Austroads

Research Report
AP-R724-25

Improving Austroads Guidance for Cycling and Micromobility Planning

Improving Austroads Guidance for Cycling and Micromobility Planning

Prepared by

Clare Huggins, Oscar Hayes, Alix Oakes, James Laing, Will Fooks, Sara Stace, Robbie Napper and William Symons

Project Manager

Mary Haverland

Publisher

Austroads Ltd.
Level 9, 570 George Street
Sydney NSW 2000 Australia
Phone: +61 2 8265 3300
austroads@austroads.gov.au
www.austroads.gov.au

Abstract

The purpose of this report is to provide recommendations to improve the current guidance on cycling and micromobility planning in Austroads' *Guide to Traffic Management* (AGTM). This is done by proposing strategic changes to the current guidance based on best practice literature, addressing gaps identified by key stakeholders, and recommending specific changes based on a detailed review of the current AGTM.

The overarching recommendations are to:

- Provide stronger links to best practice cycle planning and design principles.
- Recognise that considered terminology can help deliver projects.
- Update the scope of the AGTM to consider wider micromobility options.

These overarching recommendations are accompanied by recommendations that relate to most parts of the AGTM. The report presents the research to support the recommendations.

Keywords

Cycling, micromobility, network planning, cycle principles, all ages and abilities, infrastructure, road space allocation, e-scooters, behaviour change, case studies, data collection, data evaluation

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About Austroads

Austroads is the association of Australasian road transport and traffic agencies.

Austroads' purpose is to support our member organisations to deliver an improved Australasian road transport network. To succeed in this task, we undertake leading-edge road and transport research which underpins our input to policy development and published guidance on the design, construction and management of the road network and its associated infrastructure.

Austroads provides a collective approach that delivers value for money, encourages shared knowledge, and drives consistency for road users.

Austroads is governed by a Board consisting of senior executive representatives from each of its eleven member organisations:

- Transport for NSW
- Department of Transport and Planning (Transport Victoria)
- Queensland Department of Transport and Main Roads
- Main Roads Western Australia
- Department for Infrastructure and Transport South Australia
- Department of State Growth Tasmania
- Department of Logistics and Infrastructure Northern Territory
- Transport Canberra and City Services Directorate, Australian Capital Territory
- Department of Infrastructure, Transport, Regional Development, Communications and the Arts
- Australian Local Government Association
- NZ Transport Agency Waka Kotahi.

Acknowledgements

This report was guided by feedback from subject matter experts, including representatives from state and local government, micromobility providers, advocacy groups, think tanks and academia. A review was conducted by the Project Control Group.

Graphics for the report were designed by Bill Hope.

Summary

This research report outlines the strategic recommendations to improve cycling and micromobility planning guidance in Austroads *Guide to Traffic Management* (AGTM) (Austroads 2020a).

A supplementary internal report recommends detailed changes to the AGTM. Austroads members will consider the detailed recommendations in the internal report in conjunction with recommendations to improve guidance around pedestrian planning. Where appropriate, the strategic recommendations may also be considered for future updates to Austroads *Guide to Road Design* (AGRD) (Austroads 2023).

The scope of this project includes updating planning guidance, such as cycle network planning, selecting context-specific treatments to improve cycle safety, and evaluating cycling and micromobility projects to feed back into future planning processes. Providing detailed design requirements and specifications for cycling and micromobility infrastructure is not within the scope of the project. Detailed design requirements are addressed in the AGRD (Austroads 2023).

The strategic recommendations are based on the research and findings from the early stages of this project, including stakeholder consultation and a review of best practice literature. The project engaged subject matter experts from across the industry in Australia and New Zealand through targeted workshops and reference groups. The purpose of the engagement was to seek expert input to inform the development of the guidance, gain an understanding of end users' needs, challenges and opportunities, and ensure that the updated guidance is relevant and reflects best practice.

The project team conducted a review of current and relevant cycling and micromobility planning guidance in Australia and New Zealand. This was followed by a review of international best practice guidance to address any current or noticeable gaps in local knowledge. The literature review highlighted that, as cycling and micromobility grow, planning needs to take a user-centred approach and consider the place functions surrounding cycle facilities and parking. When selecting cycle facilities, there is a need to be aware of the context and to work within the parameters of the environment. Evaluation (both before and after) is key to ensuring projects meet changing and diverse user needs, cater to a variety of vehicle types and inform future cycle planning. The emergence of shared micromobility can support improved cycle infrastructure. The more people use micromobility, the more they are likely to seek physically separated or safe cycle routes.

After the research findings were collated and analysed, the project team conducted a detailed review of the AGTM. The results of the review produced 3 strategic recommendations for the AGTM:

1. Provide stronger links to best practice cycle planning and design principles. Principles for network planning for bicycle and micromobility riders should be consistent across all schemes and projects. Following the project team's review of best practice, we identified the *Design Manual for Bicycle Traffic* (CROW-Fietsberaad 2016) as a suitable tool to be considered as a starting point for planning for cycling and micromobility. The principles proposed as an outcome of this study are based on this document, but importantly can be tailored to the local context. The recommended principles for cycle planning and design are Direct, Safe, Connected, Comfortable, Attractive and Adaptable.
2. Recognise that considered terminology can help deliver projects. Inclusive language ensures that users feel welcome and valued. Road planning and design are subject to language norms that are both inclusive and exclusionary and that are often sourced from regulatory or legal terms. There is a need to adopt appropriate terminology depending on the audience and the context, and terms may vary between planning and traffic management on the one hand, and road design and certification on the other. The update should include a glossary with common terms for users and vehicles.

3. Update the scope of the AGTM to include wider micromobility options. The diversification of e-enabled devices requires additional considerations for the planning and design of cycling infrastructure. Considerations include the allocation of lane width to accommodate larger devices, the creation of safe intersections and the treatment of transitions. This report adopts the position that the bicycle network is normally the best, safest and most comfortable place for people to ride e-scooters and other micromobility devices (while recognising that in New Zealand, it is currently illegal to ride an e-scooter in a cycle lane and e-bikes are not limited to 25 km/h).

The 3 strategic recommendations are accompanied by detailed changes proposed for each part of the AGTM, including:

- Improving the rationale for planning for cycling.
- Updating guidance on data collection and evaluation.
- Improving guidance on effective consultation.
- Integrating infrastructure delivery with behaviour change.
- Planning for a variety of riders and the appropriate infrastructure.
- Increasing use and application of a Cycling Level of Service.
- Using an all ages and abilities cycle facility selection tool for road space allocation.
- Addressing conflict between people walking and riding.
- Improving the focus on safety and priority at intersections and roundabouts.
- Including private and shared micromobility in activity centre planning.
- Prioritising treatments for cycling and micromobility on local streets.
- Including guidance on micromobility parking at mobility hubs.
- Emphasising the importance of active transport in traffic impact assessments.
- Applying Safe System principles to cycling and micromobility.

The research to support the recommended changes is summarised in this report.

Case studies have been developed to support guidance within sections of the AGTM. The case studies were identified during stakeholder consultation with subject matter experts and aim to provide practical and illustrative examples of previous experiences to inform the practice of others.

Contents

Tables

Figures

1. Introduction

1.1 Purpose

The purpose of this report is to present strategic recommendations to improve cycling and micromobility planning in Austroads *Guide to Traffic Management* (AGTM) (Austroads 2020a). These recommendations encompass key additions and changes to the guidance in the AGTM, as well as recommendations for future updates to Austroads *Guide to Road Design* (AGRD) (Austroads 2023). This report is the final output for the Austroads project NEG6385 *Guidance for Cycling and Micromobility Planning*.

To integrate findings with a wider context and improve the usability of the AGTM, the project aims to improve cycling and micromobility guidance across each part of the existing AGTM and does not produce an additional stand-alone document.

1.2 Scope

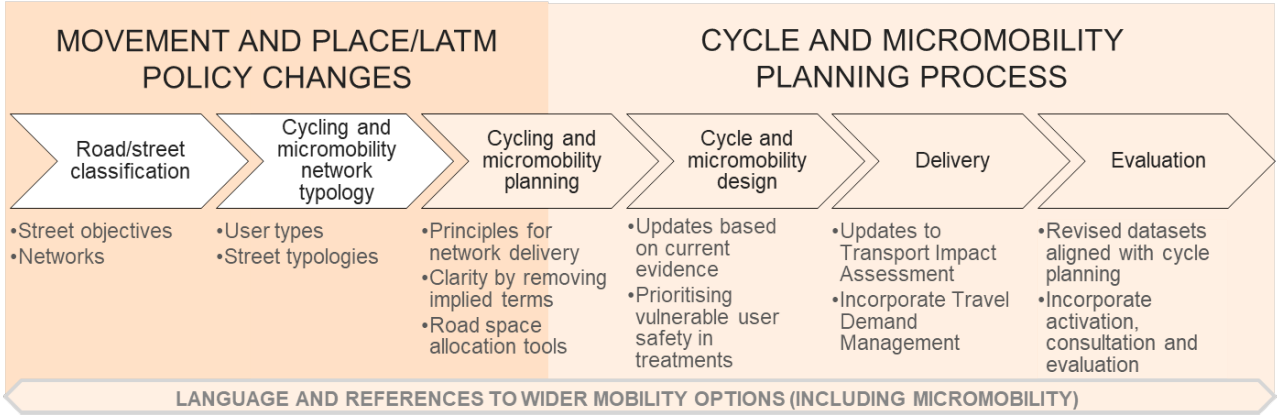
This report presents the strategic recommendations to improve guidance on cycle and micromobility planning within and across Austroads Guides.

These strategic recommendations are based on the research and findings from earlier stages of the project, summarised in Figure 1.1 and Figure 1.2. The recommendations focus on how to improve planning guidance, including network planning, the selection of cycling infrastructure, as well as the management and operations of infrastructure to improve end-user safety.

This report also highlights areas where guidance could be utilised across both planning and design. Some of the recommendations may therefore be considered for future updates to the AGRD.

Figure 1.1 provides an overview of the project scope for the work currently being undertaken by Austroads on Movement and Place and local area traffic management (LATM) policy changes; and how it integrates with this project on cycling and micromobility planning, from planning to design, delivery and evaluation. The project has also included a review of language and terminology across all these stages.

Figure 1.1: Overview of the project scope



Note: *The scope for this report excludes section-by-section changes to the AGTM and detailed design requirements and specifications, which are addressed in the AGRD.*

1.3 Methodology

This project was to deliver best practice guidance on the planning processes for cycling and micromobility infrastructure through an update to the AGTM. An overview of each project task and its purpose is shown in Table 1.1 below. Cross-references are provided to the sections in this report, with details on the delivery of each specific aspect.

Table 1.1: Methodology

Task	Purpose	Sections in this report
Consultation	To understand the key issues and opportunities with current guidance.	Section 2
Review of national and international literature	To identify best practice planning tools and approaches.	Section 3
Detailed review of each part of the current AGTM (Parts 1–13)	To understand the gaps and outdated guidance.	Section 4
Proposing changes and recommendations	To improve cycling and planning guidance in the AGTM and other relevant Austroads Guides.	Sections 4, 5 and 7

1.4 Report structure

This report is structured in line with Austroads' requirements. Sections 2, 3 and 4 detail the work involved within each task, and provide context and reasoning for the recommended strategic additions and proposed changes.

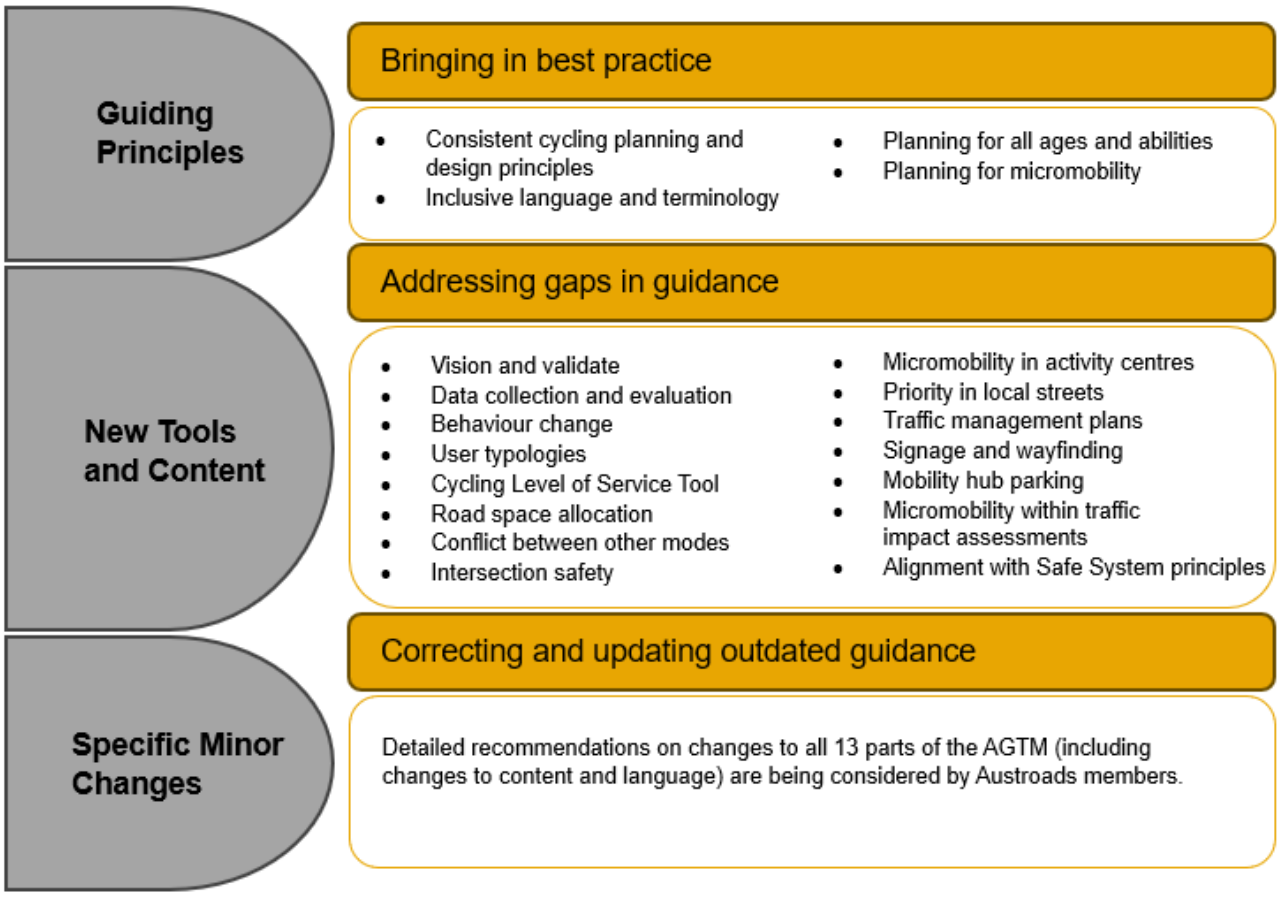
Additions and changes have been identified based on consultation with industry, an examination of national and international best practices, and a detailed review of the AGTM itself. Figure 1.2 provides an overview of the key additions and identified changes. More detail on what content is proposed in relation to these alterations is provided in Sections 5 and 6, along with what value is added to AGTM by incorporating the proposed changes.

Supporting case studies are provided in Section 7, adding real-world examples of where best practice tools and methods have been applied. This is intended to provide practitioners with confidence that the methods proposed are tried and tested.

Section 8 contains recommendations for future updates to the AGRD.

Concluding remarks are provided in Section 9.

Figure 1.2: Report overview and approach



2. Consultation

The project engaged subject matter experts from across Australia and New Zealand through targeted workshops and reference groups. The purpose of the engagement was to seek expert input to inform the development of the guidance, gain an understanding of end users' needs, challenges and opportunities, and ensure updated guidance is relevant and reflects best practice.

Several workshops were conducted with location-specific subject matter experts, including from state and local governments, micromobility providers and academia. Three face-to-face workshops were held – one in Victoria, one in New South Wales and one in Queensland. In addition, an online workshop was held with Australian and New Zealand participants. Topics discussed included examples of successful cycling and micromobility projects, getting projects done and practical applications that practitioners requested for future guidance.

Two reference group meetings were held with Cycling and Walking Australia and New Zealand (CWANZ) member agencies. One reference group meeting, which followed the same themes as the workshops above, was held with government members from each state and territory. The second reference group involved non-government members (including community advocacy groups and bicycle industry representatives). As participants had limited experience in project delivery, topics instead focused on end-user design needs, current and future cycling and micromobility vehicle types, identification of successful networks, and enablers for success.

The key findings identified from the range of consultation included:

- The importance of planning and designing for all ages, abilities and diverse needs.
- The need for improved guidance on effective consultation and engagement techniques.
- The benefits of complementing infrastructure delivery with behaviour change programs.
- The need for guidance on addressing road space allocation and potential conflict and safety concerns.
- The need to plan for a variety of rider types and the appropriate infrastructure associated with them.
- The need to plan for e-scooters and other evolving forms of micromobility.
- The importance of successful case studies and relevant examples.
- The need to help practitioners navigate data collection and evaluation.
- The benefit of prioritisation and evaluation frameworks for project selection and funding.
- The need for guidance for cycling and micromobility in regional contexts.

The findings from the consultation guided the research themes for the literature review (Section 3) and the detailed review of the AGTM (Section 4). This provided a framework to categorise the proposed strategic additions and changes that are outlined in Sections 5 and 6.

3. Literature Review

The project team conducted a review of relevant cycling and micromobility planning guidance across Australia and New Zealand. This was supplemented by a review of international best practice guidance to address any current and noticeable gaps in local knowledge.

The findings from the stakeholder consultation guided the selection of documents for review and the results of the SWOT analysis of the reviewed guidance, as shown in Figure 3.1.

The review included a summary of each document and SWOT evaluation of its strengths and weaknesses, and potential impacts (opportunities and threats) on Austroads' future cycling and micromobility guidance, in accordance with the evaluation criteria in Figure 3.1.

Figure 3.1: Definition of strengths, weaknesses, opportunities and threats in the context of the review

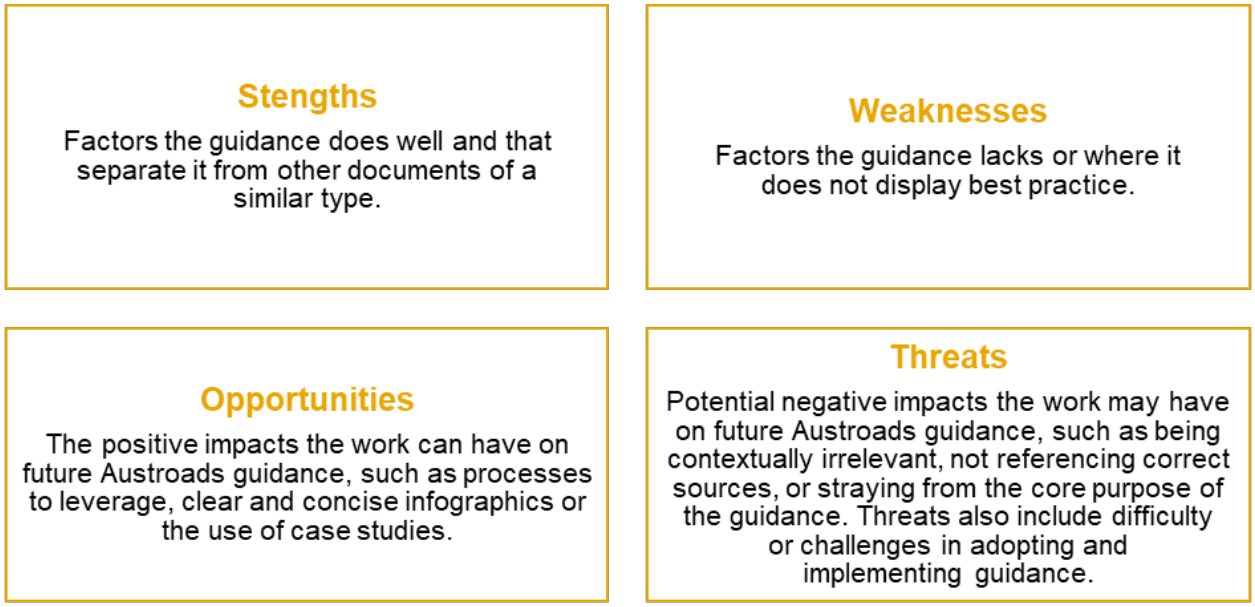


Table 3.1 lists the documents reviewed.

