences and behaviours in North Sydney.

As shown in Figure 51, the cycling trend, anticipated from the "other" graph in HTS material, exhibited an increasing trend from 2017 to 2018 and maintained a consistent level through the year 2020.

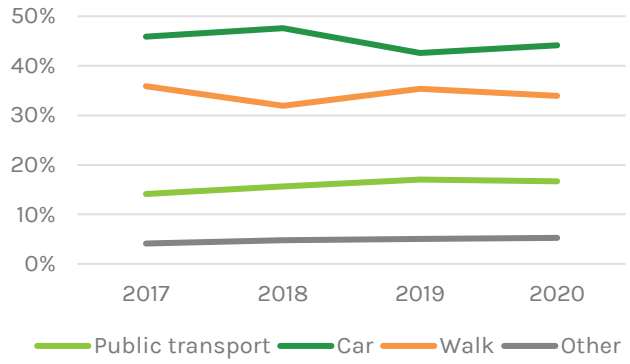

Figure 51 Mode share changes, North Sydney

Source: NSW Household Travel Survey

4.3 Strava

Strava is an activity tracking app that is popular with people wanting to monitor their walking/running and cycling. Strava has released their data to help governments better understand travel patterns within their community. Although the data is biased towards fitness-oriented cyclists, whose travel behaviour may differ to transport-oriented cyclists, it is still helpful for understanding cycling volumes along certain routes.

Figure 52 shows cycling volumes in North Sydney over a two-month period, between 31st August 2023 to 31st October 2023. Unsurprisingly, the Sydney Harbour Bridge connection to Sydney CBD records the highest cycling volumes, with a ride count of approximately 608 trips per day. Counter devices installed on the NSW network can be used to estimate the total ride count per day during this period on the Sydney Harbour Bridge. Approximately 1,136 cycling trips per day were recorded on the Sydney Harbour Bridge, where Strava trips account for 54% of all cycling trips on the bridge. The majority of Strava cyclists travelling between North's Sydney west uses the Pacific Highway-Middlemiss St and Lavender St connection, with more than 10,850 trips recorded on the Pacific Highway. Other key routes connecting the western and north eastern region of the city includes Miller St, West St, and Falcon St.

Falcon St and Military Road provide an important east-west connection, with more than 5,000 bicycle trips recorded on each road. Clark Road connects people travelling between Sydney CBD to North Sydney's east, with approximately 10,700 people riding over the two-month period. Other high-volume routes in the eastern region include Kurraba Road, Murdoch Street, Spofforth Street, and Sutherland Street-Tobruk Avenue.

The ride patterns revealed by the Strava data can be helpful in understanding popular routes and may offer some insights into safety upgrades, in locations that are found to have significant crash risk. Using Combining Strava data with data from physical bike counts can allow for an estimation of all cyclist movements (i.e. not just Strava) but a significant network of counters must be installed before this approach is possible. Future stages of this project will recommend actions Council can take to improve data collection practices.

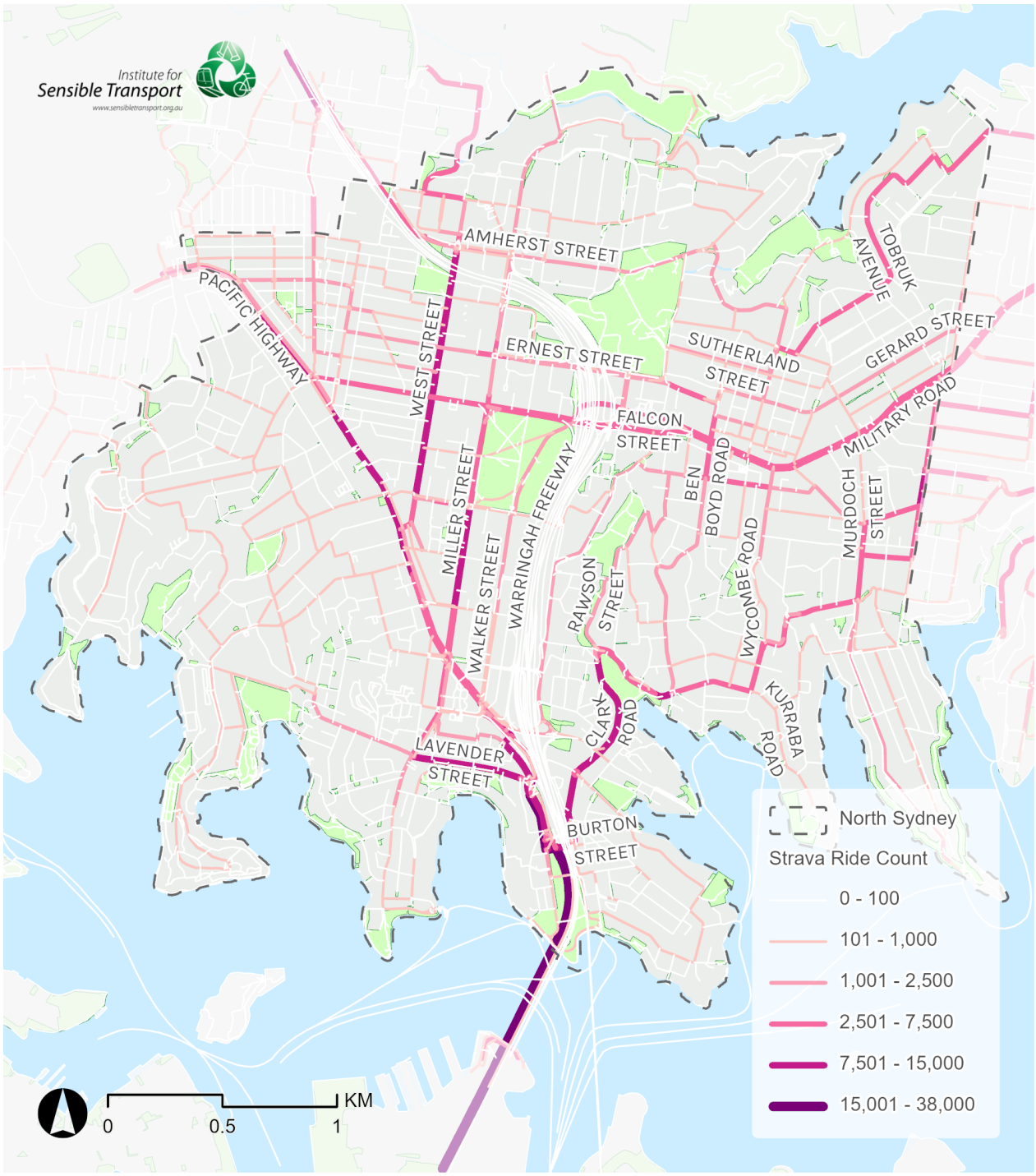

Figure 52 Strava Ride Count, North Sydney

Source: Strava

4.4 Bike Use Propensity Index

High quality bicycle infrastructure can be expensive and government budgets are limited. It is therefore important, when planning a future cycling network to determine spatial variation in the latent demand for cycling.

Through peer reviewed research (Fishman et al., 2014), a number of Census collected variables have been identified and combined, in order to provide a heat map of latent demand for cycling, known as the *Bike Use Propensity Index*.

The Index is based on seven Census collected variables that are statistically significant predictors of bike use. In sum, the map produced from this analysis provide a clear illustration of the spatial variation in latent demand for cycling in North Sydney.

Actions focusing on high propensity areas are likely to include infrastructure projects but should also consider behaviour change initiatives and other support programs to encourage greater cycling uptake. This exercise is particularly useful for North Sydney, which has a disconnected cycling network and an ambition to increase cycling levels.

4.4.1 Methodology

The *Bike Use Propensity Index* combines seven variables, all of which are collected as part of the ABS Census. The statistical basis for the Index was developed through the collection of data on riding behaviour and demographic factors. This data was analysed using binary logistic regression in SPSS and STATA. The results, published in Transportation Research Part A revealed that there are some statistically significant factors for propensity to cycle.

The data that forms the basis of the Index are shown in Figure 53. The *Bike Use Propensity Index* has been designed to show the variation in the relative propensity to cycle, at the highest possible level of spatial detail.

The Index contains more residential-oriented variables than it does employment, or destination variables. To ensure that employment rich areas that have comparatively lower residential populations are not undervalued, the employment variables in the index are weighted the same as residential factors. Doing this helps ensure important bike destinations, such as employment hubs, are adequately considered in the Index.

Geographic areas are given an absolute score, of between 0 and approximately 5 for each of the variables. These scores are then averaged to reveal an overall bike use propensity score of between 0 and approximately 5. A score close to 0 indicates a low propensity to cycle, while a score of 5 indicates a high propensity to cycle. The mapped values are aggregates of the attributes' scores.

SA1s that receive very high Index scores will have scored highly across all the variables included in the Index. In almost all cases, an SA1 that scores above 4.5 will have been highest scoring in most variables. The maps used in this report have been colour-scaled to be comparable within the study area. However, the score is relative to all other areas in Australia (for example, the Melbourne and Sydney CBDs have areas with scores above 4.5).

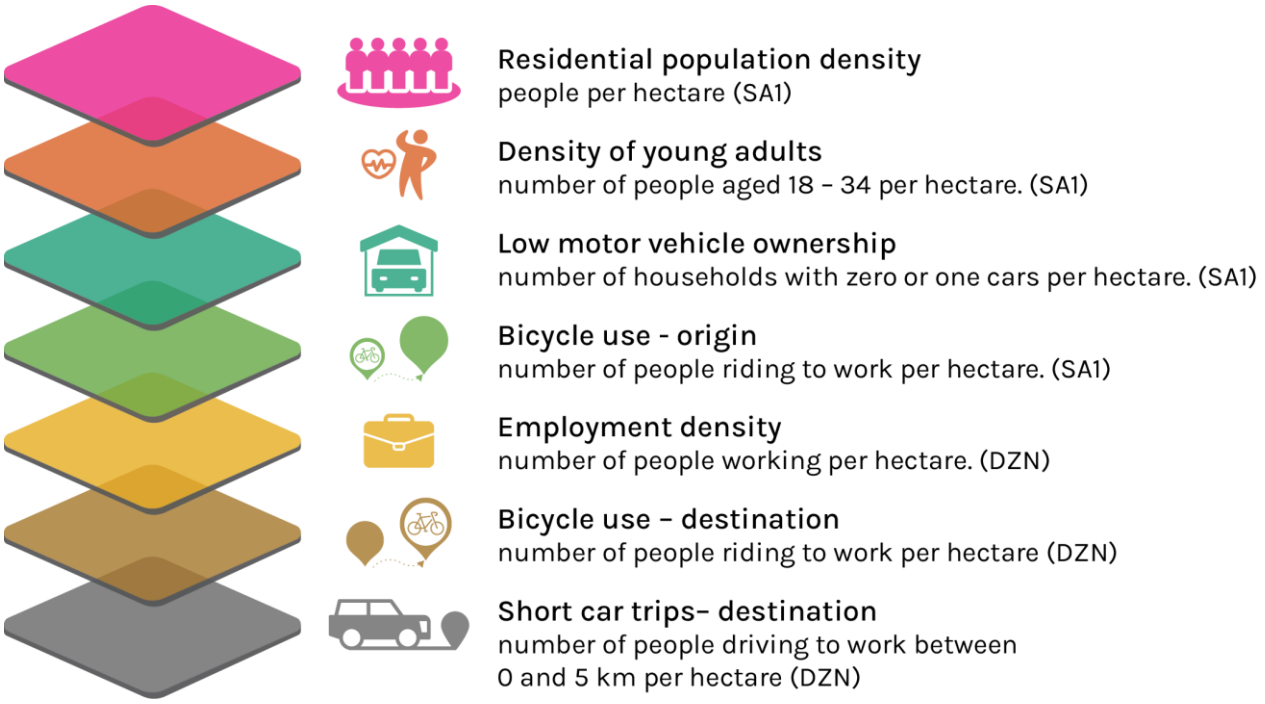

Figure 53 Variables underpinning Bike Use Propensity Index

4.4.2 Results

The *Bike Use Propensity Index*, using all seven factors, for North Sydney, is shown in Figure 54. Shopping areas in Crows Nest, Neutral Bay, North Sydney, St Leonards, McMahons Point. The area around the south eastern side of the intersection between High Street and the M1 also scored high on the Index. A natural corridor can be found along the Pacific Highway in the west side, where areas in St Leonards to North Sydney show a high propensity for cycling.