Table 3.1: List of relevant cycling and micromobility guidance analysed in literature review

Documents reviewed
Austroads publications
• *Integrating Safe Systems with Movement and Place for Vulnerable Road Users* (Austroads 2020b). • *Local Government Road Safety Management Guidance* (Austroads 2020c). • Project documents related to strategic reviews of AGTM and AGRD.
New South Wales
• *Healthy Street Design Check for Australia* (Saunders 2023), adopted by Transport for NSW (TfNSW). • *Road User Space Allocation Policy* (TfNSW 2021a) and *Road User Space Allocation Procedure* (TfNSW 2021b). • *Cycleway Design Toolbox: Designing for Cycling and Micromobility* (TfNSW 2020).
New Zealand
• *Cycling Network Guidance* (NZTA 2023a). • *Road Space Allocation Toolbox* (NZTA 2023b). • *Ngā Haerenga New Zealand Cycle Trails Design Guide* (MBIE 2019). • *Evaluating Quality of Service for Auckland Cycle Facilities* (Auckland Transport 2016).
Queensland
• *Principal Cycle Network Plans* (TMR 2022a). • 'Use of on-street space (kerbside road space) for safer cycling' in *Traffic and Road Use Management*, Volume 1 Part 11, Section 9.1.1-1 (TMR 2020b). • *Priority Cycle Route Improvement Plans: Guidelines for Assessing and Treating a Priority Cycle Route* (TMR 2022b) • *Selection and Design of Cycle Tracks* (TMR 2019).
Victoria
• *Framing Walking and Bike Riding Message Guide* (VicHealth and Common Cause Australia 2021). • *Supplement to Austroads Guide to Road Design (AGRD) Part 6A: Paths for Walking and Cycling* (DTP 2021). • *Design Guidance for Strategically Important Cycling Corridors* (VicRoads 2016). • *Bike Lane Design Guidelines* (City of Melbourne 2019).
Western Australia
• *Planning and Designing for Bike Riding in Western Australia* (DoT 2021).
Academic papers
• *Napper Cycling Typology: Identifying and Understanding Different Bicycle Trip Purposes* (Napper 2023) • *What a Girl Wants: A Mixed-Methods Study of Gender Differences in The Barriers to And Enablers of Riding a Bike in Australia* (Pearson et al. 2023) • *Congested sidewalks: The effects of the built environment on e-scooter parking compliance* (Hemphill et al. 2022)
Austroads partners
• *Contraflow Cycling in Quiet Streets* (CWANZ 2022).
USA guidance
• *Designing for All Ages and Abilities: Contextual Guidance for High-Comfort Bicycle Facilities* (NACTO 2017). • *Strategies for Engaging Community: Developing Better Relationships Through Bike Share* (NACTO 2018). • *Shared Micromobility Permitting, Process and Participation* (NACTO 2022). • *Designing for Small Things with Wheels* (NACTO 2023). • *Measuring the Street: New Metrics for 21st Century Streets* (New York City Department of Transportation 2012). • *How to Evaluate Street Transformations: A Focus on Pop-up and Interim Road Safety Projects* (GDCI 2022).
UK guidance
• *Cycle Infrastructure Design*, Local Transport Note 1/20 (DfT 2020). • 'Monitoring and evaluation' in *Active Travel Act Guidance*, Chapter 16 (Welsh Government 2021).
Dutch guidance
• *Design Manual for Bicycle Traffic* (CROW-Fietsberaad 2016).

3.1 Conclusions drawn from literature

The literature review showed a consistent theme that, as demand for cycling and micromobility grows, planning needs to increasingly take a user-centred approach. This emphasises the importance of understanding the place functions informing appropriate cycle facilities and parking.

When selecting cycle facilities, there is a need to be aware of the ‘place’ context and to work within the parameters of the environment. Evaluation is key to ensuring projects meet changing and diverse user needs and inform future cycle planning.

Increased use of shared micromobility can support the case for improved cycle infrastructure because the more people use micromobility, the more demand there is for protected or safe cycle routes.

4. Detailed Review of AGTM

Following on from the previous tasks, with an understanding of the current gaps in knowledge, a detailed review of AGTM was performed. Each part was reviewed to identify, in relation to cycling and micromobility:

- What is currently contained in that part?
- What does best practice say about the contents of the part?
- What are the gaps between current guidance and best practice?
- What changes are proposed to the AGTM?

The review identified gaps in the AGTM based on the results from consultation and an understanding of the literature review. Specific locations within the document were highlighted where gaps were found, and additional references were provided to bolster the part with relevant information sources. Where appropriate, figures and other illustrative tools were proposed to aid understanding.

The project team also prepared several case studies. The purpose of the case studies is to provide practical and illustrative examples of previous experiences or projects to inform the practice of others. The case studies support guidance within sections of the AGTM as well as decision-making processes.

The detailed review identified the following 3 overarching recommendations for the AGTM:

1. Provide stronger links to best practice cycle planning and design principles. Principles for network planning for bicycle and micromobility riders should be consistent across all schemes and projects. The recommended principles Direct, Safe, Connected, Comfortable, Attractive and Adaptable are based on the CROW-Fietsberaad manual (2016), but can be tailored to align with practice documents of local jurisdictions. This report provides guidance on how these principles can be considered at both a network level, as well as at a design and operations level.
2. Recognise that considered terminology can help deliver projects. Inclusive language ensures that all users feel welcome and valued. Road planning and design can be subject to language that is both inclusive and exclusionary, often sourced from regulatory or legal terms. Therefore, there is a need for a clear distinction between terms used for planning and traffic management and terms used for road design and certification. The update to the guidance should include a glossary with common terms for users and vehicles and a better consideration for cycling within the terms ‘vehicles’ and ‘traffic’.
3. Update the scope of the AGTM to include wider micromobility options. The rise in faster, smaller and more diverse devices requires additional considerations for the planning and design of cycling infrastructure. Considerations include the allocation of extra lane width to accommodate larger devices; the creation of safe intersections and transitions; and clearly identifying where micromobility users should be riding. The recommendations in this report adopt the position that the bicycle network is normally the best, safest and most comfortable place for people to ride e-scooters and other micromobility devices (while recognising that in New Zealand, it is currently illegal to ride an e-scooter in a cycle lane and e-bikes are not limited to 25 km/h).

The above recommendations form the basis for the proposed strategic updates to the AGTM.

5. Strategic Additions to the Guidance

This section outlines the recommended additions to improve Austroads' guidance on cycling and micromobility. The additions aim to address the gaps in current guidance, as identified through consultation and best practice review. They should be considered throughout all parts of the AGTM and taken forward for future revisions of the AGRD

The recommended additions have been summarised into 3 categories:

- cycling planning principles
- consistent language and terminology
- accommodating micromobility.

These 3 topics are proposed as strategic additions, because they represent a structural change in the industry and signify a significant and long-lasting shift in the underlying framework and dynamics of how guides are used. Unlike other updates specific to the current 13 parts of AGTM, these 3 strategic additions are cross-cutting.

The proposed changes are highlighted by stakeholders as they are critical to uplifting cycling and micromobility planning guidance, but also mean that guidance adapts to the evolving landscape.

5.1 Consistent principles for planning the cycle network

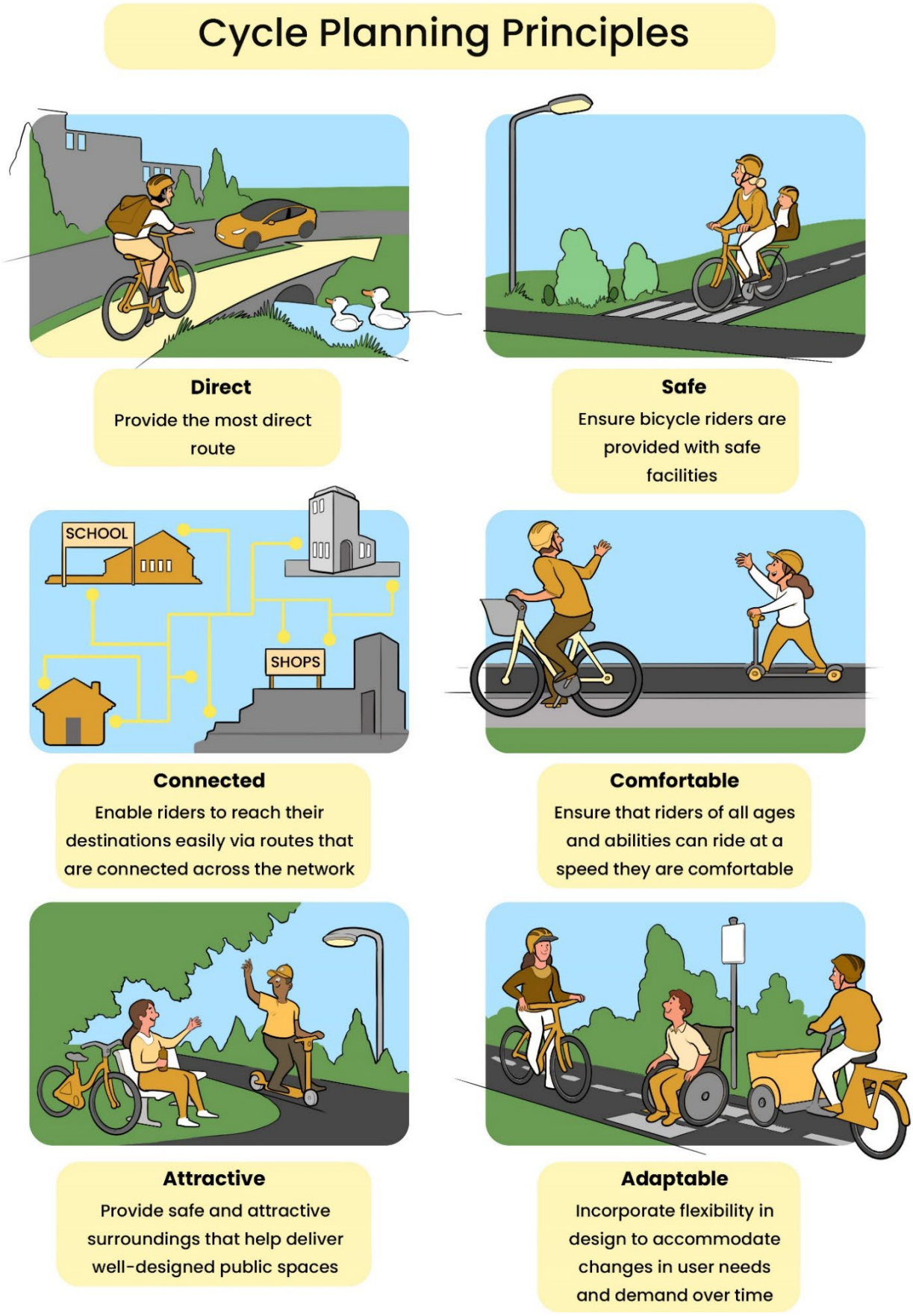
Principles for network planning for bicycle and micromobility riders should be consistent across all schemes and projects. Where cycling facilities are provided or will be provided, it is generally anticipated these facilities will be (or are already) used by micromobility users. Section 5.3 provides further guidance on planning for micromobility.

The recommended principles illustrated in Figure 5.1 are based on the Dutch CROW-Fietsberaad manual (2016) and state policy. These documents were found to be a good starting point for the analysis of cycle infrastructure planning due to their widespread recognition and use among subject matter experts. The recommended principles could potentially be tailored to align with practice documents in local jurisdictions.

Recommendation

Assess new cycle and micromobility infrastructure against recommended principles.

Figure 5.1: Cycle network planning and design principles



Source: Cycleway Design Toolbox (TfNSW 2020), adapted from CROW-Fietsberaad (2016).

The AGTM currently identifies relatively similar criteria in Part 4, Section 4.6; however, it does not provide practitioners with specific guidance on how to achieve these. Currently described as 'bicycle network features' of Safety, Coherence, Directness, Attractiveness and Comfort (Part 4, Table 4.10), there is no hierarchy of planning requirements for cycling to support practitioners in decision-making or applications.

The recommended principles illustrated in Figure 5.1 are presented in Table 5.1, which describes how each of the principles applies to each stage of the project lifecycle, from planning to design, delivery, and operations.

Table 5.1: Cycle network principles at each stage of the project lifecycle

Principles	Planning	Design	Delivery	Operations
Safe	Consider how the network will provide safe access for all types of riders.	Design provides physical separation or a suitable low-speed or low-volume environment.	When diversions are required during construction, the alternative is equally safe for all types of riders.	The network is kept clear of obstacles and hazards. Data is monitored to identify safety issues and solutions, e.g. turn bans.
Direct	Routes should be as direct as possible between key destinations, without detours.	Design provides priority for people riding, with minimal need to stop, give way or change direction.	Construction diversions are as direct and accessible as possible.	The network is managed to provide reliable journey times for people riding, including traffic signals.
Connected	Network is continuous, connected to destinations and caters for different trip purposes.	Design provides continuous, safe and joined-up access, including through intersections.	Directional signage is clear, frequent, consistent, well placed, easy to understand and improves the bicycle rider experience.	Routes are kept connected and land use changes are monitored to continuously connect destinations.
Attractive	Network is in inviting areas, near green spaces and low-car environments.	Design contributes to the sense of place, street is well lit, with landscaping and shade. Can provide buffer from traffic.	Landscaping and other materials are high quality, and efforts are made to limit cars in the area.	The street is well maintained, and signals are contributing to the attractiveness by prioritising cycling phases over vehicle green time, supporting the flow of journeys.
Comfortable	Priority for routes or streets that are already comfortable and can cater for a range of users.	Design provides enough width for a variety of bicycles and micromobility device types, preferably with enough room to ride side by side.	Surfaces and ramps are suitable for smaller wheels.	Surfaces are routinely assessed and maintained at a high quality.
Adaptable	The planned network can expand, evolve, and adapt to changing needs and expectations over time.	Lane widths can be modified to respond to future demand and changing environments.	Flexible approach to accommodating construction while still achieving the principles.	The network is managed to respond to events or surges in demand. Data is used to monitor for adjustments and upgrades.

5.2 Considered terminology can help deliver projects

Language and how words are used is important. Inclusive language ensures that all users feel welcome and valued. Exclusive language, on the other hand, can mean certain groups of people feel marginalised and not considered in planning and design decisions. Language can be a part of systemic discrimination and perpetuate stereotypes and biases.

Road planning and design is subject to numerous language norms that are both inclusive and exclusionary, often sourced from regulatory or legal terms. There is need for a clear distinction between language used for planning and traffic management, and road design and certification.

Inclusive language encompasses a broader range of the community and their perspectives, experiences, and expertise, potentially leading to more innovative and equitable outcomes. Therefore, it is crucial to use language thoughtfully and intentionally to promote inclusion, diversity and equity in all settings.

The Dutch language, for example, has 2 different words for bicycle riders. ‘Wielrenner’ (wheel runner or sports and fitness bicycle rider) refers to bicycle riders often wearing Lycra clothing, cycling at higher speeds, with helmet protection, riding for exercise purposes and sports, such as the Tour de France. On the other hand, ‘fietser’ (someone who rides a bicycle) refers to most bicycle riders in the Netherlands. Fietsers travel at a much lower speed and usually for transport purposes. Dutch guidelines and government policies will always use the more inclusive term fietsers, unless specifically targeting the high-speed riders engaged in vigorous exercise or sports.

It takes time to shift industry convention. Our approach is to support practitioners in a journey towards using inclusive language on their projects. New conventions need to be established, and new terms adopted across the planning, design and operations ecosystem. As demand for effective cycling and micromobility planning and design increases, so does the need to define and agree on basic terms.

Recommendation

Reflect updated definitions when referring to cycling and micromobility in planning.

Proposed definitions are provided in the following subsections.

5.2.1 Definitions of users and vehicles for cycling and micromobility planning

This section outlines the current state of language and terminology in the industry. It includes terminology used to describe bicycle riders, terminology of vehicle and device types, and the use of terms such as vehicle, traffic and road.

Table 5.2: Terminology for users

Term	When to use	What you should know
People who ride/ People on bikes/ People on e-scooters, etc.	Best used in external engagement and policies.	Emerging in recently published policy. These terms are a person-first way of describing street users on bicycles or micromobility devices. Including the word 'people' in the term humanises instead of labels them (VicHealth and Common Cause Australia 2021). However, this terminology is generally not referenced in technical documents and may be less specific than terms currently used for technical standards.
Bike rider	Best used in external engagement and policies.	Emerging in recently published policy. This term is a person-first way of describing street users on bicycles. This term is a good alternative to 'cyclist' and avoids dehumanising the bike user. As recognised by the National Association of City Transportation Officials (NACTO), there are several types of bike riders: highly confident, somewhat confident, and interested but concerned (NACTO 2017).
Cyclist	Best to avoid, if possible. Currently the most common term in British and Australian English. The term is used in technical guidance and recognised in road rules. Used across Austroads documents. Also used in the New Zealand Land Transport (Road User) Rule 2004.	People do not think of children as cyclists, although they make up the largest cohort of people riding bicycles. Using the term 'cyclist' elicits an image in people's minds that is often associated with confident riders wearing Lycra clothing (NACTO 2017) or the 'proper cyclist' (Aldred 2010). There is evidence that 'cyclists' are dehumanised (Limb and Collyer 2023). The term 'cyclist' should therefore be avoided as it can dehumanise people who ride. It is important to distinguish between the activity of cycling and the identity of a cyclist. Cycling is an activity that people do, whereas 'cyclist' is a label people give, identify with, and use in their definition of self and others (Aldred and Jungnickel 2014).
Bicyclist	More commonly used in American English.	Various documents published by NACTO use the term 'bicyclist'.
Children/families/ elderly etc. riding bikes	Using 'kids and families' for instance boosts support over using 'people' (VicHealth and Common Cause Australia 2021). Can be used to replace 'vulnerable road users', humanising this term.	We can connect more with people if they are illustrated in detail. Can be complex or exclusive when being specific about a change.
Bicycle rider	Used in the model Australian Road Rules.	A more inclusive term for 'cyclist'. May act as a common term across the industry (from engineers to community engagement officers).
Biker	May refer to a person riding a motorcycle and can therefore cause confusion.	'Biker' usually describes a person who rides a motorcycle, often as a member of a large group. However, it can also be used to describe a person who rides a bicycle, especially a mountain bike (Oxford Learner's Dictionaries 2023).
Rider	Used in the model Australian Road Rules. Road rule 17(1) states that a rider is a person who is riding a motor bike, bicycle, animal or animal-drawn vehicle. However, a rider does not include a passenger or person walking beside or pushing a bicycle.	Road rule 17 states that, unless expressly stated, each reference to a driver includes a reference to a rider. This means that, for most of the road rules, people driving cars and riding bicycles are bound by the same rules. The AGTM should recognise that a rider of a bicycle or micromobility device fluidly moves between using off-road facilities (such as footpaths, shared paths, and cycleways, which may form part of a road-related area) and the roadway. However, the Road Rules do not explicitly acknowledge or account for this. This may affect the transition from one facility to another, such as at intersections and traffic signals.