Running through the middle, the M1 Warringah Freeway clearly splits the municipality into two halves. The Warringah Freeway is a barrier for cycling, and more work will be required to strengthen the links between both sides of the freeway.

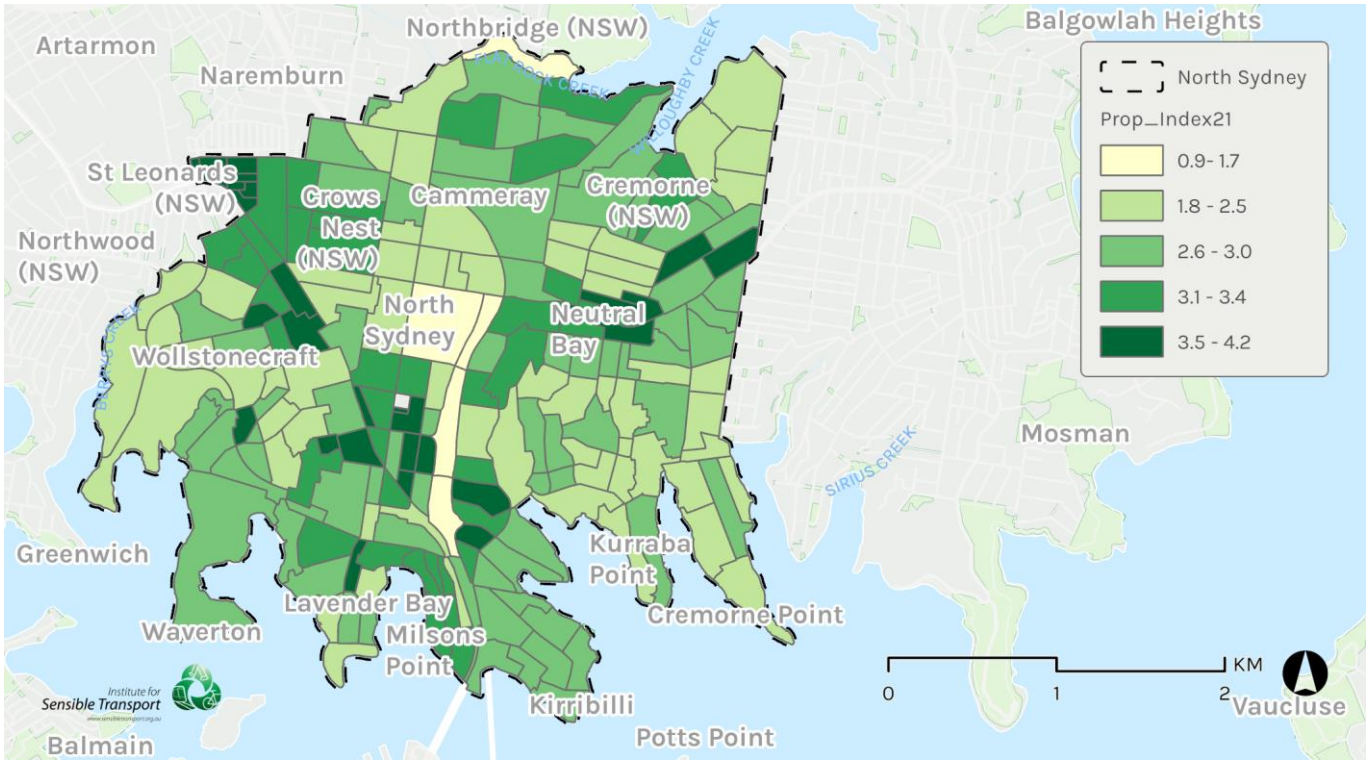

Figure 54 Bike Use Propensity Index 2021, North Sydney

Source: Institute for Sensible Transport, based on Census data

The Origin Score shown in Figure 55 indicates where residents, living in North Sydney, who are more likely to consider bike riding for transport trips.

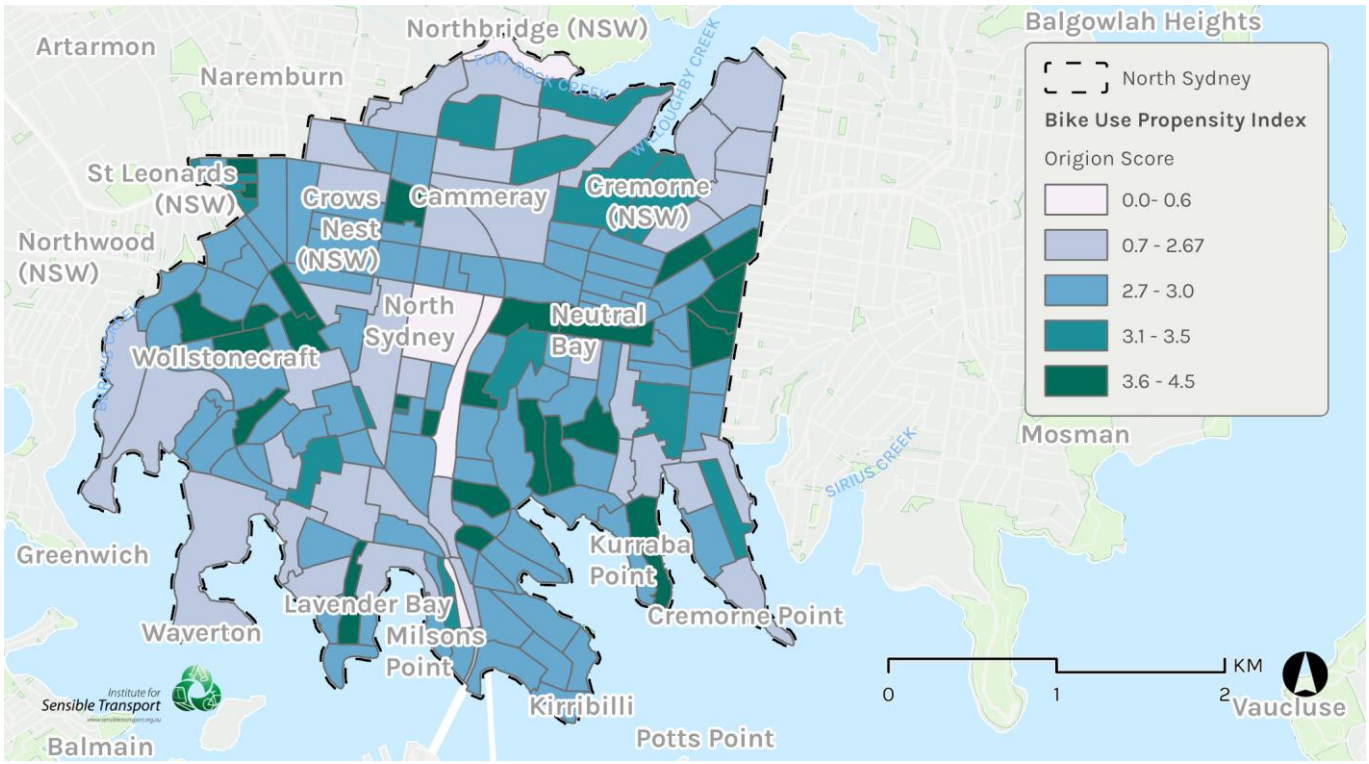

Figure 55 Bike Use Propensity Index, Origin Score

Source: Institute for Sensible Transport, based on Census data

Figure 56 shows the Destination Score for the *Index*. This refers to the propensity for cycling focused on the locations where people work.

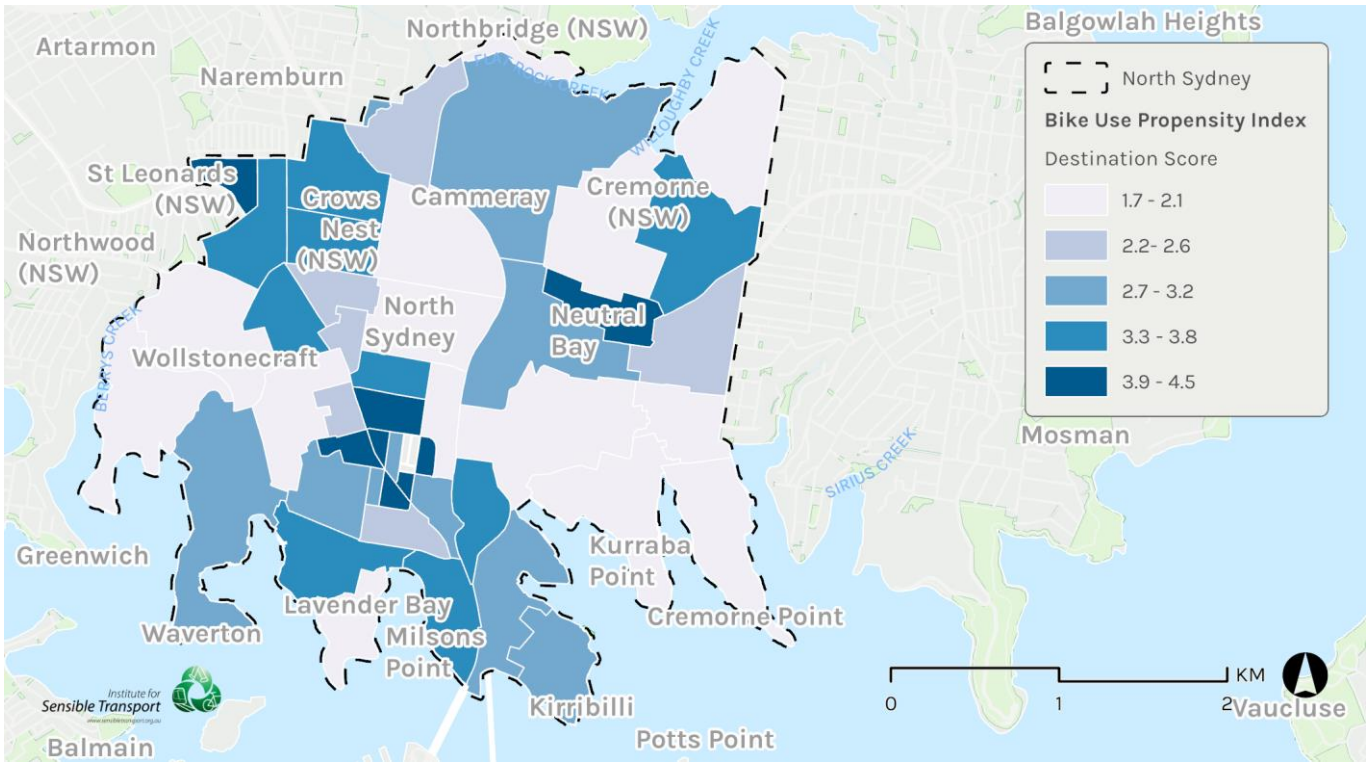

Figure 56 Bike Use Propensity Index, Destination Score

Source: Institute for Sensible Transport, based on Census data

4.4.3 Implications

The *Bike Use Propensity Index* offers some guidance as to the areas in which North Sydney Council can make prudent bicycle network investment decisions to maximise people's cycling opportunities.

The bicycle infrastructure opportunities will include how different bike infrastructure (e.g., painted bike lanes, separated bike lanes) can be utilised to maximise cycling appeal in North Sydney, particularly in the areas with high latent demand. The Index shows that the west side of Wollstonecraft and north side of Neutral Bay hold that greatest potential to grow levels of cycling. Figure 57 shows the Propensity Index overlaid with existing bike infrastructure. A core spine in the suburbs of North Sydney and Cammeray can be seen, however, significant amounts of bike infrastructure are dispersed. The municipality has a fragmented network that does not connect with most of the areas with the highest propensity for cycling. Priority should be given to connect to these areas when developing the cycling network.