Figure 5.2: Snapshot of terminology for users

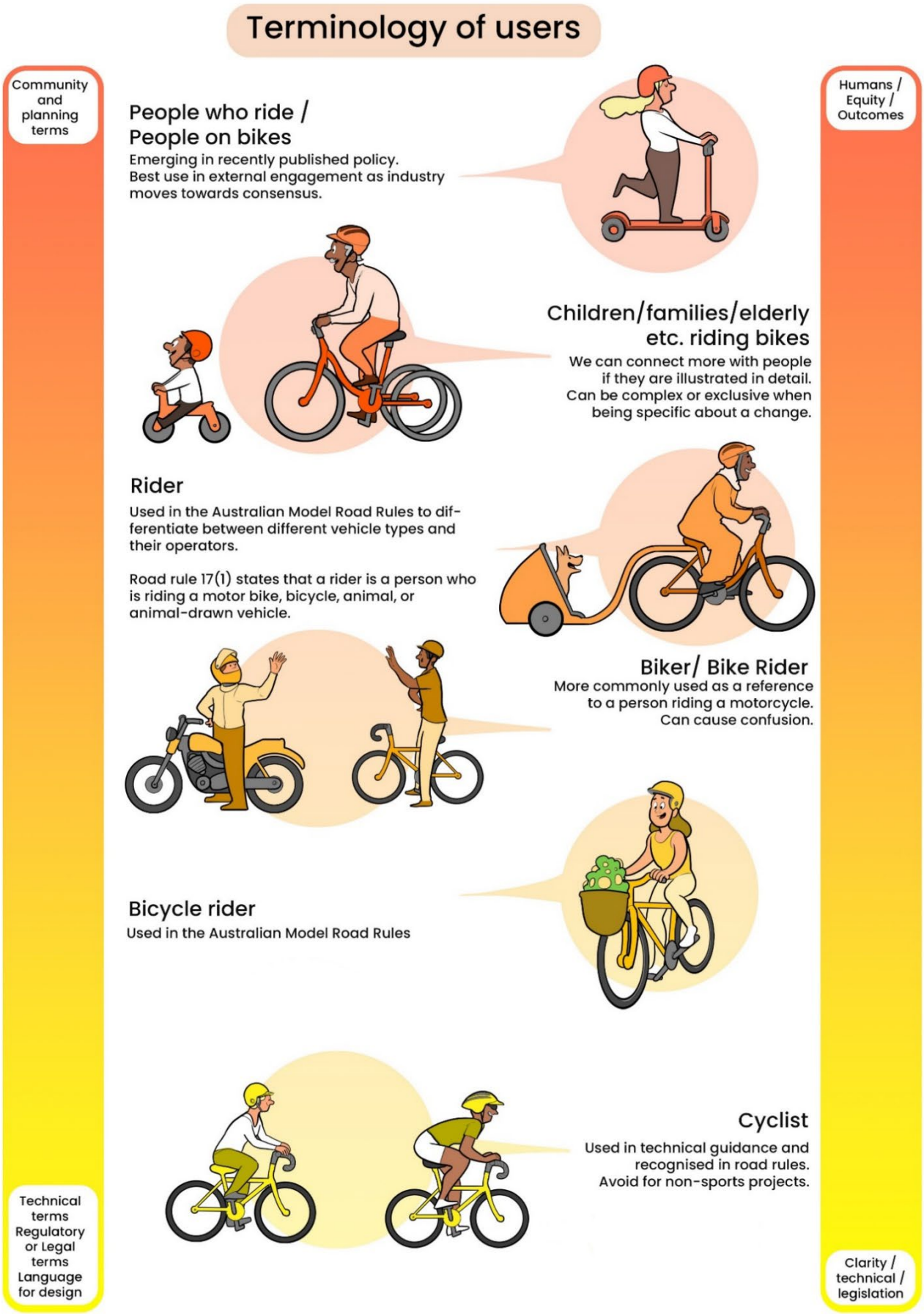
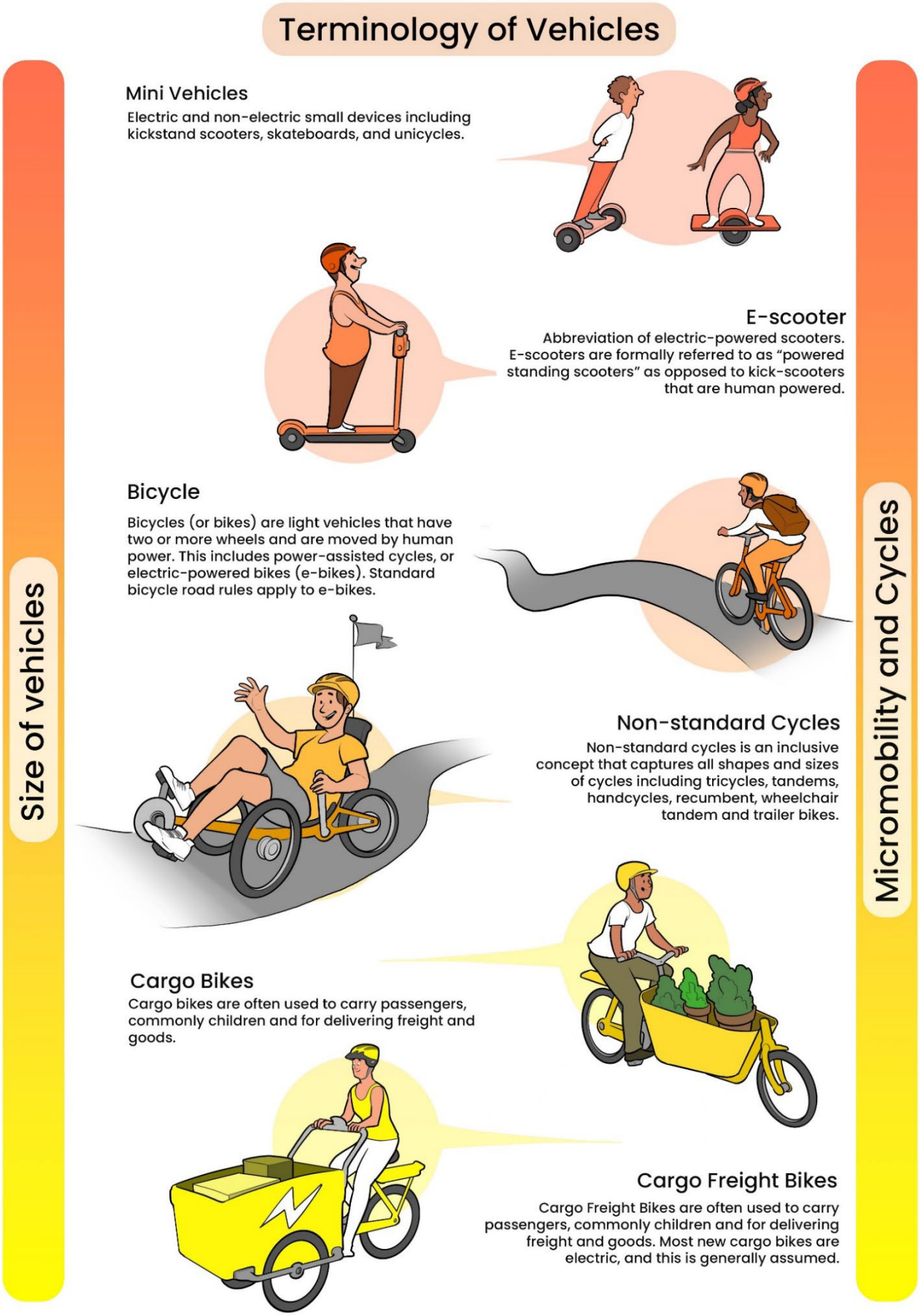


Table 5.3: Terminology for vehicles

Term	Why use it?	What you should know
Micromobility	The term is not yet universally defined. It is sometimes used to describe e-scooters, but it refers more broadly to small, lightweight devices that are human- or electric-powered, with a maximum speed, weight and width. This can include bicycles, electric bicycles, scooters, e-scooters, cargo bikes, segways, rickshaws, hoverboards and skateboards.	Micromobility refers to small, lightweight devices that are human- or electric-powered, and human dimensioned (TfNSW 2020). SAE International (2019) defines micromobility as a wheeled vehicle with a kerb weight of 23 kg to 227 kg; top assisted speed of 13 km/h to 48 km/h; and width of 0.9 m to 1.5 m. The use of micromobility devices has increased significantly since 2010 and requires a shift in infrastructure design (NACTO 2023). Many micromobility devices, such as cargo bikes, are wider, longer, and have larger turning radii than typical bicycles and, therefore, require reconsideration of design criteria (NACTO 2023).
Bicycle	The term is recognised within the model Australian Road Rules. However, the New Zealand Land Transport (Road User) Rule uses the term 'cycle'.	In the model Australian Road Rules, a bicycle means a vehicle with 2 or more wheels that is moved by human power through a belt, chain or gears. Types of bicycles include a penny-farthing and tricycle.
E-mobility	E-mobility refers to all types of electric-powered transport.	Caution is required when using this term as confusion can arise around the inclusion or exclusion of electric vehicles, and electric trains and buses.
E-scooter	Abbreviation of electric-powered scooters. E-scooters sometimes have small, solid tyres that do not absorb the shock of uneven surfaces well. This requires smoother surfaces, sensitive grade changes and better maintenance (NACTO 2023).	E-scooters are formally referred to as 'powered standing scooters' (SAE International 2019), as opposed to kickstand scooters, which are human powered. The legal status of e-scooters varies across jurisdictions in Australia. In Queensland, e-scooters fall under the classification of 'personal mobility device' or PMD and 'shared devices'.
E-bike	Overarching term for electric-powered bicycles.	Commonly used term to refer to electric-powered bicycles (see the next 2 entries below).
Electrically power-assisted cycle (EPAC)/ electric bike	Not used in everyday language	An electrically powered pedal cycle with a maximum continuous rated power of 250 W, of which the output is: (a) progressively reduced as the cycle's travel speed increases above 6 km/h; and (b) cut off, where: (i) the cycle reaches a speed of 25 km/h; or (ii) the bike rider is not pedalling, and the travel speed exceeds 6 km/h.[1]
Power-assisted pedal cycle/ pedal assist	Not used in everyday language	A vehicle, designed to be propelled through a mechanism primarily using human power, that: (a) meets the following criteria: (i) is equipped with one or more auxiliary propulsion electric motors with a combined maximum power output not exceeding 200 W; (ii) cannot be propelled exclusively by the motor or motors; (iii) has a tare mass (including batteries) of less than 50 kg; (iv) has a height-adjustable seat; or (b) is an electrically power-assisted cycle; but does not include a vehicle that has an internal combustion engine.[1]
Mini vehicles	This term includes electric and non-electric scooters, skateboards, rollerblades, and other similar small wheeled recreational devices.	NACTO refer to mini vehicles as 'mini devices' (NACTO 2023). In Queensland and New Zealand, mini vehicles are generally referred to as 'wheeled recreational devices'.

[1] Different jurisdictions may have a variation of this definition.

Figure 5.3: Overview of different vehicle types



5.2.2 Definitions of vehicle, traffic and road

Current Austroads guidance documents refer to 'traffic' inconsistently, which results in professionals inadvertently not considering bicycles and micromobility in many planning and design processes. In some parts of the AGTM, traffic is defined as multimodal and includes people who travel by bicycle. In other cases, 'traffic' is used as a term to refer to vehicles and planning guidance does not consider bicycles.

The level of knowledge about vehicle design within planning and guidance means that design for cars is high quality, whereas much of the material on bicycle planning is lacking. Defining bicycle planning as a separate discipline requires future guides to develop a level of understanding of bicycle planning similar to the knowledge of vehicle planning, and to enrich the overall quality across all modes.

Furthermore, Section 1.3 of the AGTM (in all parts) states that bicycle riders and pedestrians are 'traffic'. This assumes 'vehicular cycling', a concept that originated with John Forester in the United States and asserts bicycle riders act like drivers on the roadway (Forester 1993). This view is not compatible with the current understanding on mixing bicycles with motor vehicles (they do not mix except at very slow speeds). The 'vehicular cycling' assumption, and the guidance, design and provision of infrastructure that flows from it, fails to acknowledge the real needs and concerns of a broad cross-section of the community and results in low participation in cycling.

Likewise, Section 1.3 in all parts of the AGTM states that 'road' and 'road corridor' are interchangeable and cover the whole space between property boundaries including footpaths. This corresponds with the model Australian Road Rules, which specify that a road-related area includes footpaths. However, there needs to be an additional definition that 'roadway' (or other appropriate term) is the space between the kerbs that is generally for the movement and parking of vehicles. This would help clarify the difference between space that is allocated to motor vehicles, and space that is allocated to people walking and riding. A possible term for use in this context is 'carriageway'.

The interchangeability of the terms 'traffic', 'transport' and 'road' is problematic for pedestrians and bicycle riders, as they are often left out of consideration.

5.3 Planning considerations for e-scooters and other evolving micromobility

Micromobility is an evolving term that is not yet universally defined and is not currently referenced in the AGTM. According to a draft definition prepared in 2023 by the NZ Transport Agency Waka Kotahi (NZTA), micromobility may be defined as follows:

> *A range of small, lightweight vehicles operating at speeds typically below 25 km/h and driven by users personally. Micromobility devices include bicycles, e-bikes, electric scooters, electric skateboards, shared bicycles, and electric assisted (pedelec) bicycles (NZTA 2023a).*

Shared micromobility schemes – in which people can hire micromobility devices on a short-term basis using an online app – are now prevalent across Australia and New Zealand and need to be considered within planning assessments. Regulations are progressively being developed and refined to manage the use and deployment of shared devices. As with bicycles, it is legal to ride micromobility devices on the footpath in some jurisdictions but not others. The legal use of privately owned e-scooters also varies by jurisdiction.

Providing for private and shared micromobility in activity centres and hub parking is discussed in more detail in Sections 6.11 and 6.14 respectively.

The rise in these faster, smaller, and more diverse devices requires additional considerations for the planning and design of cycling and micromobility infrastructure.

In *Designing for Small Things with Wheels*, the US National Association of City Transportation Officials (NACTO) states:

> *Micromobility comes in different sizes, moves at a wide range of speeds, handles turns and surfaces differently, and attracts people with varying degrees of skills and expertise. (NACTO 2023)*

It is, therefore, important to understand and plan for the likely differences between device types. For example, e-scooters have smaller wheels. This means e-scooters handle bumps, grates and gradients differently from devices with larger wheels. Turning radii, acceleration and stopping distances also vary between different micromobility devices.

Some considerations for emerging micromobility types, sizes and speeds include:

- Lane width: Extra width should be allocated to accommodate larger devices (such as cargo bikes) and to support safe passing where there is increased demand or where some riders may be slower (for example, when travelling uphill).
- Intersections: Creating safe crossings and transitions between facility types.
- Network legibility: Making it obvious where to ride and park.
- Parking requirements: E-scooters require different parking facilities to standard bicycle parking facilities, such as upfront storage on ground level due to heavy weight.

Nevertheless, the infrastructure needs for people using micromobility devices are generally very similar to those of people riding bicycles (aside from different parking needs). Generally, the recommendations in this report are based on the position that the bicycle network is normally the best, safest and most comfortable place for people to ride e-scooters and other micromobility devices (while recognising that in New Zealand, it is currently illegal to ride an e-scooter in a cycle lane and e-bikes are not limited to 25 km/h). This position is adopted for the following reasons:

- The speed and weight (including the rider) of micromobility devices is most similar to bicycles compared to larger motor vehicles or pedestrians (note that in New Zealand the speed differential between bicycles and e-scooters is much higher, hence the difference in approach).
- People riding micromobility devices are at risk of harm from drivers and therefore require safe, physically separated facilities.
- Footpaths are typically not wide, smooth and connected enough for people to share between walking and using micromobility, particularly where there are higher volumes of pedestrians.

Providing a network that follows the principles of planning for all ages and abilities will increase the comfort and safety for everyone, including those using micromobility devices, those using the footpath and those using the roadway. Consideration of the diverse range of modes is recommended to ensure equity of access.

Recommendation

Consider micromobility in new planning schemes, particularly the wide range of vehicle types and needs.

6. Strategic Changes to Guidance

This section outlines the strategic changes to improve guidance on cycling and micromobility planning across the AGTM. For readability, the changes are presented as a summary of the research that supports the recommendations. Each proposed change relates to a section within a part of the AGTM.

6.1 Moving to 'vision and validate' from 'predict and provide'

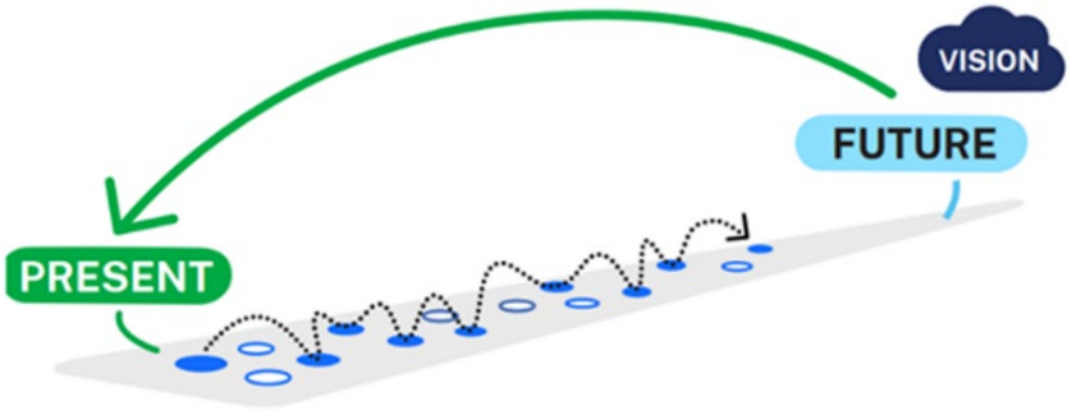
In recent years, there has been a growing recognition in Australia and New Zealand of the economic and social benefits of promoting walking and cycling as modes of transportation. According to the *Australian Transport Assessment and Planning Guidelines*, walking and cycling incur a wide range of economic benefits including health ($4.39 per kilometre walked and $2.20 per kilometre cycled), traffic decongestion, environment, climate and amenity benefits, as well as addressing disadvantages related to social, economic, location and transport access (ATAP 2023).

As a result, jurisdictions have been actively working to reduce reliance on private motor vehicles and increase the share of active and public transport options. It is also becoming clear that simply expanding traffic capacity (in terms of motor vehicles only) to meet future demands is not a sustainable solution. This approach not only conflicts with the goal of shifting mode share away from private vehicles, but it also leads to an increase in vehicle usage due to induced demand (ATAP 2016). Additionally, the investment in road infrastructure often leads to dispersed settlement patterns, resulting in higher infrastructure costs and a range of negative externalities associated with car dependency.

To address these challenges, jurisdictions in Australia and New Zealand are moving away from the traditional 'predict and provide' approach and adopting a 'vision and validate' approach. This new approach focuses on establishing a vision for sustainable travel mode share, developing and testing measures against specific criteria, and making recommendations that align with desired place outcomes, environmental sustainability, social equity and health.

Figure 6.1 provides an overview of the approach to planning that established the vision and then validates the steps to achieve this vision form the present state.

Figure 6.1: Vision and validate



Source: TfNSW (2022).

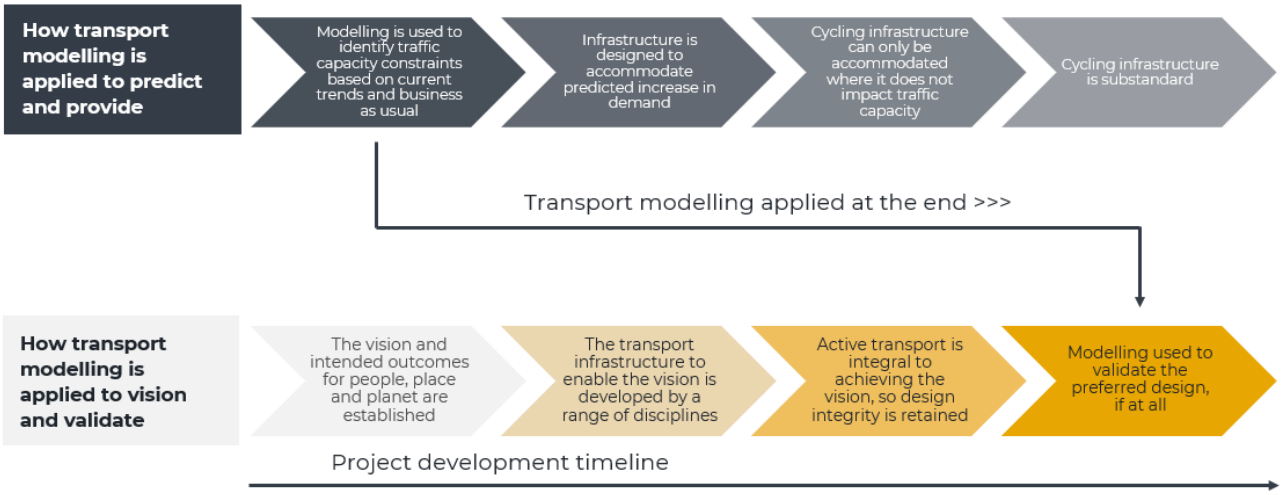
6.1.1 Moving towards vision and validate: A long-term plan

The traditional predict and provide approach meant transport planning was founded on current experiences and historical trends. This often reinforced the belief that projects should prioritise general traffic capacity as a primary objective. Transport modelling is often used to support this approach with prioritised consideration of the level of service for general traffic the focus for designing the transport network. This approach often makes it harder to plan and deliver higher priority cycling routes due to a lack of data-led support and a business-as-usual approach.

The project aims to increase mode share of cycling on a particular corridor. The proposed transport infrastructure is developed using an interdisciplinary approach, in which active transport infrastructure is integrated as part of a holistic view of the street network and broader precinct. Only then is modelling applied to validate the options in the proposal, if this is deemed relevant.

Figure 6.2 provides an illustrative example of applying a vision and validate approach to an active travel project.

Figure 6.2: Comparison of traffic modelling in a 'predict and provide' and 'vision and validate' process



In the vision and validate approach, modelling remains a transport planning tool that may support efforts to realise the vision. For a project where the cycling infrastructure requires road space to be reallocated, modelling the preferred design may help to understand the scale of change, negotiate trade-offs and plan implementation.

Vision and validate should be a core skill of the future transport planner. Firstly, they need to understand how to interpret visions and goals for the future and articulate a clear summary of the needs of the community and stakeholders. The relevance of this approach is the growing importance of active travel and its benefits. Secondly, validation is the process of confirming or validating the most efficient and safe outcome. This involves gathering evidence, conducting trials or pilots, assessing feasibility, modelling (when practical) and delivery.

Overall, vision provides a sense of purpose and direction, while validation ensures that efforts are focused on viable and valuable endeavours, ultimately increasing transport delivery cost-effectiveness and sustainability.

Recommendation

Champion a vision and validate approach.

6.2 A call for consistency: evaluating bicycle network performance

Feedback from both workshops and the reference group highlighted a critical need: consistent guidance for evaluating bicycle network performance and design. Practitioners across the board emphasised the importance of standardised measurement methods to accurately assess the multifaceted benefits of active travel projects, encompassing both Movement and Place based aspects.

6.2.1 Expanding data horizons for cycle network planning

A surge of new technologies and data sources has dramatically expanded the resources available for informed cycle network planning. While practitioners have more tools and information at their disposal than ever before, the quality and range of data, and the insights gleaned from it, remain key determinants of success.

Table 6.1 summarises data source types that are not currently identified in the AGTM, and the insights that can be gathered from such sources.

Table 6.1: Summary of data sources and corresponding insights missing from existing AGTM

Data source	Insights
Intercept and phone surveys	User experience, types of riders, frequency of riding, regular origin or destination locations
Online surveys	User experience, types of riders, frequency of riding, regular origin or destination locations
Temporary and permanent counters, including pneumatic tubes and piezoelectric sensors	Volumes, speeds, peak times of use
Artificial intelligence (AI) camera or lidar automated data collection	Volumes, speeds, path tracking or tracing, near misses, types of bicycle riders, types of riding device used
Data from shared micromobility devices and platforms	Trip origins, destinations, route volumes, parking locations and volumes of micromobility devices, types of riding device used
'Smart' devices such as lights on bicycles, smartphones and watches	Trip routes and patterns, volumes, speeds, surface conditions, acceleration and deceleration, near misses
Big data sources	Trip routes and patterns, mode share, route volumes, origin or destination

By leveraging these diverse data sources effectively, planners can make more informed decisions, optimise cycle network investments, and create a more sustainable and equitable transportation system.

Recommendation

Expand use of available cycling-related data sources.

6.3 Reasons for collecting data about cycling and micromobility

Collecting data about cycling is crucial for gaining valuable insights into patterns and trends over time, which ultimately inform decision-making, enable assessment of the effectiveness of policies and infrastructure and help identify areas for improvement. Table 6.2 highlights the key reasons to collect data when planning for cycling and micromobility.

Table 6.2: Key reasons to collect data for cycling and micromobility planning

Key reasons to collect cycling and micromobility data	Explanation
To understand cycling participation	Monitoring cycling trends reveals whether participation is increasing, decreasing or stagnant, allowing for an assessment of the effectiveness of existing policies and infrastructure. Data on bicycle rider and e-scooter demographics (age, gender, location, etc.) provides insights into who is using the infrastructure and who is not, enabling tailored cycling initiatives to address the needs of diverse segments of the population.
To optimise infrastructure investment	Analysing cycling routes, frequency and duration of trips helps identify areas where infrastructure is most needed, guiding the planning and prioritisation of new cycling routes, crossings, bicycle parking and other facilities. Collecting data before and after implementing infrastructure projects and behavioural initiatives provides valuable insights into their effectiveness and potential areas for improvement.
To prioritise resource allocation	Data-driven insights can help prioritise and allocate resources more efficiently. By understanding where and when cycling is most prevalent, has the most potential or is most needed, investments can be directed towards areas with the highest impact.
To build public support	Quantified data and real-life experiences of bikes and micromobility users can be used to demonstrate the popularity and benefits of cycling, fostering public support and increasing participation.
To assess safety	Data on bicycle and e-scooter crashes and near misses can identify dangerous areas and inform the development of targeted safety interventions.
To measure environmental impact	Data on cycling activity can be used to estimate the environmental benefits of cycling, such as reduced greenhouse gas emissions and air pollution.
To evaluate economic impact	Data on cycling activity can be used to assess the economic impact of cycling, such as increased tourism spending and job creation.
To determine public health impact	Data on cycling activity can be used to estimate the public health benefits of cycling, such as increased physical activity levels.
To benchmark and compare performance	Data on cycling allows for benchmarking performance against other cities and regions, facilitating continuous improvement and best practice sharing. By collecting and analysing cycling data effectively, cities can make informed decisions that promote cycling as a safe, sustainable, and equitable transportation mode.

6.3.1 Evaluation methods

Project evaluation is a critical step in the project delivery process. Evaluation enables transport planners to make any necessary adjustments, measure project benefits and confirm whether outcomes have been achieved. It can also be used to communicate the project outcomes to the community and support the success of future projects. However, for an effective evaluation, data needs to be collected both before and after completion. It is generally recommended that 5–10% of the capital budget be committed to monitoring and evaluation (as advised by the City of Sydney).

An evaluation framework should be agreed with stakeholders prior to project delivery. Agreed targets, timelines and measurable evaluation criteria should be determined at the outset. Results should be well communicated and transparent to stakeholders and the public.

Having a clear and agreed evaluation framework in place before delivery is a critical tool to ensure that:

- Success can be measured and communicated to the community and stakeholders.
- Actions can be identified if a design is not delivering on the desired outcome.
- Stakeholders and decision makers are aligned on the project objectives and how progress will be measured.

Cycling projects can be delivered at different scales of complexity and cost, ranging from a new kerb ramp to a cycleway that is several kilometres long. While protected infrastructure will attract new, less confident riders, significant growth in bicycle volumes requires a safe and connected network of routes. It will require multiple well-connected projects to see this occur.

Recognising that many projects at different scales may contribute to the cycle network, it is important to distinguish between project scale indicators and network scale indicators in an evaluation framework. For a small project, bicycle volumes may not be a suitable indicator of success as it may take a long period for volumes to increase and could be dependent on other projects also being completed. For a longer, continuous and protected corridor, bicycle volumes are likely to increase more quickly because a larger catchment of people can access more destinations safely. Similarly, crash data can take a long time for statistically significant data to be available, and for smaller projects it may not be suitable at all. For evaluation, crash data for less than a 24-month period is unlikely to be suitable.

It should be noted that bicycle volumes are influenced by macro influences beyond infrastructure, including the available transport options, population density, education, employment, and points of interest such as shopping, services and recreation. As such, the increase in ridership due to new infrastructure will vary across different locations.

An evaluation framework should be designed to consider and respond to the context and objectives of the individual project. Some recommended indicators to assess performance against the cycle planning principles are identified in Table 6.3.

Table 6.3: Example indicators to assess projects against cycle planning principles

Suitable indicators	Metric(s)	Potential data collection methods	Cycle planning principles relevant to indicator
Project scale indicators			
Diversity of users	• Gender and age • Types of riding device	Intercept surveys and observations	• Safe • Attractive • Adaptable
User confidence	Perception of safety (reported level of comfort and confidence)	Intercept surveys	• Safe • Comfortable • Attractive
Improved access and connectivity for people walking	People crossing the street on foot	Intercept surveys and observations	• Safe • Attractive
Community and stakeholder feedback	• Participation • Sentiment	Available channels such as online engagement tools	• Safe • Connected • Adaptable
Traffic speeds	Reduction in mean traffic speed	Manual or automatic counts	• Safe • Attractive
Network scale indicators			
Number of bicycle and micromobility riders	Volume of vehicles in bicycle lane/path	Manual or automatic counts	• Direct • Connected
Crash statistics	Fatal, serious and other injuries	State-based crash data	• Safe

An example of how to apply project evaluation is described by the Activation, Consultation and Evaluation (ACE) delivery model developed by the Western Australian Department of Transport (DoT 2022a). ACE is a delivery model for any cycle infrastructure and encourages an outcomes-focused evaluation – which aligns well to the cycle network 'principles-based' approach. If it is agreed at the start of a project that the project intends to improve level of service across all principles, then the ACE model will help this to happen through all phases of delivery (planning, design, construction, activation, and ongoing monitoring and improvement).

The idea of ACE is to ensure the desired outcomes of a project are determined from the beginning, and that the appropriate pre, during and post evaluation and engagement occurs to inform and deliver these outcomes. Social factors become a big part of the picture given that infrastructure alone cannot solely support a broad uptake of cycling, but ACE can ensure that social factors inform the physical design and that the physical design supports the social outcomes.

It is recommended that guidance to support evaluation of cycle plans and projects is introduced in network management practices.

Recommendation

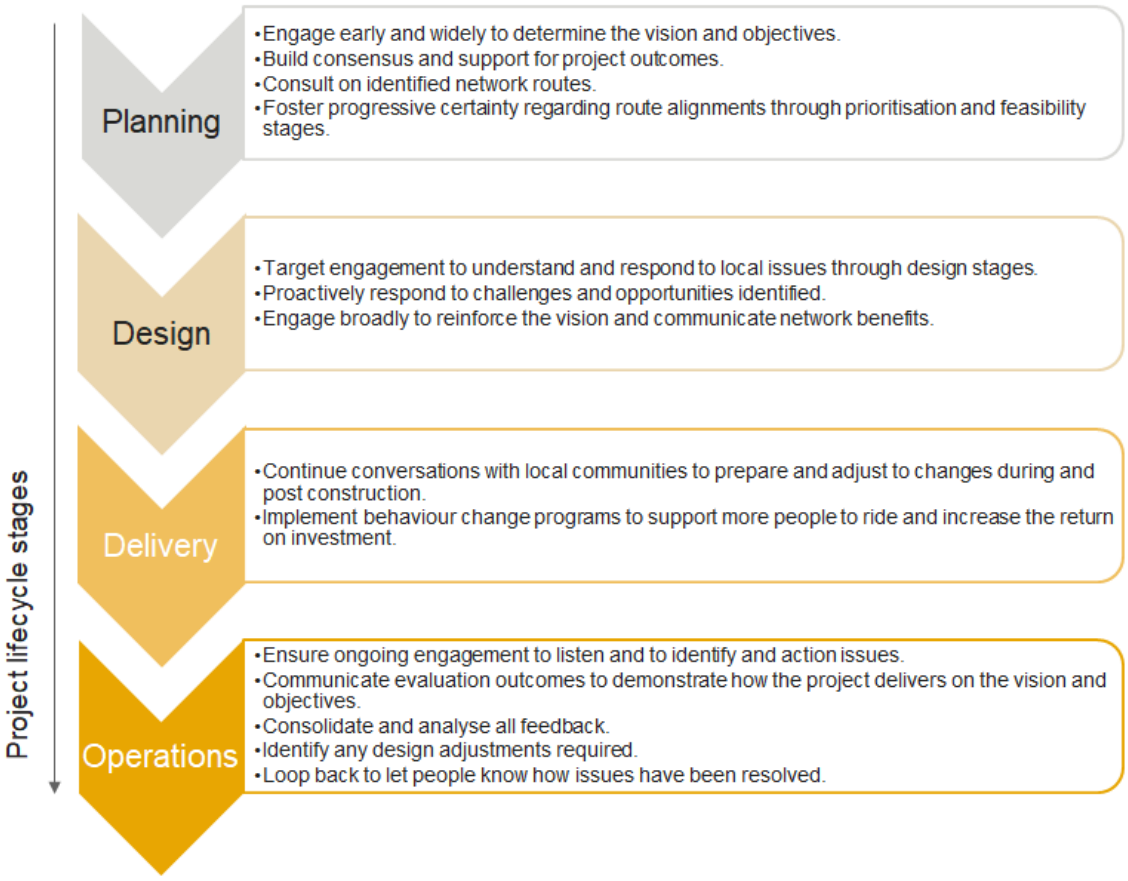
Collect and analyse cycling-related data both before and after installation.

6.4 Improved guidance on consultation and engagement techniques

Successful planning and implementation of cycling and micromobility initiatives must include community engagement and consultation. Engagement can take place throughout the project lifecycle, from the up-front planning to initial design stages, delivery and post-completion. The objective is to ensure that transport studies and subsequent interventions accurately reflect and address the current experiences and preferred outcomes of all road users within the transport network.

Recommended engagement strategies for each phase of the project lifecycle are shown in Figure 6.3. Recognising and addressing the specific worries of communities through engagement plans tailored to each project's particular situation guarantees that everyone is included. This approach helps a project meet the varied requirements and viewpoints of all affected parties.

Figure 6.3: Recommended approach to engagement at each stage of the project lifecycle



During the planning stage of project development, the aim is to facilitate a broad conversation with the community and stakeholders to determine and build consensus around the vision and objectives. This early engagement is focused on outcomes and longer-term benefits. The aim is to progressively establish and strengthen consensus in support of an agreed vision and longer-term outcomes. During the planning stage, project negotiables will be broader and will be used to inform the next stages of project development.

As the project proceeds to the design stages, the local impacts and benefits will become increasingly clear. Practitioners can now identify aspects of the project that may require trade-offs and at times will need to prepare for conversations with local community members who might be affected in some way, such as by parking changes. During these conversations, the aim is to listen and respond to community concerns while also protecting the integrity of the project design to ensure that it delivers on the vision and objectives. By the time the project progresses to detailed design, the project negotiables will become much more limited. However, conversations with community and stakeholders need to continue, and there is an opportunity to identify complementary actions to help those affected adjust to change.

During the delivery of the project, it is especially important to have effective, open and responsive communication channels. Operational impacts and changes such as rubbish collection, maintenance and other servicing must be identified and managed. During project delivery, proactive communications and behaviour change initiatives should be delivered to support and encourage people to consider using the new infrastructure upon its opening. This is further described in Section 6.5.

As the project opens to the public and becomes operational, it is critical to listen and respond to feedback from community and stakeholders. When a project impacts traffic patterns, it typically takes approximately 3 months for road users to become aware, react and adjust their behaviour. During this time, it should be anticipated that some people will object to the changes, and practitioners need to understand these concerns while reinforcing the project objectives and outcomes. Effective project evaluation will assist practitioners to communicate the project benefits (where they exist) during this often difficult period. A successful project needs to be adequately resourced, and staff need to be supported to manage feedback during the period of change. If a complaint identifies a design issue, such as a safety concern that requires an adjustment, this needs to be prioritised. Once the change is complete, it is important to communicate with the parties who complained so they know they have been heard and had a positive influence over the project.

It is also important to communicate with positive messages about the fact that the project is open, where it is located and how people can use it. This often requires a variety of media, including social media, websites and flyers. It may also benefit from having people on the ground to talk to the community about how the project could benefit them.

Successful planning for cycling and micromobility applies integrated community engagement and consultation as part of any transport study and analysis.

Recommendation

Engage with stakeholders authentically, early and often.

6.5 Supporting projects with behaviour change programs

The AGTM assists professionals in developing infrastructure projects. Evidence suggests that the outcomes from these infrastructure projects can be magnified by incorporating a behaviour change program.

Delivering a behaviour change program alongside the opening of new infrastructure will significantly increase the uptake of cycling on a new route, both in terms of the volume of riders and the diversity of people who use it. To make the most of infrastructure investments, the City of Sydney plans to invest up to 10% of the capital works cost in behaviour change programs.

Behaviour change programs are designed to encourage and support individuals through the decision-making process to ride a bicycle or micromobility device. A program may focus on promoting the new infrastructure to current riders, so they are aware of this addition and change their route choices accordingly. Alternatively, the program may focus on people who do not currently ride, or are not confident riding, to provide the support and encouragement they need to try riding again and improve their riding skills. For new infrastructure, it is likely that the behaviour change program will support both aims.

Well-designed behaviour change programs provide individuals with the awareness, skills and knowledge to ride, or to change their current habits and routines.

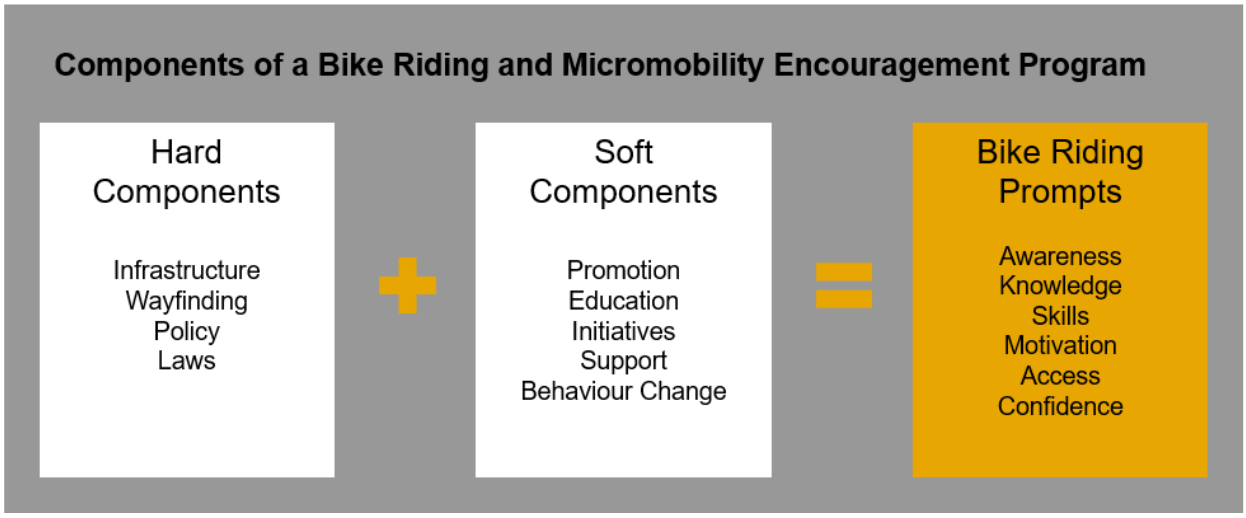
The motivation, opportunity and ability (MOA) behaviour change framework provides guiding principles to design integrated behaviour change programs. This framework helps to understand how infrastructure is best integrated with a behaviour change strategy. It is based on the following 3 components:

1. Motivation refers to the individual's internal desire to engage in a particular behaviour. Motivation can be influenced by factors such as personal goals, values, beliefs, attitudes and emotions. For behaviour change to occur, individuals need to perceive the behaviour as meaningful and beneficial. Regarding the decision to cycle, this might be an appreciation of personal health benefits, an individual's desire to reduce emissions or the desire to save time and money.
2. Opportunity relates to the environmental factors that enable a behaviour. Opportunity includes the physical and social environment, social norms, accessibility and available resources. Primarily, providing the opportunity for individuals to choose to cycle means providing a physical environment that delivers on the cycle planning principles. To accelerate uptake of cycling, behaviour change initiatives should also seek to influence social norms, which can be achieved through strategic communications and promotional campaigns.
3. Ability refers to an individual's capability to perform the behaviour. Ability includes the knowledge, skills and physical or cognitive abilities needed to carry out the behaviour. Enhancing an individual's ability through education and skills development improves their capacity to adopt the behaviour.

When all 3 factors align, the likelihood of people changing their behaviour to start cycling or cycle more often will increase. If any of these factors are absent, behaviour change is less likely. A behaviour change program that is integrated with infrastructure delivery (opportunity), provides opportunity to develop new skills (ability) and encourages people to ride by appealing to their values (motivation) will be most effective.

Figure 6.4 illustrates how this framework can be applied.

Figure 6.4: Bicycle riding encouragement guide



Source: Adapted from TMR (2018)

These components deliver on all 3 components of the MOA framework with safe infrastructure to provide the opportunity, promotion to build motivation and opportunities to develop individual skills and improve ability. This framework is recommended to be incorporated in AGTM network management planning.

Recommendation

Combine infrastructure delivery with behaviour change and activation initiatives.