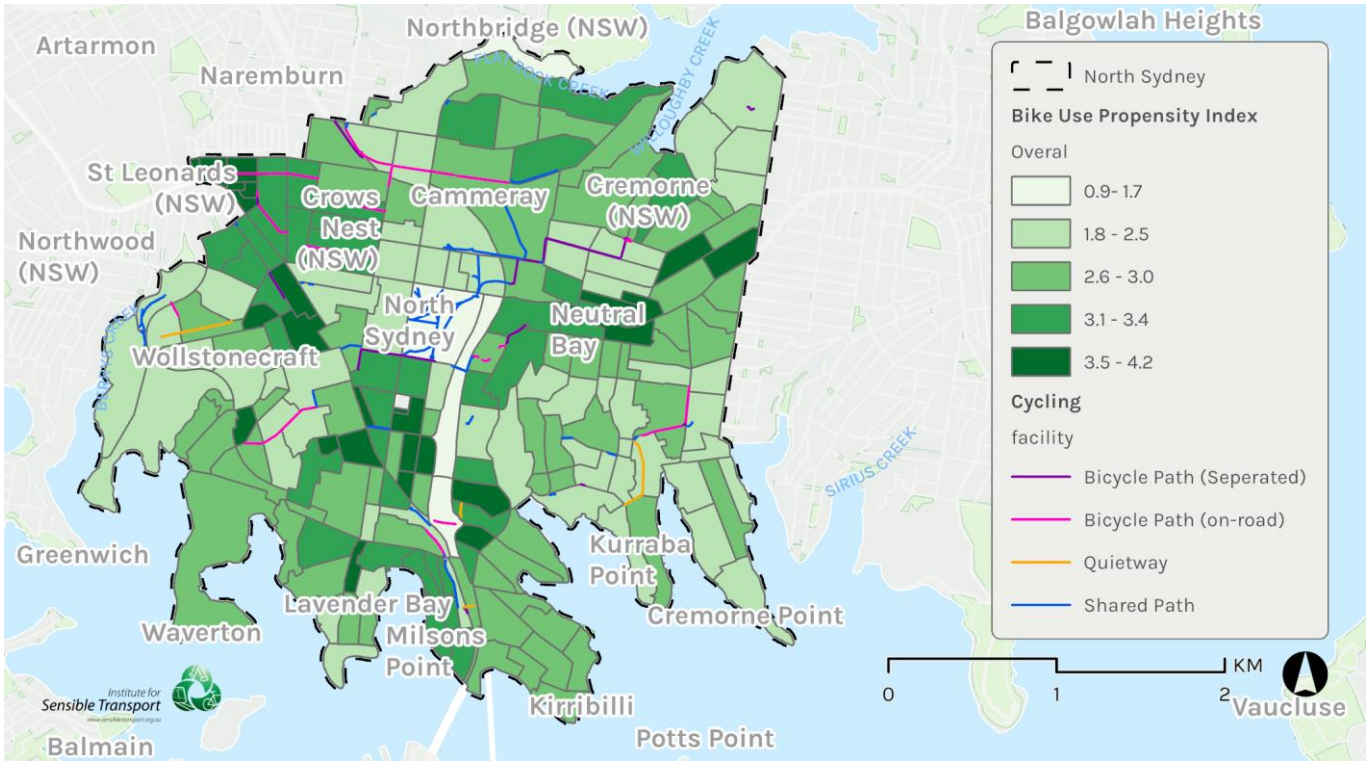

Figure 57 Bike Use Propensity Index with existing bike infrastructure

Source: Institute for Sensible Transport, based on Census data

4.5 Safety analysis

An analysis of crashes is a critical element in the development of the Bike Action Plan. Safety concerns are consistently the main reason reported by people when asked about barriers to cycling.

In this section, crash data collected by the NSW Government from 2018 over a five-year period is examined. While the focus are crashes involving people on bikes, we also look at overall crash data.

4.5.1 Crash analysis

Figure 58 shows the crash trend between 2018 and 2022. A total of 640 crashes were recorded within the LGA in this five-year period. For North Sydney, crashes have been trending down between 2018 and 2022.

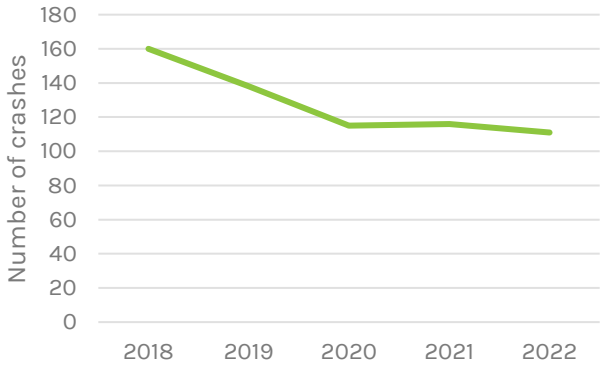

Figure 58 Crashes per year, North Sydney

Source: Transport for NSW

Figure 59 shows the crashes by their location within the road network. It shows that 66% of all crashes in North Sydney are recorded at intersections.

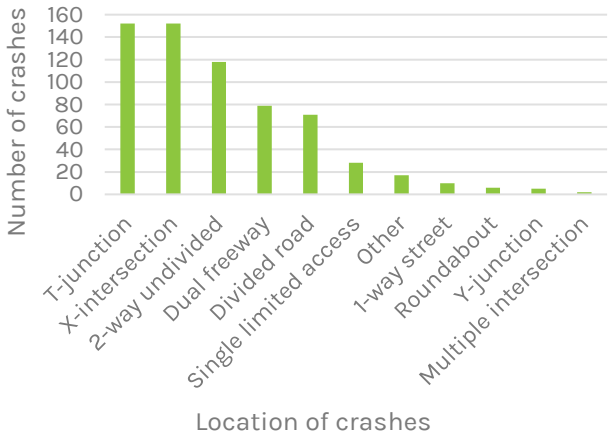

Figure 59 Crashes by location, 2018 -2022

Source: Transport for NSW

4.5.2 Crashes by severity

Figure 59 represents the location of crashes recorded in North Sydney between 2017 and 2021, broken down by severity of the crash. The majority of crashes occurred on the Warringah freeway and Cahill expressway.