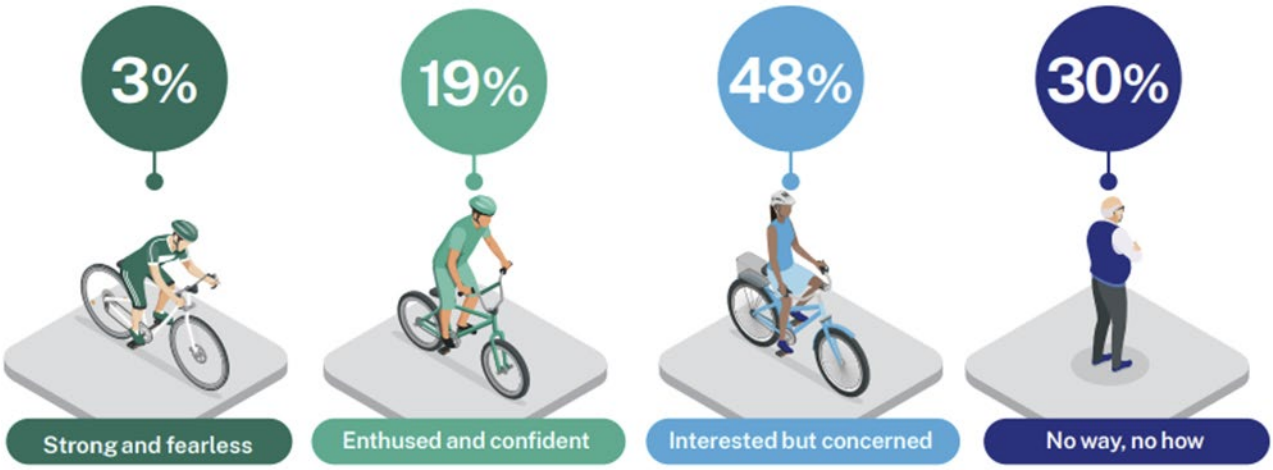
6.6 Planning for a variety of riders and the appropriate infrastructure – user typologies

Achieving substantial cycling and micromobility adoption requires infrastructure designed for a diverse community. This includes young children, seniors, individuals with disabilities or neurodiversity, and those carrying loads or using various vehicle types like tricycles, cargo bikes, e-bikes, scooters, and more. An inclusive approach, often termed 'all ages and abilities', caters to a broad spectrum of users and fosters a truly accessible and equitable transportation system.

The use of the Roger Geller typology of bicycle riders is established practice to understand the types of current and potential bicycle riders. The methodology has been replicated by Monash University (Pearson et al. 2022) and Cycling and Walking Australia and New Zealand (CWANZ) in its biennial survey (CWANZ 2023). The typology has been further studied in relation to infrastructure treatments by the 'near-market' cycling infrastructure study (CDM Research and ASDF Research 2017).

Figure 6.5 illustrates the Geller typology of bicycle riders.

Figure 6.5: Understanding different types of riders – Geller typology of riders



Source: TfNSW (2020).

The Geller typology helps inform design by the understanding that most people will not choose to cycle without continuous infrastructure because of low levels of confidence sharing space with traffic. Cycling infrastructure designed for all ages and abilities serves all potential riders but should primarily provide for people who are interested in cycling but may not yet be doing so.

The Napper cycling typology (Napper 2023) identifies 6 journey types for cycling: commute, tasks and errands, work, passenger, recreation and sport (see Figure 6.6 below). The typology recognises that people make trips for different purposes. Catering for a variety of trip types is not currently reflected in transport decision-making, which has a focus on planning for commuting. This presents a transport policy gap. Transport planning and engineering practice require better recognition of the different types of cycling trips people make in their daily lives, aside from commuting, so that higher rates of cycling can be achieved.

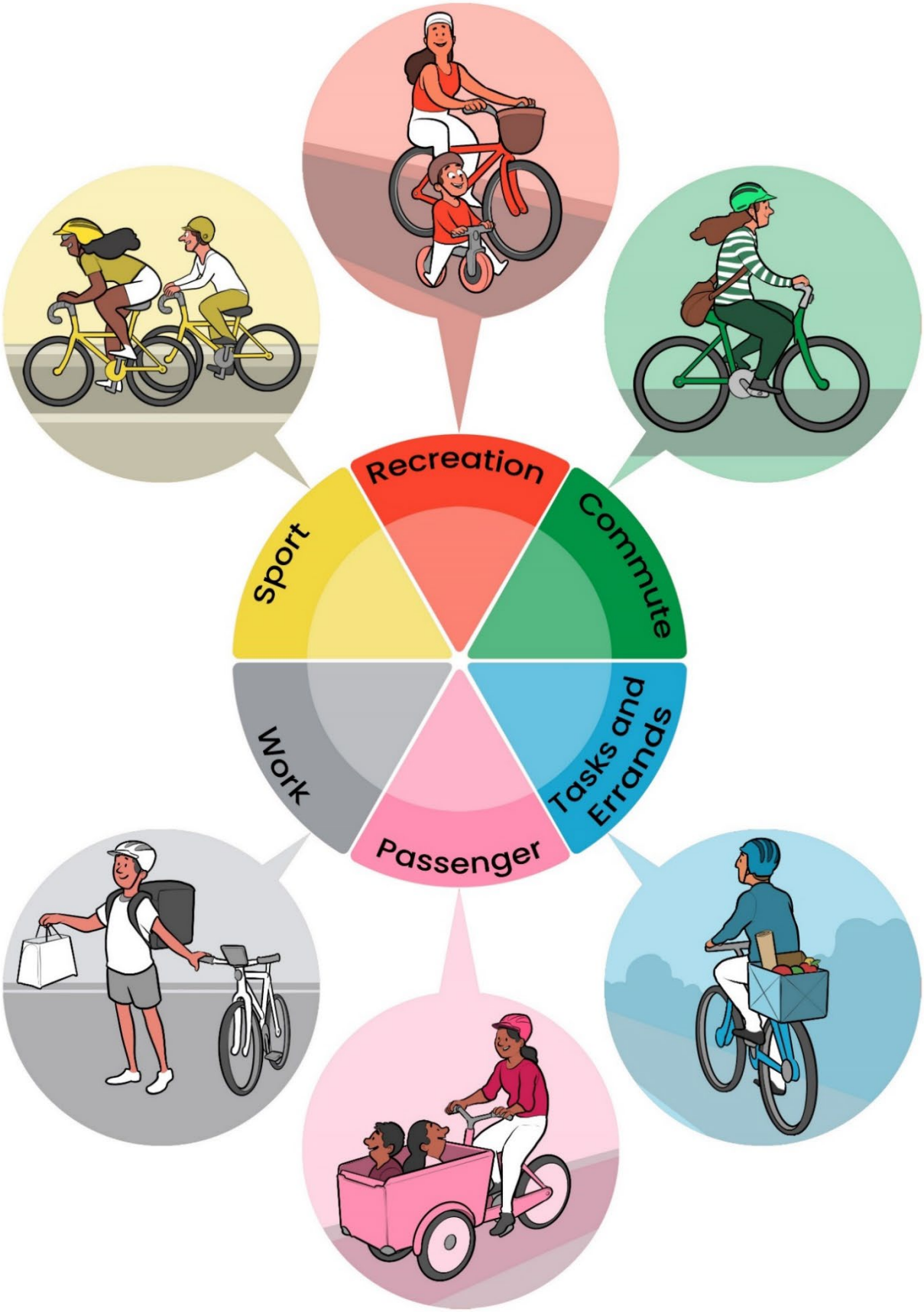
Census journey to work data as the main indicator of a modal split for any given geographical area does not provide a full picture of transport modal habits.

Factoring in the different trip purposes shown in the Napper typology into transport decision-making processes may help create a bicycle transport network that can cater for the variety of user needs within cycling and achieve a greater take-up of cycling. All 6 of the Napper journey types should be considered when designing cycling infrastructure so that better safety outcomes and mode shift aspirations can be achieved.

Recommendation

Assess which user types are being targeted to use the facility and design appropriately.

Figure 6.6: Understanding different trip purposes – Napper cycling typology



Source: Napper (2023).

6.7 Increased use and application of a Cycling Level of Service tool

Level of service (LOS) in transport planning is a tool to rank the extent to which infrastructure services the needs of users.

The current guidance includes a LOS framework for pedestrians and bicycle riders, but the actual guidance for its application is limited and does not align with the cycle network principles. Without more direct and specific guidance to apply LOS analysis, its adoption in practice is likely to be limited. Austroads' Level of Service Metrics (for Network Operations Planning) included level of service metrics for cycling (Austroads 2015). However, the review of the AGTM identified the need for updated guidance on level of service for cycle routes to ensure identified cycle routes provide a consistently high standard of service for bicycles.

The Cycling Level of Service (CLoS) tool is used to assess the quality of cycling infrastructure. The tool helps to understand how comfortable, safe and direct cycling is on a particular route or network. Governments and transport agencies including Transport for NSW, the Queensland Department of Transport and Main Roads and the UK Department of Transport use the CLoS tool to evaluate and improve cycling conditions by considering factors such as path widths, surface quality, traffic volume and perceived safety (CDM Research 2013; TfNSW 2020 and DfT 2020). They apply CLoS to ensure that cycling infrastructure meets certain standards to encourage more people to cycle by providing safer and more comfortable routes. In some cases, CLoS has been closely linked to planning frameworks such as 'Movement and Place'. It is also worthwhile considering the CLoS assessment in the context of the cycle network planning and design principles.

The CLoS approach adopted by the NSW Cycleway Design Toolbox (TfNSW 2020) and the UK Government's Cycle Infrastructure Design, Local Transport Note (LTN) 1/20 (DfT 2020) is specifically tailored to align with the principles of planning and designing infrastructure for all ages and abilities. This approach takes into account safety and accessibility, ensuring that the infrastructure caters to a wide range of riders, including children and less confident riders. It prioritises the safety, comfort and attractiveness of use for all riders, promoting and encouraging more people to cycle.

The UK's LTN 1/20 CLoS tool (DfT 2020) stands out for its comprehensive nature and user-friendly approach. It employs a straightforward scoring system based on the key attributes crucial for planning and designing cycling facilities. The simplicity makes it accessible to a wide range of practitioners, especially in organisations or teams with limited planning and design resources. The tool can be used as a standalone assessment and can demonstrate to users how best practice is achieved. Similarly, it can act as a benchmarking or monitoring and evaluation tool by working towards limiting 'zero' scores and highlighting where improvements can be made. Stakeholder consultation found that the UK version of the tool is already starting to be used across Australia and New Zealand. For these reasons, a version of this tool adapted to the Australia and New Zealand context is recommended for the update of the AGTM. It should also be considered in future revisions of the AGRD as it spans both planning and design elements.

The CLoS tool breaks down the 6 cycling planning and design principles into a set of different factors. These factors are all assigned an indicator that enables assessment of the proposed cycling route according to the guiding principles. Each indicator is attributed a scoring scale of 0, 1 or 2. Zero scores should be considered as failing to meet the expected standard of service for the indicator. A zero score should be perceived as a need to reconsider whether this design factor will reduce the likelihood of people cycling on the proposed route. Furthermore, the tool includes several 'critical' indicators. Given the importance of these indicators to achieving a cycle route that meets the key cycling planning and design principles, they have increased score weightings. For indicators with a critical rating, scores are multiplied by 3 (Red = 0 points, Amber = 3, Green = 6). The CLoS tool includes a variety of factors which may not be applicable to all routes throughout the planning process. Depending on the route that is being designed, some factors may need to be prioritised over others due to relevance to the site-specific context.

Figure 6.7 provides a snapshot of the adapted version of the CLoS tool. A full version of the tool is provided in Appendix A. The CLoS tool can be downloaded from the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure 6.7: Snapshot of Cycling Level of Service (CLoS) tool

Key Requirement	Factor	Principle Explanation	Indicators	Critical*	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Cohesion	Connections	Riders should be able to easily and safely join and navigate along different sections of the same route and between different routes in the network.	1. Ability to join/leave route safely and easily: consider left and right turns.		Riders cannot connect to other routes without dismounting.	Riders can connect to other routes with minimal navigation disruption to their journey.	Riders have dedicated connections to other routes provided, with no interruption to their journey.		
	Continuity and Wayfinding	Routes should be complete with no gaps in provision. 'End of route' signs should not be installed – riders should be shown how the route continues. Riders should not be 'abandoned', particularly at intersections where provision may be required to ensure safe crossing movements.	2. Provision for riders throughout the whole length of the route.		Riders are abandoned at points along the route with no obvious way to continue their journey.	Riders can clearly understand how to navigate through sections and intersections.	Riders are provided with a continuous route, including through intersections.		
	Density of network	Cycle networks should provide a mesh (or grid) of routes across the town or city. The density of the network is the distance between the routes which make up the grid pattern. The ultimate aim should be a network with a mesh width of 250m.	3. Density of routes based on mesh width i.e. distances between primary and secondary routes within the network.		Route contributes to a network density mesh width >500m.	Route contributes to a network density mesh width 250 – 500m.	Route contributes to a network density mesh width <250m.		
Directness	Distance	Routes should follow the shortest option available and be as near to the 'as-the-crow-flies' distance as possible.	4. Deviation of route Deviation Factor is calculated by dividing the actual distance along the route by the straight line (crow-fly) distance, or shortest road alternative.		Deviation factor against straight line or shortest road alternative >1.4.	Deviation factor against straight line or shortest road alternative 1.2 – 1.4.	Based on an average speed of 15kph, travel time should not be impacted by 10%.		
	Time: Frequency of required stops or give ways	The number of times a rider has to stop or loses right of way on a route should be minimised. This includes side roads, and commercial access points.	5. Stopping and give way frequency.		The number of stops or give ways on the route is more than 4 per km.	The number of stops or give ways on the route is between 2 – 4 per km.	The number of stops or give ways on the route is less than 2 per km.		

Source: Adapted from the UK Cycle Infrastructure Design LTN 1/20 (DfT 2020)

Recommendation

Incorporate the use of the CLoS tool when planning and designing for cycling.

6.8 Road space requirements for bicycles and micromobility riders – an all ages and abilities cycle facility selection tool

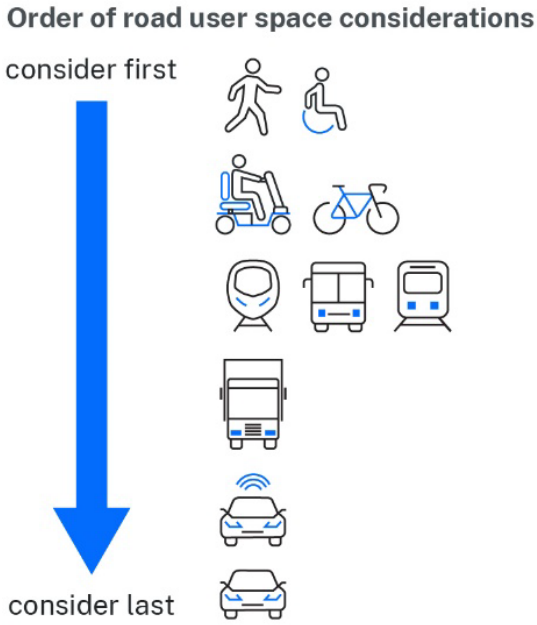
The allocation of road space is an important consideration when planning and designing for cycling infrastructure. The current link management guidance in the AGTM provides a summary of road space requirements for bicycles, but it does not consider the practical layouts of road space based on establishing equitable allocation of space for all modes and users. There is also a gap in guidance on the allocation of space for cycling for all ages and riding abilities.

While the current trend is for road space to be allocated toward motor vehicles (both lanes for moving traffic and for parking vehicles), this can often leave little room for safe, separated cycleway infrastructure. In almost all instances, planning for on-road cycleways requires trade-offs of road space allocation between modes of travel.

The current trend of road space allocation can cause barriers to achieving common policy objectives of increasing cycling take-up. It is important to have community engagement, education about the benefits of cycling and trialling of projects to demonstrate effectiveness (as discussed in Sections 6.1 and 6.4) when pursuing cycling projects that involve road space reallocation.

Planning frameworks and polices, such as Movement and Place and the NSW Road User Space Allocation Policy and Procedure (TfNSW 2021a, 2021b), can also help practitioners advocate for, and justify, the reallocation of road space based on context-specific requirements. These are policy implementation tools to help order road user space considerations and influence change, as illustrated in .

Figure 6.8: Order of considerations for allocating space for road users



Source: TfNSW Road User Space Allocation Policy and Procedure (TfNSW 2021a, 2021b).

NZ Transport Agency Waka Kotahi has published a road space allocation toolbox that supports their cycle network planning process (NZTA 2023b). The toolbox highlights several techniques to obtain space for cycles such as rearranging roadway space, trading corridor space, finding space elsewhere and parking management techniques. The guidance notes that, in different contexts such as busy traffic routes, facilities suitable to an interested but concerned target audience generally require more space than those targeted at enthused and confident riders, due to the degree of separation from motor traffic the former group requires.

Table 6.4 introduces considerations for the reallocation of road space for cycles, summarised and adapted from the NZTA road space allocation toolbox (NZTA 2023b).

Table 6.4: Road space reallocation techniques

Road space reallocation techniques	
Rearranging road carriageway space	
Adjust general traffic lane positions or widths	Traffic lanes can be narrowed to cater for cycling facilities. This may be separated facilities or riders sharing lanes with drivers. The latter must be considered in parallel with a low-speed environment (30 km/h or less). Narrowing traffic lanes supports traffic calming and the reduction of signposted travel speeds.
Reduce the width of the median to widen carriageway	Consider why the median was installed in the first place. If the objective was to achieve narrower traffic lanes, this will be achieved through allocating space to cycling facilities. If the objective was to increase the separation between traffic in opposing directions and reduce the risk of head-on crashes, it must be considered how this risk compares to the safety advantages of installing facilities for cycling. The speed-calming effects of narrower lanes may also help reduce the risk of head-on crashes.
Remove a traffic lane	It may be possible to consolidate the number of traffic lanes if there is excess road capacity. This may be achieved alongside other measures aimed at reducing volumes.
Close the road to specific or all motor vehicle movements	Providing for fewer movements will simplify the requirements for road space. This is especially relevant at intersections and side roads, which have flow-on effects to the type of provision between intersections. Key questions to consider include: • Are all current movements really needed? • Can some movements be provided for elsewhere on the network? Answers to these questions may change over time. When establishing new cycle routes (as a response to elevating the status of cycling along a particular corridor), it may be appropriate to diminish the level of provision to other modes.
Allow contraflow cycling	Introducing a contraflow cycle facility on a one-way street may be an alternative to installing a facility on an adjacent road.
Temporary treatments	Temporal allocation of road spaces aims to optimise how space is allocated throughout the day, week or year. This includes the dynamic control of space, access, level of priority, speed and kerbside use through signage, signals and other technology.
Trading corridor space	
Seek opportunities to remove car parking to facilitate space for protected cycling lanes	Parking can be removed from one side or both sides of the road, depending on the local context.
Seek opportunities within the existing verges to reallocate parking and provide carriageway space for riders	Providing inset parking can facilitate the provision of painted or buffered cycling lanes. Take care to ensure this does not compromise pedestrian level of service or has an adverse effect on the surrounding environment, especially those that contribute to reducing the heat island effect.
Seek opportunities to narrow the existing verge to facilitate space for protected cycling lanes	Ensure this does not compromise pedestrian level of service or has an adverse effect on the surrounding environment, especially those that contribute to reducing the heat island effect.
Seek opportunities to manage car parking to facilitate space for cycling	Timed parking restrictions can be put in place to provide peak hour clearways for cycling. A painted or buffered cycle lane should be provided outside of peak hours to ensure a basic level of service is still provided for riders.
Seal road shoulders	Suburban and rural road bicycle rider groups appreciate the additional space from sealed shoulders provided the surface is smooth and kept free of debris. This is not a suitable consideration for less confident riders, such as the interested but concerned target audience.
Finding space elsewhere	
Off-road route	If a desired facility cannot be accommodated on the road, an off-road facility may be a viable alternative if it has a high standard of design, construction and maintenance and it can limit conflict with other road users, such as people walking (the preference is for separated paths). In some cases, off-road facilities may be more desirable than on-road routes, especially where they provide safer and more direct connections, for example, routes through parks or away from high-speed roads. Off-road facilities are generally perceived as suitable for all ages and rider abilities.

As part of the road space allocation, consideration should be given to ensuring the right cycling facilities are provided for the right road environment, and that they cater for those who will use them. A cycling facility selection tool that could be adopted is the UK Government's LTN 1/20 (DfT 2020) and the Irish National Transport Authority's *Cycle Design Manual* (NTA 2023) shown in Figure 6.9 (and provided in Appendix B). This is an easy-to-use tool that can be adopted independently or in conjunction with planning frameworks such as Movement and Place, if available. It clearly sets out that some provisions may be more suitable than others, depending on the local context, traffic speed and who is intended to use the facility. This tool could be considered for future updates to the AGTM and the AGRD, with adaptations to suit the Australian and New Zealand context. The 'All ages and abilities cycle selection tool' can also be accessed on the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure 6.9: All ages and abilities cycle selection tool

Speed Limit[1]	Two-way traffic flow (peak hour pcus)	Off-road cycle track	Raised cycle track adjacent to kerb	On-road Protected Cycle Lane	Painted Cycle Lane	Mixed Traffic
20 km/h	< 200					
	200-400					
	> 400					
30 km/h	< 200					
	200-400					
	> 400					
40 km/h	< 200					
	200-400					
	> 400					
50 km/h	< 200					
	200 - 400					
	> 400					
60 km/h	Any					
≥ 80 km/h	Any	*				

Provision should be suitable for most users.

Provision is not suitable for all ages and abilities, and will exclude some users.

Provision not recommended because it will not be suitable for most users.

Provision not suitable.

Notes:

1. If the 85th percentile motor traffic speed data is recorded/available and is more than 10% above the speed limit, the next highest speed limit should be

* Assumes adequate buffer from general traffic.

Source: Adapted from the Irish Cycle Design Manual (NTA 2023)

Recommendation:

Use road space allocation techniques to ensure sufficient riding space and comfort for people of all ages and abilities.

6.9 Addressing conflict between people walking and cycling

Guidance on managing interactions between people riding and people walking is limited, particularly for locations where the different user groups merge or share points and spaces. There is currently no discussion on the appropriateness of shared paths with consideration of emerging micromobility. Updates to link management guidance should consider these issues.

The issue of shared paths accommodating, for example, people walking, cycling and riding e-scooters, is multifaceted. Conflict may arise due to differences in speed, behaviours and safety concerns among users. There is a growing rationale against shared paths as a preferred treatment. Key considerations include:

- Safety concerns: Users have varying speeds and behaviours. Pedestrians move at a slower pace, while bicycles and micromobility devices tend to move faster. This speed discrepancy can lead to accidents and conflicts, posing safety risks for all users.
- User experience: Shared paths may discourage some users, particularly vulnerable user groups such as visually impaired people, from utilising these paths due to perceived or actual safety concerns. If the vision is to achieve high volumes of people cycling and walking, then the facility needs to be fit for purpose. Providing facilities for all intended users and reducing conflict should be the goal.
- User preference: Bicycle and micromobility users are likely to prefer dedicated lanes or paths that allow them to move at their preferred speeds without the need to constantly navigate around pedestrians. This preference aligns with the cycle planning principles.

These key factors are supported by evidence from a range of sources including Victoria Walks (2015), TMR Queensland (TMR 2020a), the UK (DfT 2020) and NACTO (2023).

In urban areas, it is recommended that well-designed, separated facilities should be delivered. Where this is not feasible, a shared path may be considered. Shared paths should be planned and implemented for futureproofing; if volumes become large, separation between people walking and cycling may need to occur. Futureproofing may include widths that can later accommodate separated walking and cycling facilities.

In regional areas, a well-constructed shared path designed to meet cycle traffic needs (including for width, alignment and treatment on side roads and intersections) may be adequate due to limited growth and a lack of future conflict between people walking and cycling.

Other examples where well-designed shared paths may be adequate include:

- alongside regional and arterial roads where there a few pedestrians
- other off-road trails, including river, rail or coastal trails
- at a roundabout or intersection where bicycles are generally moving at a slow speed
- in situations where a length of shared path may be acceptable to achieve direct and continuous cycle routes
- in situations where high cycle and high walking flows occur at different times.

The decision on whether a shared path is appropriate or not will be driven by the local context. The following factors may help in the planning and use of shared or separated facilities:

- Volume and speed analysis: Assessing the volume of different users and their typical speeds can help determine whether shared paths would be viable or if separate infrastructure is necessary.
- User behaviour and conflict points: Studying the behaviours of different user groups at intersections or merge points can highlight potential conflict areas. If conflicts are frequent or pose safety risks, dedicated paths might be more suitable.
- User surveys and feedback: Gathering input from users about their experience, preferences and safety concerns can provide invaluable insights into the practicality and effectiveness of shared paths.

The recommended minimum width of a shared path will need to be revised in the AGRD to a least 3 m (ideally wider) based on the proposed recommendation to update shared path guidance in the AGTM (see Table 8.1).

Recommendation:

Consider managing and mitigating user conflicts when designing the path network – shared paths should not be the default option.

6.10 Improved focus on safety and priority at intersections

6.10.1 Intersections and crossings

Safety and ease of access is paramount at intersections, interchanges and crossings for people riding bicycles and micromobility devices. Intersections are high-risk areas for bicycles and micromobility due to the complex traffic movements, multiple conflict points and interactions between various modes of transport. Bicyclists and micromobility users are more vulnerable at intersections due to their smaller size, lower visibility and differing speeds compared to motor vehicles. They need specialised considerations to navigate these spaces safely.

Enhancing safety at intersections can significantly reduce the likelihood of collisions and accidents involving riders, promoting overall road safety for all road users. Planning and designing intersections and crossings with safe and direct routes ensure inclusivity for people of all ages and riding abilities and encourage more people to choose these modes of transport.

With that in mind, the process of selecting an appropriate intersection type for safe cycling and micromobility should be aligned with planning and design principles. The selection of intersection treatments for bicycles and micromobility needs to be better integrated with planning intersections for general traffic, not a standalone consideration as reflected in current guidance. This includes planning for new intersections and retrofitting existing intersections.

Nationally, guidance has emerged to support better planning of intersections for cycling. VicRoads (now the Department of Transport and Planning in Victoria) published *Design Guidance for Strategically Important Cycling Corridors* (VicRoads 2016), which provides consideration for intersection treatments, predominantly drawing on guidance from the AGRD. The NZ Transport Agency Waka Kotahi provides guidance on cycle route intersections and crossing treatments (NZTA n.d.). Internationally recognised guidance includes NACTO's *Don't Give Up at the Intersection – Designing for All Ages and Ability Bicycle Crossings* (NACTO 2019). Current planning guidance is often closely linked to the design elements of intersections and crossings.

The UK Department for Transport provides clear guidance on the planning of intersections and crossings. The Local Transport Note 1/20 (DfT 2020) links the planning of intersections and crossings to the 6 cycle planning principles. To continue the narrative of adopting consistent planning principles throughout the AGTM, it is therefore recommended the UK guidance be considered in future updates.

Table 6.5 shows the application of the planning and design principles to intersections and crossings, adapted from the UK Department for Transport (DfT 2020).

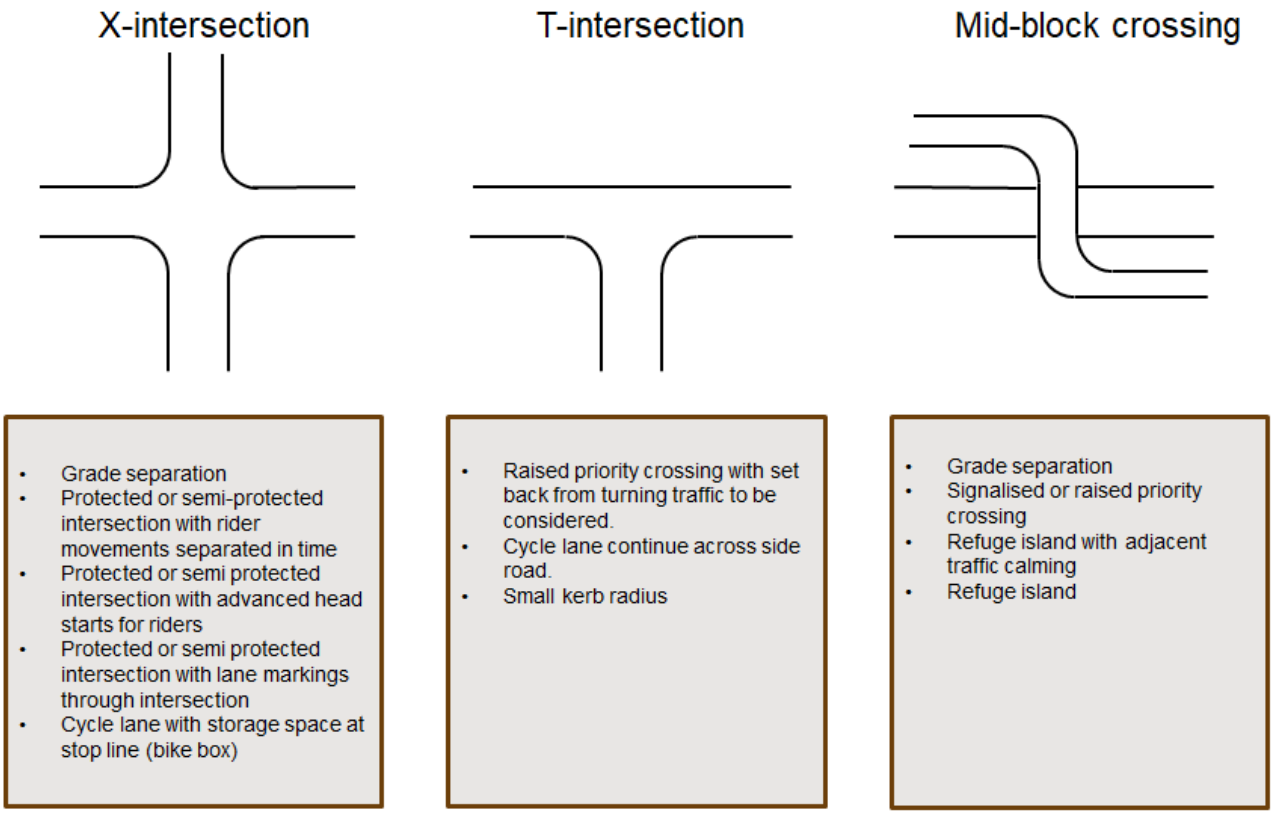
Table 6.5: Application of planning and design principles to intersections and crossings

Principle	Planning and design considerations
Safety	Where possible, ensure stakeholders who are focused on safety are central to decision-making. Language shifts are required to focus on the safety benefits and away from intersection performance. Utilising a Safe System approach, intersections should be planned and designed to minimise conflict between bicycles, pedestrians and vehicle traffic. A hierarchy of treatments should be considered during decision-making. The following should be considered in order of importance: • Consider a protected intersection (see case study 7.5) • Provide a dedicated signalised crossing phase for riders. • Provide an early release for riders at intersections. • Provide an unsignalised priority crossing for cycles. • Reduce vehicle traffic movements. • Reduce the speed or volume of motor vehicles so cycles can safely integrate with them. • If collisions do occur, the impacts are minimised as much as possible by, for example, building out kerbs to produce tighter swept paths and reduced speeds.
Direct	The distance and time for riders to travel through intersections should be minimised. The level of delays for riders should be less than for motor traffic but without increasing delays for people walking, where possible. Exempting bicycles from turning movements that are banned for other vehicles will significantly increase directness.
Connected	Use continuous bicycle lanes through unsignalised intersections where feasible. Provide green surfacing for bicycle lanes through hazardous areas or complex situations. If practicable, reallocate road space used by other road users or for other purposes to achieve bicycle lane continuity.
Comfort	Minimise the occasions when bicycle riders need to stop or give way. Provide dedicated phasing with sufficient crossing time for bicycle riders while holding turning traffic. Provide a refuge island that caters for diverse bicycle riders, with footrests and balancing aids where appropriate.
Attractive	Intersections can often have high volumes of vehicle traffic. Where possible, provide cycle stopping space away from vehicles and closer to pedestrian waiting areas. Consider greening and shade at intersections. Consider adequate lighting for visibility at night.

Source: Adapted from LTN 1/20 (DfT 2020)

Stakeholder feedback revealed a need for improved guidance on the hierarchy of intersection treatments for riders. Depending on the intersection type, certain treatments may favour riders more than others. Figure 6.10 provides an overview of intersection treatments that correlate to different intersection types.

Figure 6.10: Cycle treatment considerations for different intersection types



Note: Visibility assessments should always be undertaken when selecting a crossing treatment.

It is vital to select the most appropriate design solution to achieve the best outcomes for active transport users. Priority for bicycle riders at crossings will vary depending on the context. The selection of crossing type requires consideration of site-specific factors that should be assessed by a design practitioner. As a starting point, Figure 6.11 illustrates a cycling crossing suitability guide for different contexts, with speed limits as the key determining factor (see also Appendix C). This tool could be considered for adoption in the Austroads Guides. The 'Crossing Selection Guide' can also be accessed on the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure 6.11: Crossing selection guide

Speed Limit[1]	Two-way traffic flow (peak hour pcus)	At-grade Cycle Priority Crossing*	Uncontrolled Crossing*	Raised Priority Crossing*	Signal-controlled Crossing	Grade-separated Crossing
30 km/h	< 200		**			
	Any		**			
40 km/h	Any		**			
50 km/h	< 200		**			
	200-400		***			
	> 400					
60 km/h	< 200					
80 km/h	Any					
> 80 km/h	Any					

Provision should be suitable for most users.

Provision is not suitable for all ages and abilities, and will exclude some users.

Provision not recommended because it will not be suitable for most users.

Provision not suitable.

Notes:

1. If the 85th percentile motor traffic speed data is recorded/available and is more than 10% above the speed limit, the next highest speed limit should be applie

* Provision not recommended where more than one traffic lane per direction is needed to be crossed

** Consider providing a refuge island or kerb extensions if a priority crossing is not feasible and the road width is suitable

*** Refuge island recommended if a raised priority crossing is not feasible, and the road width is suitable

Source: Adapted from the Irish Cycle Design Manual (NTA 2023)

Recommendation:

Provide increased priority for bicycles and micromobility at intersections and crossings.

6.10.2 Roundabouts

The current design standard for roundabouts in Australia often fails to appeal to a wide range of the cycling population. Many perceive roundabouts as challenging to navigate safely and comfortably, and this is exacerbated by road rules that require riders in the roundabout to stop and give way to any vehicle exiting. In contrast, the Dutch design of roundabouts presents a very different approach. These roundabouts feature separate lanes for pedestrians, bike riders and drivers, ensuring each user type has a distinct and easily understandable path with clear right-of-way rules.

Separated bicycle facilities should be encouraged on single lane roundabouts; however, this must be accompanied by measures to reduce entry, exit and circulating speeds within the roundabout. When spatial limitations hinder the addition of separated facilities, it becomes imperative to implement measures that reduce entry speeds and allow riders to merge safely into traffic.

In urban environments, granting roundabout priority to bicycle and micromobility riders or restricting vehicle entry and circulating speeds to 20–30 km/h can significantly enhance safety (Campbell et al. 2005).

Unless grade separation or signalised crossings can be provided, a facility for people to leave the roundabout should be provided and any crossing of the roundabout should be uncontrolled unless a single entry or exit is in place.

Well-designed roundabouts can offer advantages over signalised intersections, particularly when riders can maintain continuous movement. Well-designed roundabouts often include:

- raised crossing platforms and distinct line marking to heighten awareness
- prioritised, continuous and separated bicycle paths around the roundabout
- enforced lower vehicle traffic speeds.

Grade-separated cycling and pedestrian facilities at roundabouts should be considered in areas with high levels of walking and cycling activities or where traffic volumes and speeds are elevated. This approach aims to ensure riders have safe and connected routes while navigating roundabouts.

Recommendation:

Consider entry treatments and/or grade separation for people riding when designing roundabouts.

6.11 Inclusion of private and shared micromobility in activity centres

Encouraging the movement of people over vehicular traffic is critical for successful activity centres. Shared and private micromobility is becoming an increasingly important part of the way people access community destinations. Currently, the AGTM does not mention micromobility, not least because it is an emerging theme in transport planning. However, the use of shared and private micromobility is expected to increase over time and their inclusion within activity centres must therefore be considered at the planning stage or during any redevelopment.

Important considerations for determining likely movement considerations of cycling and micromobility within existing or newly proposed activity centres include understanding:

- Cycle planning principles (see Figure 5.1)
- User types (see Figure 5.2)
- Types of vehicles that are likely to be encountered (see Figure 5.3)
- Journey purposes (see Figure 6.6)
- Potential for conflicts with other people or transport modes (see Section 6.9).

Once bicycles and micromobility vehicles have arrived in a centre, they are likely to require somewhere to park. Well-planned cycle and micromobility parking facilities can strengthen visual amenity and minimise obstruction to bicycle and micromobility users. Considerations relating to parking provision for private micromobility devices and bicycles in activity centres should be updated to include charging facilities and wayfinding signage, particularly regarding the likely ultimate destination(s), and the safety, security and visibility of parked micromobility devices and cycles.

Parking provision should also cater for vehicles of varying sizes, particularly where delivery by cargo bikes is a likelihood. For example, spaces should accommodate ride-in-and-out in a forward motion.

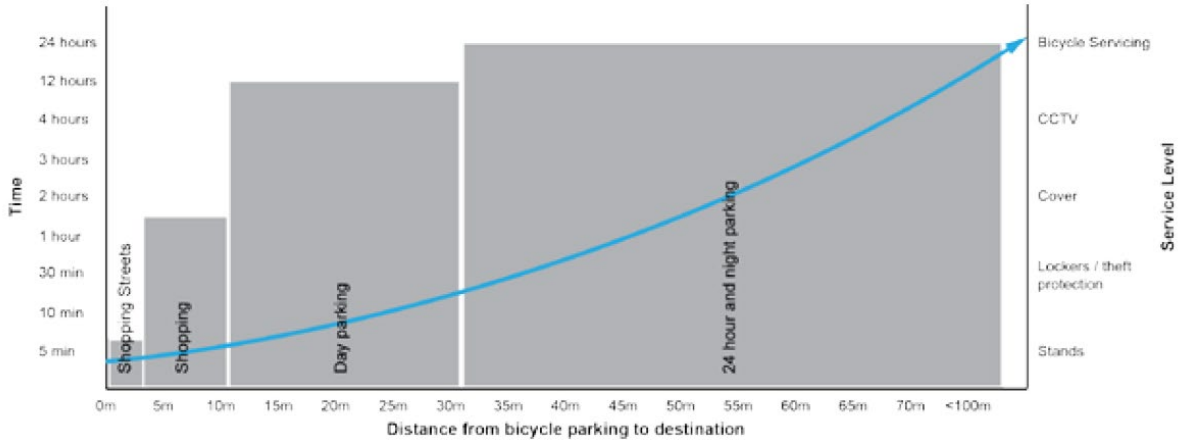
Consideration of whether road space can be reallocated to parking may also be useful, particularly where footpath space is at a premium. It also demonstrates the priority of movement for people using active transport over car-based modes in activity centres, which have a high place function.

Addressing these issues will reduce the likelihood of bicycles and micromobility devices causing an obstruction to other users by parking in undesirable locations.

More work is required to determine how to incorporate micromobility with cycling in relation to parking ratios.

Figure 6.12 and Figure 6.13 below provide useful information from UK guidance regarding the distance of cycle and micromobility parking. Further information relating to micromobility parking hubs is provided in Section 6.14.

Figure 6.12: Relationship between cycle parking duration of stay, location, and ancillary facilities



Source: Cycle Infrastructure Design (DfT 2020)

Figure 6.12 shows how the expected service level of cycle and micromobility parking increases with the length of time of parking. For short stay parking, access and convenience are important to users (for example, access to bicycle parking facilities outside a shop). As the duration of parking increases to whole day parking or longer, the importance of security increases and becomes the main consideration of users. When planning and designing parking facilities, these factors need to be considered.

Figure 6.13: Recommended and minimum dimensions for banks of bicycle hoops

	Recommended	Minimum
Bay length (length of cycle parked on a stand)	2m	2m
Bay length (tandems, trailers and accessible cycles)	3.0m	2.5m
Access aisle width (if larger cycles use the end bay only)	3m	1.8m
Access aisle width (if large cycles use internal bays)	4m	3m
Edge access aisle + one bay to the side	5m-6m	3.8m-5m
Central access aisle + one bay to each side	7m-8m	5.8m-7m
Spacing between stands	1.2m	1.0m
Gap between stand and wall (part of bay width)	700mm (typical wheel diameter)	500mm

Source: Cycle Infrastructure Design (DfT 2020)

Figure 6.13 shows a breakdown of the design factors for bicycle hoop racks. The dimensions consider the need to accommodate the increasing variety of cycle and micromobility devices and ensure the parking facility remains accessible to all users.

The implementation of any infrastructure that relates to cycling and micromobility (particularly where it has been retrofitted into existing activity centres) will benefit from application of the Activation, Consultation and Evaluation (ACE) model. Section 7.2 provides more details on its benefits.

Recommendation:

Provide parking and infrastructure for micromobility in activity centres based on cycle planning principles and diverse vehicle dimensions.

6.12 Local street treatment priorities for cycling and micromobility

Considerations for bicycle riders and micromobility users on local streets need to be revised within the AGTM. The update needs to reflect a clearer understanding of the role local streets can play in the cycle network and what treatments should be considered in favour of others in the context of cycling safety, comfort and connectivity.