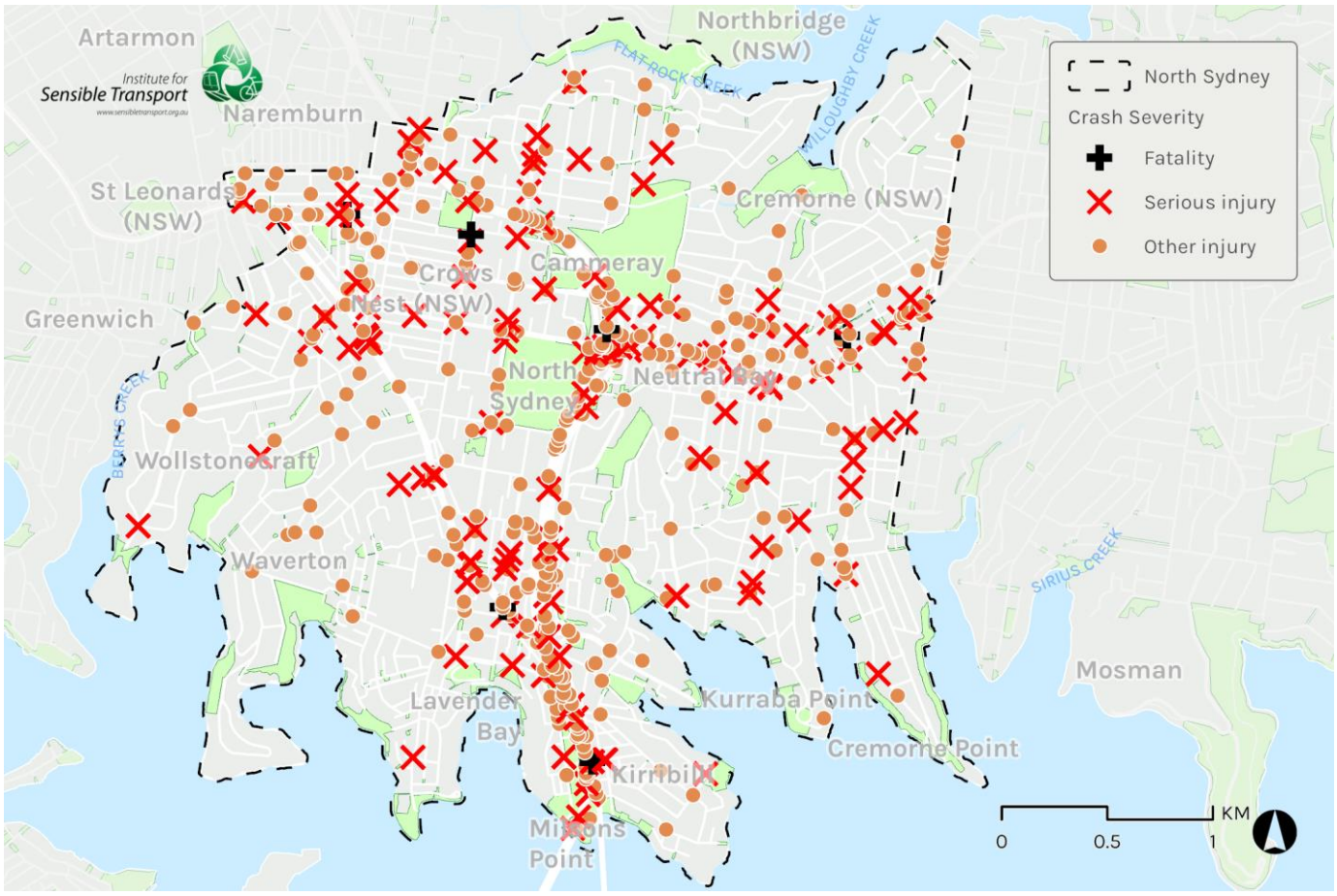

Figure 60 Crashes by severity, 2018 – 2022

Source: Transport for NSW

4.5.3 Crash density

As crashes occur across the road network, a density analysis was undertaken to determine which areas in the network were the most dangerous and likely to record a crash.

In Figure 61, the distribution of road crashes has been estimated using a Kernel Density Estimation algorithm. This function creates a grid of cells and predicts the probability of a crash occurring at that point based on the number, density and distribution of crashes that have been recorded nearby. In order to reflect true travelling distances, the search distance of 150 metres for nearby crashes was constrained to a buffer of the transport network. As this is a statistical prediction, the numbers estimated reflect a relative heatmap of crash locations.

The analysis revealed that intersection of Falcon Street and Warringah freeway accounted for the highest densities of crashes.

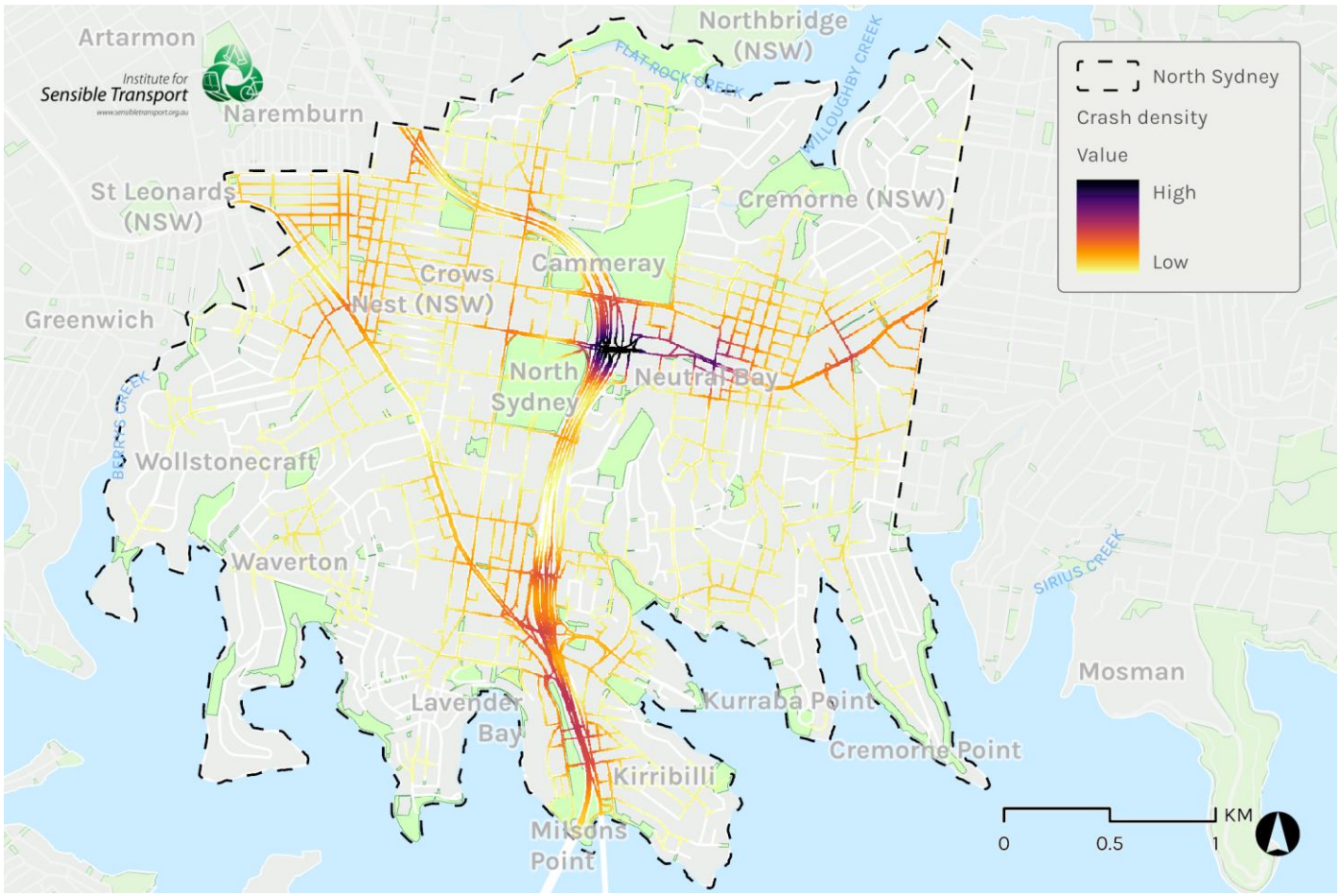

Figure 61 Crash density, 2018 – 2022

Source: Transport for NSW and Institute for Sensible Transport

4.5.5 Crashes by mode

In North Sydney, 87.8% of reported crashes primarily involve cars as key traffic user, while 2.80% are attributed to bicycles (see Figure 62).

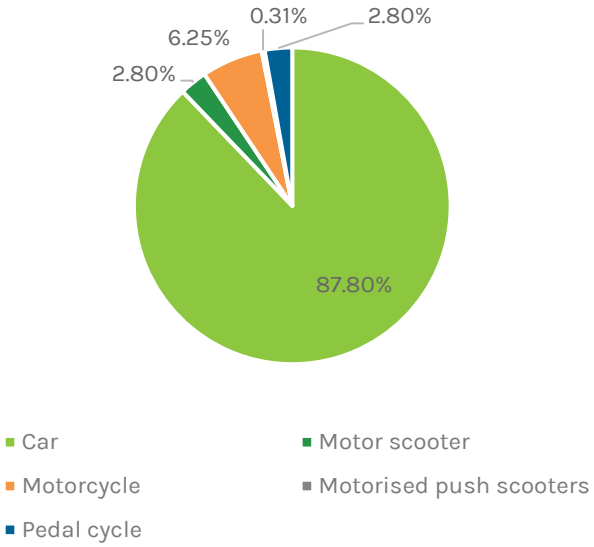

Figure 62 Crashes by mode of transport

Over the course of the past five years, a majority (92.5%), of documented bicycle-related crashes (as key traffic user or other traffic user) in North Sydney have featured the involvement of cars (see Figure 63).

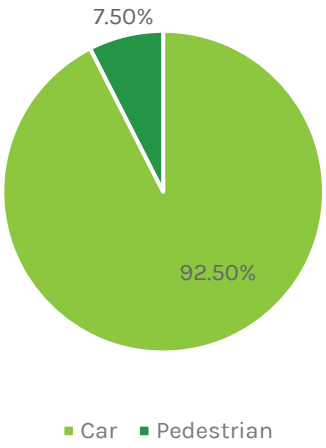

Figure 63 Crashes by mode of transport (crashes involving cyclists)

Figure 64 shows crashes involving cyclists, either as key traffic user or other). There is high density of crashes involving cyclists on Pacific Highway near to Crows Nest Junction.