Local streets can play a key role in supporting the wider cycling network and strategic cycling corridors by providing improved connections and accessibility for riders. They can complement strategic cycling corridors by offering alternative routes and catering for different preferences and destinations. For example, they can provide increased opportunities to connect residential areas to local shops, schools, parks and other daily destinations. By facilitating direct access to these places, they can encourage shorter trips to be completed by cycling and reduce dependency on cars for everyday needs.

Local streets are often characterised by lower speeds and different transport dynamics compared with main roads. In the local street context, the emphasis should shift towards creating a safer shared space for various modes of transport, including bicycles and people walking.

Best practice for cycling and micromobility safety on local streets is to remove or significantly limit vehicle access to the street. Measures such as road closures and modal filters can help achieve this objective. Where removal of access for all vehicles is not possible, traffic should be limited to local vehicle access only. This outcome can be achieved by adopting low-traffic neighbourhood principles to prevent rat-running. A lesser alternative is to reduce traffic volume and speeds through traffic-calming measures (such as vertical deflections, horizontal shifts and roadway narrowing (Institute of Transportation Engineers n.d.). Lower speeds such as 30km/h speed limits have been tried, tested and evaluated to show an increase in the safety and comfort for bicycle riders. Holistic planning approaches such as ‘Complete Streets’ and ‘Healthy Streets’ have been successful in prioritising bicycle riders of all ages and abilities in local streets in Australia and New Zealand, as well as in the United Kingdom and the United States.

Table 6.6 shows the local street priority treatment options for improved cycling safety.

Table 6.6: Local streets cycle priority treatment options

	Planning considerations	Design solution
Most preferred	Removal of vehicle traffic.	Road or partial road closure.
	Traffic speed reduction.	Reduce speed limits and use modal filters.
	Traffic volume reduction.	Traffic calming and modal filters.
	Removal of car parking.	Remove/minimise on-street parking.
	Intersection treatment or hazard treatments.	Localised set back crossing points.
	Reallocation of carriageway space.	Protected or painted cycle lane.
Least preferred	Cycle tracks away from roads.	Off-road facilities.
	Shared use paths for pedestrians and cycles.	Conversion of footpaths to shared use.

Recommendation:

Incorporate traffic reducing or calming measures on local streets to prioritise cycling and micromobility.

6.13 Planning for bicycle wayfinding and signage

Wayfinding is vital to realising an attractive, comfortable and connected cycling network. The provision of clear, frequent, well placed and easy to understand directional signage improves the bicycle rider experience, especially for new riders who may lack confidence when navigating by bicycle. Wayfinding is strongly related to traffic management because it helps direct bike riders to routes that are safe and accessible. It is also important that wayfinding is consistent across different jurisdictions so that bike riders are familiar with the meaning of signs regardless of where they are riding. Therefore, it is important that the AGTM provides clear and detailed instructions on how decision-makers should approach wayfinding design.

A set of key wayfinding principles should guide practitioners. Jurisdictions across Australia and New Zealand have wayfinding principles that can broadly be classified according to the principles outlined in Table 6.7.

Table 6.7: Cycling wayfinding principles

Key wayfinding principles	Explanation
Consistency	Signage, symbols and wayfinding logic should be standardised across regions and local government areas. This creates familiarity for riders, reducing confusion and improving the overall experience.
Clarity	Signs need to be unambiguous, with easily understood symbols and concise route information.
Visibility	Signs should be placed prominently, with good sightlines to ensure riders can see them well in advance of decision points.
Frequency	Signs need to be placed with enough regularity to reassure riders they are on the correct path, especially at intersection or route changes.
Hierarchy	Information should have a visual hierarchy. Primary destinations should be more prominent than secondary or local destinations.
Integration with traffic management	Wayfinding should guide riders towards the safest and most efficient routes, aligning with broader traffic management plans.
Accessibility	Wayfinding should consider the needs of all riders, using clear language and potentially incorporating tactile elements for those with visual impairments.

In addition to signs and wayfinding, pavement markings can help reinforce routes and directional signage. NACTO highlights pavement markings may often be more visible than signs to riders, particularly in busy urban conditions (NACTO n.d.). Pavement markings may be especially useful where signs are difficult to see, for example, due to vegetation or parked cars.

Recommendation:

Update wayfinding principles and consider pavement marking for visual aids.

6.14 Mobility hub parking

Given the increasing importance of facilitating active modes, prioritisation of parking for bicycles and micromobility devices in planning must be addressed, particularly in locations where travel demand needs to be spread across a wide variety of modes to ensure amenity for people using the space, such as in activity centres.

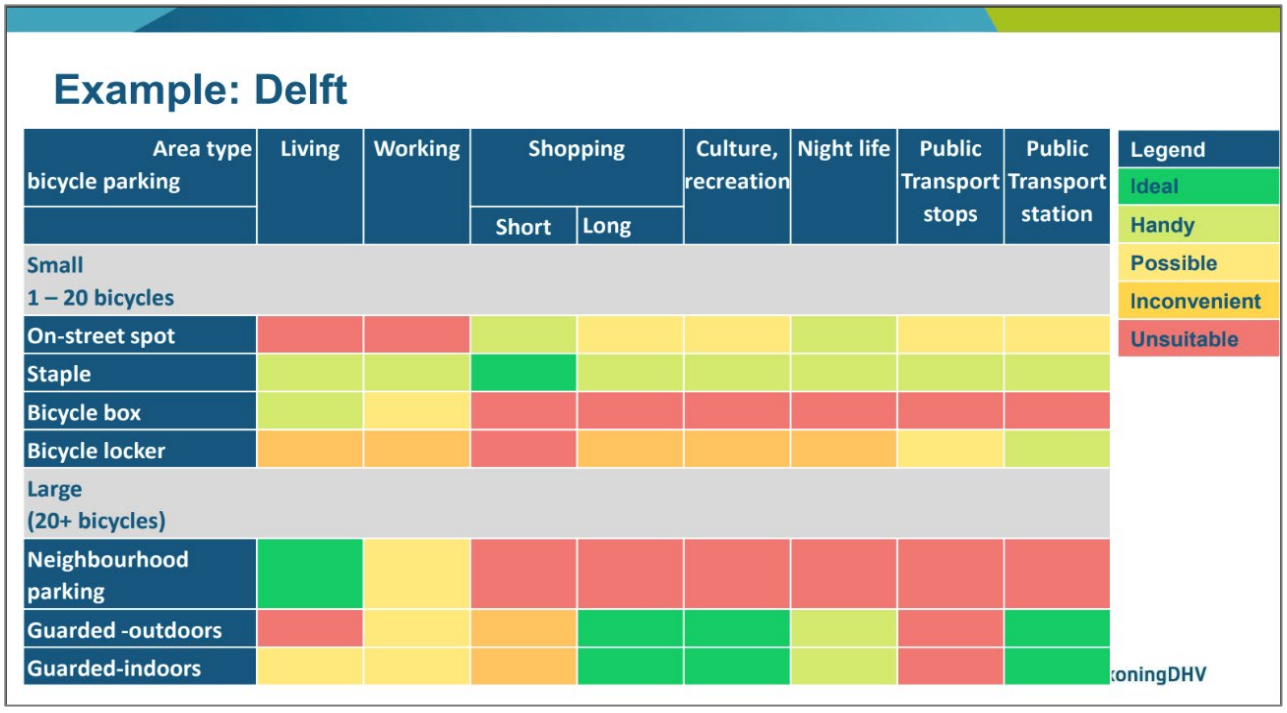
Shared and private bicycles and micromobility have a role to play in relation to travel demand management and transport decarbonisation. Planning parking hubs that can offer safe short- and long-term storage of a wide range of wheeled devices will become increasingly important.

Existing guidance on shared parking for bicycles and micromobility devices considers the following aspects:

- location – on the street, footpath or in open spaces, and adjacent to specific complementary land uses
- space for a variety of vehicle dimensions, styles, weights and manoeuvrability
- charging facilities
- landscaping features
- proximity to power supplies
- ease of access for users and maintainers (eliminating conflicts with people walking or using other modes)
- geofencing for shared vehicles
- security
- passive surveillance
- conversion of car parking spaces
- promotion and wayfinding
- management of improperly parked vehicles
- management of user risks
- balance of provision and access between shared and private vehicles.

Guidance around the appropriateness of larger cycle parking facilities by location type are provided in the example below in Figure 6.14.

Figure 6.14: Cycle parking by area type



Source: Royal HaskoningDHV.

Recommendation:

Provide parking for a range of micromobility modes in activity centres.

6.15 More emphasis on active transport within traffic impact assessments

The current AGTM guidelines for traffic impact assessments (TIAs) are high level and need to better reflect the importance of active transport. Noting that this is updated through a separate project, the following recommendations are made:

- The guidance should move away from focusing on car travel and promote a more balanced discussion of all transport options.
- The principles of a diverse transport system should be made clearer and more prominent in the AGTM.
- Consider wider network implications and investments beyond local traffic capacity improvements.
- The TIA framework should be reviewed to align with contemporary thinking about active transport and decarbonisation.
- The guidance should be updated to reference micromobility and avoid 'othering' and insufficient consideration of active transport modes.
- TIAs should address how human behaviour can be influenced to promote compliance and encourage a spread of travel demand across all modes. Case studies demonstrating best practices for active transport should be included.

The current AGTM guidelines on TIAs need to better promote and support active transport in development planning, especially as it relates to urban developments in highly accessible areas.

Recommendation:

Elevate the role and significance of cycling and micromobility in delivering new developments.

6.16 Safe System focus

It is not within the scope of this study to propose changes to the Safe System approach. However, in the context of improving planning for cycling and micromobility within the AGTM, it is necessary to note the following:

- Safe System principles apply to users of all transport modes, not just drivers of cars.
- Safe System as an approach should be elevated to an earlier part of the AGTM to provide an important framing mechanism and justification for the guidance that follows.
- People operating vehicles of any kind (including bicycles) can suffer the same impairments and cause injury to other road users.
- Driving tasks and driver characteristics apply equally to those operating bicycles and micromobility devices, even if the outcomes of an incident may be less severe.
- Separation of data relating to crashes and fatalities of riders of bicycles and e-scooters and other active transport users will add depth (noting that New Zealand's Crash Analysis System already separates data relating to cycle crashes).

7. Case Studies and Examples

The case studies in this section provide practical and illustrative examples of previous experiences or projects to inform the practice of others. The case studies have been developed to support updates to the guidance in sections of the AGTM. They complement other updates by providing a detailed understanding of how a project has been planned, delivered and assessed in the past with the intention to support future decision-making processes. The relevant examples were identified during stakeholder consultation with subject matter experts.

7.1 Providing a bicycle network for micromobility – Brisbane's CityLink cycleway

Table 7.1: Case study – Brisbane's CityLink cycleway

Category	Response
Topic(s) under review	• Evaluation of protected bicycle facilities for cycling and micromobility • Safe infrastructure for e-scooters
The process	Brisbane City Council undertook a 12-month CityLink Cycleway trial in 2021–2022, which aimed to increase safety and connectivity in the city centre's active transport network with separated riding facilities. The cycleway involved a two-way separated path installed along Elizabeth Street, Edward Street and William Street to Grey Street, via Victoria Bridge. The CityLink Cycleway was designed in consultation with the Queensland Government to ensure that, under legislation, e-mobility devices could use the separated facilities alongside bicycles. The performance of the cycleway was monitored and evaluated, and feedback was sought from a range of users and community members.
The outcome	The results of the evaluation conducted in October 2022 highlight an increase in riders using the CityLink Cycleway and a reduction in riders using nearby streets. The data shows an overall growth of e-mobility that is reflected most strongly on Elizabeth Street (93%). Before the cycleway trial, 100% of e-mobility devices were legally required to be ridden on footpaths, sharing the available space with people walking. Camera survey data taken during the trial shows more than 70% of e-scooter trips used the trial infrastructure instead of the footpath, helping to improve pedestrian safety and address community concerns. In January 2022, Brisbane Council undertook further work to add e-scooter symbols along the cycleway to increase awareness and encourage e-mobility riders to use the cycleway.
Region/jurisdiction	Brisbane, Queensland
Any tools or data used	The evaluation of the trial included the following tools to gather feedback on the use of e-mobility in bicycles lanes: • An online community survey: 78% of people surveyed believe that pedestrian safety is increased due to e-mobility devices using the CityLink Cycleway. • Travel behaviour surveys of local businesses, customers and delivery workers: Riding and e-mobility are generally seen as safe and comfortable, with 66% of customers and 100% of delivery workers generally agreeing that cycling and e-mobility are safe and comfortable modes of transport in the CityLink Cycleway trial area. • Empirical data: Camera survey data taken during the trial period shows more than 70% of all e-scooter trips on Elizabeth Street made use of the CityLink Cycleway.
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The size and speed of micromobility is evolving and appropriate space needs to be provided for these vehicles. As the volumes of cycling and micromobility increase, wider cycle lanes, for example, may need to be accommodated. Trials provide an opportunity to test potential solutions, evaluate outcomes and adapt to changing needs.

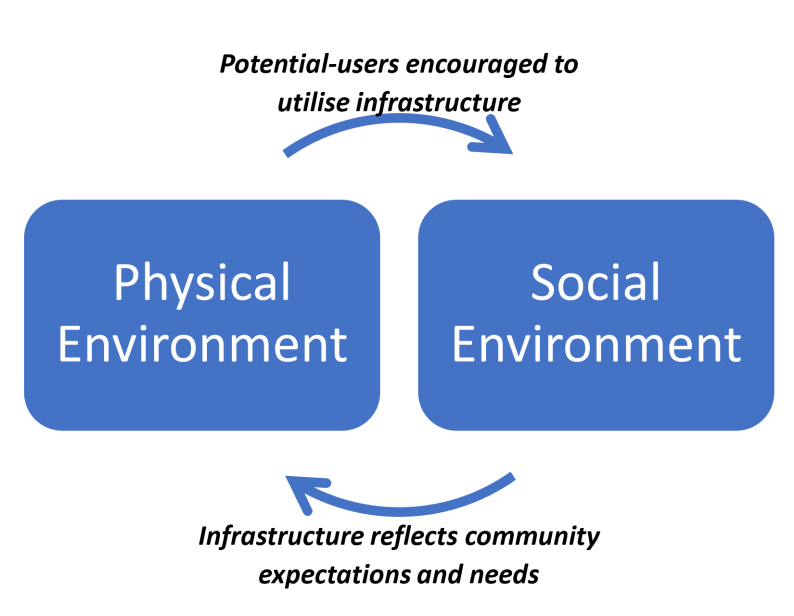
Category	Response
Discussion – what has worked well, benefits, impacts	Further research highlights the bicycle network is the safest and most comfortable place for people to ride e-scooters and other micromobility devices. Queensland University of Technology (QUT) found over 70% of people riding an e-scooter used the footpath when no protected cycle lane was available, compared to 20% when a cycle lane was available. A high uptake of e-scooters using the protected lane (>80%) was evidenced. Brisbane continues to plan and accommodate for the growing transport needs of the city through the Brisbane e-mobility strategy (Brisbane City Council 2021).
Source(s)	• *CityLink Cycleway Key Findings Report* (Brisbane City Council 2022). • *Bikeway and Pathway Projects* (Brisbane City Council n.d.). • QUT Centre for Accident Research and Road Safety – Queensland (CARRS-Q) e-scooter research (CARRS-Q n.d.).
Image(s)	 *Source: Brisbane City Council (2022).*

7.2 Adopting a principles-based approach to evaluating and engaging on cycling projects – the Activation, Consultation and Evaluation (ACE) case study

This case study should be included in the AGTM Part 4, Section 4.6 'Bicycle Networks', as a new subsection that focuses on evaluation and the importance of working with and agreeing on outcomes before the project delivery. The ACE model ensures the outcomes of a project are determined from the beginning and that the appropriate pre-, during and post-evaluation and engagement occurs to inform and deliver these outcomes.

Table 7.2: Case study – ACE delivery model

Category	Response
Topic(s) under review	• Activation, Consultation and Evaluation (ACE) delivery model • Engagement and evaluation components of the cycling project life cycle • Outcomes-focused evaluation approach
The process	A review of guidance developed to assist local government authorities (LGAs) deliver Activation, Consultation and Evaluation (ACE) components of the Western Australian Bicycle Network (WABN) Grants Program. The ACE model is a delivery model developed by the Western Australian (WA) State Government to enable local governments to ensure that engagement and evaluation components are considered throughout the length and breadth of an infrastructure project. The model considers and measures built and social outcomes of cycling projects side by side to ensure: • Built infrastructure reflects the social needs and desires of people who will use it. • Integration of engagement throughout the full project lifecycle activates the physical infrastructure that is delivered. The impact of the project can be measured against a range of anticipated outcomes.
The outcome	The ACE model actively encourages people to utilise the infrastructure delivered, creates opportunities for constructive engagement, links social and built environment factors, and facilitates definition and measurement of project outcomes. The accompanying ACE Plan and Report Form document allows respondents to share with WA Department of Transport (DoT) what will be or was implemented in each ACE area and learnings about what did and did not work. Success stories are used to promote the work being done to support cycling and deliver facilities across WA, as well as providing opportunities for knowledge sharing and continuous improvement of the grants program. Projects delivered using the ACE model have had demonstrably better outcomes, with many LGAs reporting that the approach ensures a collaborative delivery approach both within the organisation and with the community. Application of ACE on state-funded bicycle infrastructure projects has: • Established a solid experience base across different-sized projects in metropolitan and regional settings. • Embedded a consistent approach across projects, with adequate time and resources to properly deliver ACE. • Resulted in dozens of local success stories, and (most significantly). • Started a shift in the industry with project deliverers seeing the value of the engagement and evaluation elements and proactively exceeding grant agreement requirements. By shifting focus and targeting the infrastructure's operation (through community engagement), rather than simply focusing on its provision, the ACE model helps achieve both the functional and dynamic objectives of the infrastructure. Although behaviour change is a recognised discipline, fully integrating these principles across all aspects of any project ensures the delivery of best practice outcomes that go beyond merely well-designed physical infrastructure.
Region/jurisdiction	WA
Any tools or data used	The ACE guidance presents a range of tools and datasets that could be employed, including: • activation types • consultation methods based on IAP2 • data collecting tools through bicycle surveys to enable proponents to achieve low-cost submissions.

Category	Response
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The ACE approach may be applied to broader infrastructure projects. The approach has been designed to enable state and local governments to deliver outcomes-focused projects though a simple framework that weaves ACE elements into technical delivery. It is strongly focused on maximising a groundswell of complementary activities, both non-infrastructure and infrastructure based. The framework fosters thinking beyond construction to how projects will be used, maintained and improved over time.
Discussion – what has worked well, benefits and impacts	The ACE guidance is designed to enable a broad range of organisations to both submit and access advice on developing a project. The tools suggested (Activation checklist, Consultation planning questions and Evaluation) are 'low-tech' resources but are highly informative when incorporated. Applying the ACE guidance ensures that the infrastructure constructed ultimately meets community needs and measures how well it is being used. The ACE guidance is purposefully outcomes focused so that success measures are built into the project or, if they fail, the reasons why are clear. Other benefits of the ACE approach include: • establishes a baseline for monitoring and evaluation • provides knowledge of what engagements work best • ensures the use of a facility from day one • interacts with other projects and services • builds local government capacity through coaching and on the job experience • exposes the project to other state and LGA departments • delivers amenity • generates positive feedback from officers and the community.
Source(s)	• *Activation, Consultation and Evaluation (ACE) Model Overview* (DoT 2022a). • *WA Bicycle Network Grants: Activation, Consultation and Evaluation Guidance* (DoT 2022b).
Image(s)	 *Source: Department of Transport, Western Australia.*

7.3 Planning for all ages and abilities (AAA) – a cycling network plan for Greater Hobart

This case study should be included in the AGTM Part 4, Section 4.6 'Bicycle Networks'. The case study provides an example of how practitioners can develop a collaborative cycling network plan that considers safety, comfort and connectedness for all ages and abilities.