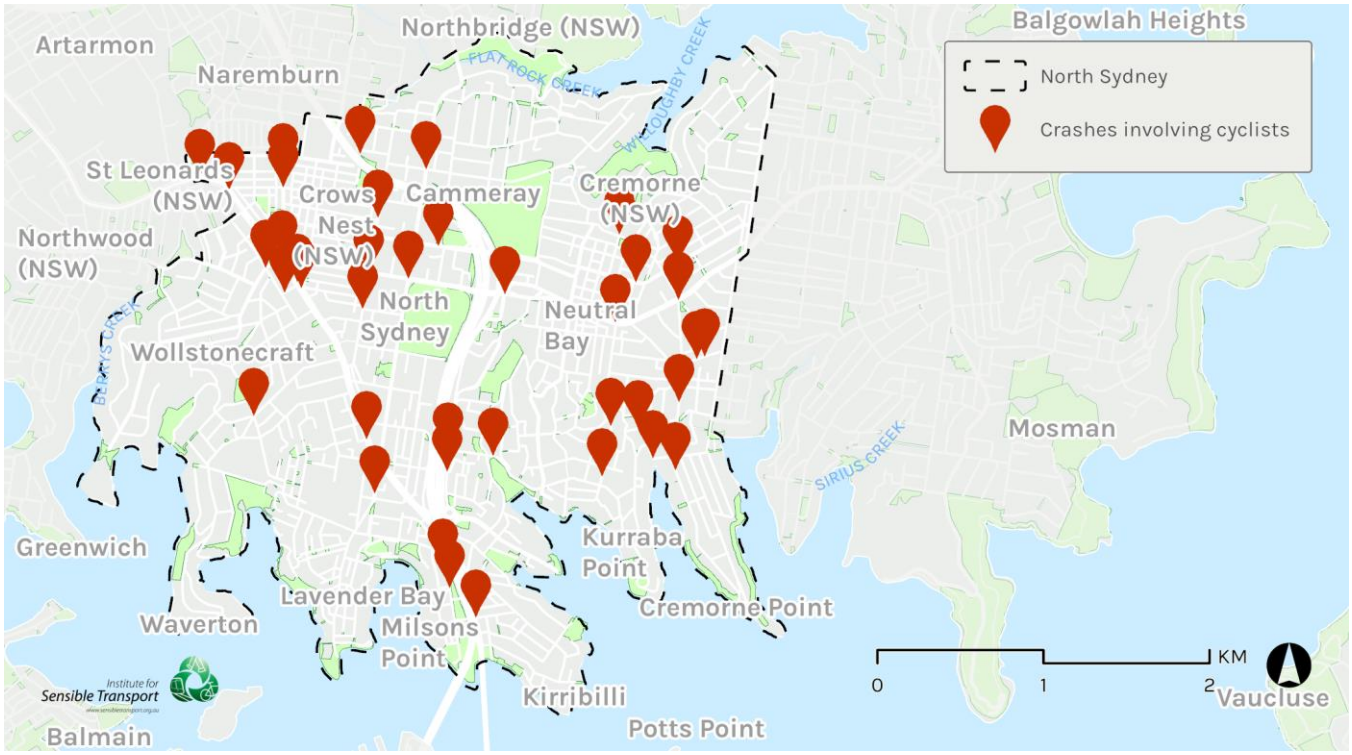

Figure 64 Crashes involving cyclists

4.5.6 Conclusion

In summary, the analysis of crash data in North Sydney from 2018 to 2022 reveals a decreasing trend in total crashes, with intersections being prominent locations. Severity is concentrated on the Warringah freeway and Cahill expressway, and a density analysis identifies the Falcon Street and Warringah freeway intersection as high-risk. Cars are involved in 87.8% of crashes, while bicycles are involved in some 2.8% of incidents. Notably, 92.5% of bicycle-related crashes involve cars. This analysis informs targeted intervention strategies, emphasising the need for safety measures at intersections and specific areas to enhance overall road safety in North Sydney.

5. Monitoring and Evaluation Framework

Monitoring and evaluation is a critical component of any Action Plan. It allows Council to track how well they are meeting their goals and objectives and allows Council to adjust their approach based on their performance. This section offers a monitoring and evaluation framework that can be used following Council's adoption of the Bike Action Plan.

The framework is designed to monitor and evaluate the success of the North Sydney Bike Action Plan as a whole, as well as individual projects within the plan.

5.1 Goals and objectives

The first step is to set goals and objectives. These will be used to evaluate the performance of the plan. The following metrics can be used to create targets to assess Council's progress in growing cycling participation:

- Expenditure on cycling
  - Total spending
  - Per capita spending
- Infrastructure delivery per period
- Non-infrastructure delivery per period
- Cycling participation for residents of North Sydney for all trips
- Mode share for journeys to work
- Inclusion targets (age/gender)
- Road safety (crash and crash risk reduction).

5.2 Data collection

Data must be collected in order to measure progress in meeting goals and objectives. Data should come from multiple sources, including North Sydney Council's own collection. A list of data sources and types are offered below.

5.2.1 Data collected by North Sydney Council

- North Sydney Cycling Participation Survey (new)
  - Survey which includes questions:
    - Demographics
      - Age
      - Gender
      - Residential location within North Sydney Council
    - Cycling activity
      - Number and type of bikes owned
      - Bicycle riding in previous year (daily; a few times a week; a few times a month; a few times in six months; at least once a year; never)
      - Change from last year (less; the same; more)
    - Cycling activity in last week
      - Number of cycling trips
      - Purpose of trip(s)
      - Origin/destination of trip(s)
      - Time of trip(s)
      - Other people on trip(s), e.g., friends, partners, children (if applicable)
    - Satisfaction with cycling
      - Satisfaction with route choice (Likert)
      - Satisfaction with infrastructure typology (Likert)
      - Feelings of safety while riding (Likert)
      - Feelings of comfort while riding (Likert)
    - Non-infrastructure actions
      - Awareness of non-infrastructure actions
      - Satisfaction with non-infrastructure actions (Likert)
- Cycle Counts (existing and new)
  - Permanent counters installed along key routes
  - Temporary counters
    - Between one and six months before installation of major infrastructure (total cost over $500,000) – for at least one week
    - In the same month the following year after completion – for at least one week

5.2.2 Data collected by other organisations:

- Australian Bureau of Statistics – Census
  - Number of journeys to work by bicycle (residents in North Sydney Council)
  - Percentage of journeys to work by bicycle (residents in North Sydney Council)
  - Number of journeys to work by bicycle (people working in North Sydney Council)
  - Percentage of journeys to work by bicycle (people working in North Sydney Council)
- TfNSW – Household Travel Survey (note that North Sydney is currently not included for data collection)
  - Number of trips (all purpose) by bicycle (note that this data is not currently included)
  - Percentage of trips (all purpose) by bicycle (note that this data is not currently included)
- NSW Centre for Road Safety – Crash Statistics
  - Number of crashes involving pedal cyclists in North Sydney Council
  - Number of pedal cyclist injuries in North Sydney Council
  - Number of pedal cyclist fatalities in North Sydney Council
  - Location of all crashes involving pedal cyclists in North Sydney Council (including severity)

5.3 Input and Output evaluation

Inputs refer to investments (e.g. $1M spent on bicycle infrastructure). Outputs refer to what has been developed as a consequence of the input (e.g. 1km of separated bike lane). Ensuring a combination of inputs and outputs are included in the evaluation framework is critical to Council's ability to track its progress. This should include assessment on an annual basis of:

- Expenditure on cycling
  - Total spending
  - Per capita spending
- Infrastructure delivered
- Non-infrastructure items delivered

This reporting will show how the plan is performing over time in delivering its infrastructure and non-infrastructure actions.

5.4 Outcome evaluation

Outcomes refer to the impact of the inputs and outputs. For instance, the number of trips or distance covered by bicycle per year is an example of an *outcome.* Evaluation of outcomes will help Council monitor its progress in meeting the ambition of the Bike Action Plan. This should include an assessment on cycling participation and satisfaction, including assessment on a periodic basis of:

- Percentage of journeys to work by bicycle
- Participation in cycling for all residents of North Sydney Council, including:
  - Participation in cycling by age and gender
  - Trips per person per week
  - Trips by purpose
  - Km cycled
- Crashes – total and by exposure (i.e., crashes per 100,000 km travelled by bicycle)
- Satisfaction with cycling in North Sydney Council (route choice, typology, feelings of safety, feelings of comfort)

These data should be evaluated regularly and compared with targets (see Section 5.1). Data should also be evaluated across time to see how travel patterns, cycling participation, and cycling satisfaction is changing over time.

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