Table 7.3: Case study – a cycling network plan for Greater Hobart

Category	Response
Topic(s) under review	• Planning for all ages and abilities • Collaborative network planning
The process	In 2021 the Tasmanian Government released the *Greater Hobart Cycling Plan – For All Ages and Abilities (AAA)* (Infrastructure Tasmania 2021). The plan was created through a review of past cycling and transport strategies and plans. Cycling advocacy organisations were involved to provide direct input and feedback to the plan, building buy-in and alignment between key stakeholders responsible for delivering the plan. The Greater Hobart Cycling Plan helps the community understand the bigger picture. This represents vision-led transport planning. The plan prioritises a pipeline of projects based on a framework of need, complexity and readiness.
The outcome	The Tasmanian Government has committed $2 million to help local government authorities (LGAs) implement the Greater Hobart Cycling Plan. Funds will be distributed to the 4 Hobart City Deal local government partners through a grant program. Through the Hobart City Deal partnership, the plan was endorsed by the then Minister for Infrastructure and Transport, and the mayors of Hobart, Glenorchy, Clarence and Kingsborough Councils. The Royal Automobile Club of Tasmania (RACT), the Bicycle Network, and the University of Tasmania (UTAS) also expressed support for the plan.
Region/jurisdiction	Greater Hobart, Tasmania
Any tools or data used	The plan was developed collaboratively to align, integrate and build on existing plans and strategies. This approach builds consensus between agencies to foster collaboration and overcome barriers to delivery. This case study exemplifies: • strong stakeholder engagement and consensus building • policy analysis • network planning to deliver infrastructure that will increase cycling participation. The following principles guide project phasing: • Need: With consideration of network connectivity, how will the project improve access for people riding? • Complexity: Consideration of the technical barriers to delivery. Changes to kerb alignments, signal phasing and significant parking or capacity impacts will make projects more complex to deliver. • Readiness: Understanding the level of stakeholder and community support for a project.
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	To increase cycling participation, evidence shows that physical protection from motor vehicles is required to increase rider safety and comfort. Investing in low-stress cycling infrastructure improves gender and access equity. Recognising this, the AAA framework requires projects to provide a high level of rider comfort. Projects included in the plan must be attractive to less confident riders.
Discussion – what has worked well, benefits, impacts	• Collaborative multi-stakeholder process to increase policy alignment and simplify transport planning decisions. • Clear network maps. • A low-stress cycle network needs to be direct, connected and protected. A strength of the Hobart plan is that it then prioritises delivery based on the criteria of need, complexity and readiness. This approach combines the long-term ambition with a pragmatic approach to enable short term action.
Source(s)	• *Greater Hobart Cycling Plan – For All Ages And Abilities (AAA)* (Infrastructure Tasmania 2021). • *Active Transport – Strategies, Policies and Guides* (Infrastructure Tasmania n.d.).

7.4 Wagga Wagga active travel plan

Table 7.4: Case study – Wagga Wagga active travel plan

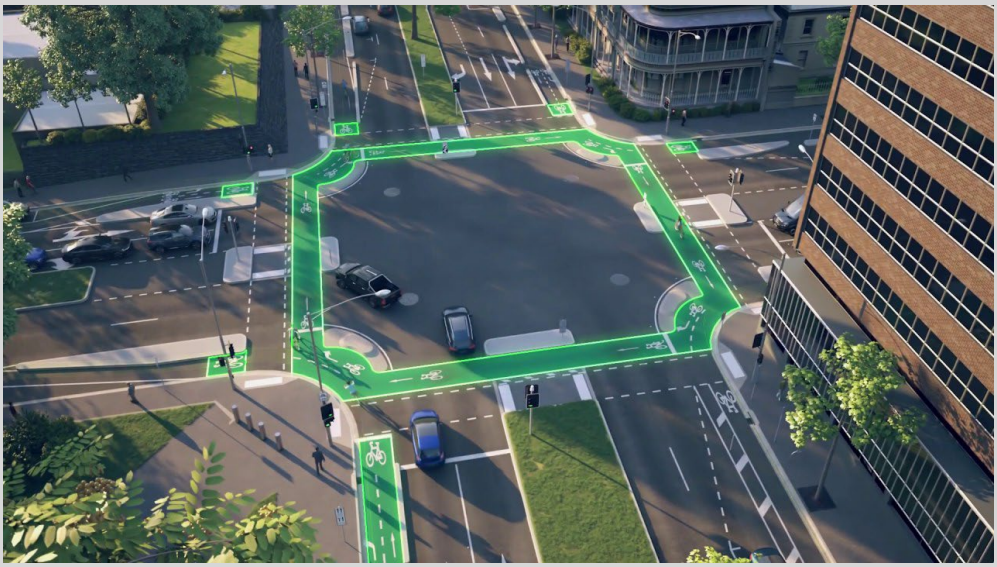
Category	Response
Topic(s) under review	Regional network planning
Overview of the case study – summary of approach, process	As the largest inland city in NSW with a population expected to grow beyond 80,000 by 2036, Wagga Wagga established a new active transport plan to keep the city moving and boost tourism. The aim was to create a comprehensive shared path network that offered a safe, attractive system to serve a diverse range of the population, including children, the elderly, and less confident riders. It upgraded existing infrastructure, created new links and facilities and connected previously isolated paths to the broader network.
The outcome	The plan guided delivery of a 56 km walking and cycling shared path network throughout the city. The benefit-cost analysis on the initial $12.8 million investment was determined to be 13.3 at a 7% discount rate, which is consistent with other shared path investment analyses. The benefits were endorsed by Infrastructure NSW, allowing the project to proceed with delivery. The 56 km network of dedicated shared paths from the Wagga Wagga Active Travel Plan was completed in 2021.
Region/jurisdiction	Wagga Wagga, NSW
Any tools or data used	• Strategic business case • Options assessment
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The 56-kilometre walking and cycling shared path network is one of the largest in a regional city in Australia, and the first to be planned and delivered as a single project It is a pedestrian and cycling network covering the whole city and its suburbs, an area of 12 km by 16 km, linking the university, regional airport, central CBD, up to 33 schools, indigenous sites and wetlands, and other key destinations. The benefit-cost analysis is transferable to many regional cities.
Discussion – what has worked well, benefits, impacts	Investment in a strategic business case attracted $16.7 million in funding from the NSW Government, with an additional $1.58 million from the Wagga Wagga City Council to deliver the plan.
Source(s)	*Wagga Wagga Active Travel Plan* (City of Wagga Wagga n.d.).

7.5 Considering a protected intersection – the case of the Albert and Lansdowne intersection

This case study should be included in the AGTM Part 6, Section 3.4.3, after Table 3.14: Issues for cyclists. The case study provides an example of how practitioners can consider a protected intersection to improve cycle safety and comfort.

Table 7.5: Case study – Albert and Lansdowne intersection

Category	Response
Topic(s) under review	• Bicycle safety priority treatments • Protected signalised intersection
The process	The protected intersection at Albert and Lansdowne Streets in East Melbourne offers improved safety and comfort for people cycling and using micromobility. This was a flagship project for Victoria's Department of Transport and Planning (DTP). Extensive consultation was undertaken with key stakeholders, including Bicycle Network, the City of Melbourne and other councils from Melbourne's inner metro area. This included the creation of a one-to-one mock-up of the proposed design, by adopting linemarking reflective of proposed lane widths, crossing configurations, kerbing and separators. Stakeholders were invited to ride and walk the proposed layout and provide feedback prior to finalising the design. The protected intersection includes bicycle lanes adjacent to traffic, separated and protected by kerb islands. The treatment places left-turning vehicles at more of a right angle to the path of riders that they are crossing. The treatment deployed is classified as a 'partial protection' treatment, according to the *Bike Lane Design Guidelines* (City of Melbourne 2019). This is because there are 2 traffic lanes located at the stop line of the intersection (as opposed to a single lane with a wider physical island between the bicycle lane and traffic lane. The partial protection treatment was applied within the available space at the intersection.
The outcome	• The Albert–Lansdowne intersection was delivered in 2020 and was funded through a Transport Accident Commission (TAC) Safer Cycling and Pedestrian fund. The key features of the intersection include: • Phased traffic lights to give riders a head start • Coloured line marking to increase the visibility of riders and improve safety • Separated paths for people walking and for people cycling • Improved safety for cycling by tightening the turn radii to improve sightlines between drivers and riders, resulting in slower traffic. There were initial concerns and key learnings of the intersection outcome. These included: • Both riders and car drivers had difficulty noticing the banana island separators. • The layout of the intersection shifts people cycling from their preferred crossing path, which reduces the comfort and ease of riding. • The width of the separator could be wider to encourage further set-back of vehicles.
Region/jurisdiction	Melbourne, Victoria
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	This treatment is widely regarded as a safe priority crossing facility for bicycles and micromobility in Australia and globally. Alongside the City of Melbourne *Bike lane design guidelines* (City of Melbourne 2019), this treatment option is included in the TfNSW *cycle design toolbox* (TfNSW 2020). The treatment can be applied across jurisdictions and, where space permits, a fully protected version of this intersection could be used.
Discussion – what has worked well, benefits, impacts	The protected intersection at Albert and Lansdowne Streets is a treatment with significant potential for future application within the City of Melbourne and across Australia and New Zealand. Where space for full protection cannot be accommodated, a partial protection intersection may be desirable, with a significant increase in the volume of bicycle riders justifying an upgrade to full protection later down the track. Initial concerns, such as the lack of visibility of the banana island separators, are being reviewed and updated accordingly. This example shows the iterative nature of achieving a safe priority treatment for cycling and micromobility.
Source(s)	• *City of Melbourne Bike Lane Design Guidelines* (City of Melbourne 2019). • *East Melbourne Protected Intersection Completed* (Bicycle Network 2020). • *VicRoads Design Guidance for Strategically Important Cycling Corridors* (VicRoads 2016).

Category	Response
Image(s)	 *Source: Victorian Department of Transport and Planning.*

7.6 Improving local streets through Safe Active Streets, WA

This case study should be included in the AGTM Part 8 *Local Street Management*. It provides examples of local street treatment options to improve safety and comfort for bicycle riders and micromobility users.

Table 7.6: Case study – Safe Active Streets, Western Australia

Category	Response
Topic(s) under review	• Local streets treatment options • Reduced speeds (30km/h) • Adaptability
The process	Developed in partnership with local government, Safe Active Streets (SAS) are active travel routes on quiet local streets, where speeds have been reduced to 30 km/h to allow for a safer shared street space. Other treatments such as narrowing road widths, slow points and intersection changes on the streets can help to create low-speed residential precincts. With lower vehicle speeds, the streets aim to improve amenity for the community and are much safer for all users, including pedestrians, riders of all ages and abilities, and people driving. SAS routes form part of wider bicycle networks, connecting to off-road shared paths and linking community amenities such as schools, railway stations or shops. The program is designed to make streets friendlier and safer for all users, including people in cars and those riding bicycles and walking. Installations have followed best practice, typically for local area traffic management, with adjustments where needed for the consideration of people walking and riding.
The outcome	The Safe Active Streets Pilot Program launched in 2015 and ended in 2023, and since that time has seen the construction of 12 safe active streets across Perth and regional WA. Safe active streets have gained traction within local governments providing safe walking and riding routes through suburbs to local amenities, including schools, parks and shops. Throughout the pilot program, the Western Australian Department of Transport (DoT) has worked with 19 local governments to progress 23 SAS projects through various phases of feasibility, consultation, design, construction, activation and evaluation. An evaluation plan was established to assess the SAS Pilot Program, testing the correlation between vehicle speed reduction and increased active transport use. Due to the complexity and differing treatments applied to each of the projects, the evaluation is designed to collect and analyse data on 3 key components: • design features and treatments • user behaviour (vehicle volumes, movements, and active transport use tested pre- and post-delivery) • community perceptions about safe active streets. The evaluation considers the impacts, cost-effectiveness and comparability between projects and is used to guide ongoing design and delivery of future safe active streets. Early evaluation findings suggest that safer shared street spaces are being achieved through slower speed environments in the redesigned local streets. Interim evaluation results are available on the DoT website for 8 of the completed projects, with the final evaluation report scheduled for release in 2024. Since the end of the pilot program, all remaining projects transitioned into the WA grants program and local governments can now apply for funding for SAS projects for up to 50% of the total project cost through the grants program.
Region/jurisdiction	WA
Any tools or data used	To understand the success of the program at each site, data is collected pre- and post-construction under the following 3 key components: 1. Design features – SAS rubric rating 2. User behaviour – Vehicle speeds and counts – Parking counts – Active transport counts

Category	Response
	3. Community sentiment – Community surveys Guidelines for the development and implementation of SAS is currently being prepared, which will include the requirement for collation of pre- and post-construction data.
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The idea behind SAS can be applied to any road connection that would benefit from a greater presence and improved safety of people riding and walking, but where continued accessibility for motor vehicles is required. The extent of treatments selected can be varied depending on site factors, budget limitations and road user preferences.
Discussion – what has worked well, benefits, impacts	The installations have resulted in increases in the number of people riding on the upgraded road sections and an increase in people walking. In general, active travel modes through the installations has increased, with minimal impacts on levels of service for motor vehicle drivers. SAS installations benefit from community engagement early on and throughout the project development to ensure all invested parties are involved through the design process and that ultimately the facility is supported and well used.
Source(s)	• *Navigating Safe Active Streets* (DoT 2023a). • *Safe Active Street Program: Melville Interim Evaluation Report 2023* (DoT 2023b).
Image(s)	 *Source: Department of Transport Western Australia.*

7.7 Pop-up bicycle lanes – Phillipson Street, Wangaratta, Victoria

Table 7.7: Case study – Phillipson Street, Wangaratta, pop-up bicycle lanes

Category	Response
Topic(s) under review	• Pop-up bicycle lane design for regional townships • Road corridor selection for on-road cycling facilities in regional contexts
The process	In 2021, the Victorian Department of Transport (now Department of Transport and Planning) provided investment for the delivery of new and improved cycle routes via temporary pop-up treatments. This pipeline was extended beyond metropolitan Melbourne to include regional townships. Wangaratta was selected as an opportunity for this program's delivery. Different road corridors were reviewed, with Phillipson Street being selected as the best corridor for the program. It provides a connection through residential areas, connects to multiple schools and has a wide cross-section to deliver the infrastructure. Designs were prepared in consultation with local and state governments as well as the local community. The challenges included school buses stopping immediately at the front of the entrance to schools and how to minimise conflict between buses and bicycles arriving at the same time.
The outcome	Ultimately, a fully separated bicycle lane was delivered along Phillipson Street in Wangaratta from Sisely Avenue to Edwards Street. This provided a protected bicycle lane through the residential suburbs of Wangaratta in the west and connections to St Bernard's Primary School, Wangaratta High School and Galen Catholic College. The cycle lanes removed minimal on-street parking, reducing the impact on immediate residents while providing generous 1 m wide buffers between bike riders, parked cars and traffic. Many conversations were had around the removal of on-street parking. The site location was selected due to its wide carriageway to reduce the impact on car parking and the surrounding area. Three key considerations for a successful outcome included: • Wide carriageways, which provided a natural network for the town. • Local use – connecting a local residential area to a destination, something centrally located for the target residential neighbourhood. • Targeting land use and prioritising networks to schools above anything else. Schools were low-hanging fruit because of the limited opportunities for children to access school by other transport modes.
Region/jurisdiction	Department of Transport (now Department of Transport and Planning) Hume Region, Victoria
Any tools or data used	Publicly available data was utilised for the selection of the appropriate road corridors. This included land zoning, population densities and the provision of existing infrastructure. Local residents and businesses were surveyed during the design process.
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The site selection techniques and ultimate designs prepared can be used as a methodology for the delivery of separated bicycle lanes throughout other regional townships, specifically for targeting the use of wide roads through residential areas and roads that connect to local schools.
Discussion – what has worked well, benefits, impacts	The removal of on-street car parking is always a cause of controversy in transport projects, and this is particularly the case in a regional context. Minimising the impact on on-street car parking reduces negative feedback and attention from the local community. Children under the age of 18 are a key demographic for cycling facilities, given they are not able to drive. Targeting schools as a location to provide cycling facilities is a good strategy in normalising cycling as a mode of transport where it may not be common.
Source(s)	Stantec project team.

Category	Response
Image(s)	

7.8 Adaptable cycle planning – Pitt Street cycleway, Sydney, NSW

Table 7.8: Case study – Pitt Street cycleway

Category	Response
Topic(s) under review	• Tactical bicycle lanes • Monitoring and evaluation • Adaptability
The process	In 2020, the City of Sydney with Transport for New South Wales installed a pop-up bi-directional cycleway on Pitt Street in Sydney's CBD. With the new route attracting thousands of new riders, the pop-up cycleway was upgraded to a permanent route in late 2021. This project demonstrates how tactical bicycle lanes can speed up implementation and reduce project risk. This is considered an ideal approach, with the permanent upgrade being delivered soon after the project evaluation had confirmed the importance of the route for people riding bicycles. The project also integrated expanded footpaths, which enabled more outdoor dining space, providing benefits for local businesses and better place outcomes.
The outcome	Monitoring and evaluation identified the Pitt Street pop-up cycleway to be a standout success, with around 6000 bicycle trips a week. There was a 500% increase in bicycle trips in 6 months, peaking at 2000 trips a day.
Region/jurisdiction	Sydney, NSW
Any tools or data used	• Tactical implementation • Monitoring and evaluation
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	Tactical implementation is appropriate for projects that have a significant impact on traffic capacity and on-street parking. Using adjustable, low-cost components allows the design to be tested and impacts measured with reduced construction disruption – before more costly permanent works that may require civil works. Tactical projects require significant resources for maintenance and post-installation adjustments (where warranted). For projects with lower risk, it may be more cost effective to proceed directly to permanent infrastructure.
Discussion – what has worked well, benefits, impacts	The City of Sydney was able to move quickly to install the cycleway by having an existing design concept that had been prepared in 2019. The project was initially installed as a wide single-direction bicycle lane while signal changes were progressed to enable the contraflow movement to be safely accommodated. This case study represents the importance of being able to measure success and having funding and designs available to upgrade the pop-up to permanent as soon as the project evaluation has been completed.
Source(s)	*Pitt Street leads the way with plans for a permanent cycleway* (City of Sydney 2021).
Image(s)	 Pitt Street, Sydney pop-up *Source: City of Sydney.*

Category	Response
	 Pitt Street, Sydney permanent *Source: WSP.*

7.9 Adjustable bicycle lanes – City of Melbourne, Victoria

Table 7.9: Case study – City of Melbourne adjustable bicycle lanes

Category	Response
Topic(s) under review	• Tactical bicycle lanes • Monitoring and evaluation • Adaptability
The process	In June 2020, the City of Melbourne announced plans to rapidly deliver 40 km of protected bicycle lanes to increase alternative transport options in response to the pandemic. Working with local manufacturer Orca Civil, spike-down bicycle lane kerbs and separator islands were designed and manufactured to enable rapid installation and post-installation adjustments. The products are manufactured using polymer concrete with 80% recycled glass aggregate, reducing embodied carbon while reducing weight and increasing strength.
The outcome	More than 19 km of protected bicycle lanes have been delivered by City of Melbourne using the Orca product. These projects have seen an increase in bicycle volumes of 22% across the network, attracting more riders to the safer, upgraded routes. Recycled glass has been collected from within the city of Melbourne, much of it diverted from landfill due to glass recycling constraints.
Region/jurisdiction	City of Melbourne, Victoria
Any tools or data used	• Recycled materials • Post-installation adjustments
Transferability – ability to be scaled to different regions, jurisdictions, scales and levels of complexity	The same product has been used across projects in NSW. Additional applications for the material have also been delivered, such as the Yarra Trams tram separation kerbing in Victoria. Orca has also manufactured the separation islands for the permanent installation of the St Kilda Road bicycle lanes, which are nested in asphalt to improve durability.
Discussion – what has worked well, benefits, impacts	City of Melbourne has completed more than 120 post-installation adjustments across 21 completed projects. Many of these have been possible due to the flexibility of the lightweight spike-down kerbing. This has allowed meaningful engagement with residents and businesses post-installation, which is a novel technique for this program. The approach has enabled the City of Melbourne to successfully install several challenging projects that had approvals delayed for extended periods of time, such as the Exhibition Street bicycle lanes. In locations where the kerbing is frequently struck by moving vehicles, damage has occurred, which has created a maintenance burden for the council. This needs to be carefully considered during design and recognised when a tactical delivery technique is chosen. To get the most out of this technique and reduce maintenance costs, upgrade projects to permanent kerbing should be delivered following project evaluation. The adjustable kerbing could then be repurposed for new projects or alternatively can be recycled into new products.
Source(s)	*Implementation Update: City of Melbourne Transport Strategy 2030 and Transport Program to Aid City Recovery and Reactivation* (Handley 2022).

Category	Response
Image(s)	Example of Orca kerbing installed by City of Melbourne on Swanston Street, Carlton: 

8. Recommendations for Future Updates to the AGRD

This report gives 3 key overarching recommendations for improvement of the AGTM. They are:

1. Provide stronger links to best practice cycle planning and design principles.
2. Recognise that considered terminology can help deliver projects.
3. Update the scope of the Guide to include wider micromobility options.

These recommendations have been developed for the AGTM, but they are also relevant to the design process. It is vital that guidance on traffic management and design recognises cycling and micromobility as viable modes of transport that should be encouraged. Updating guidance to reflect modern sustainable transport planning is key to achieving greater rates of active transport use.

This report includes many specific recommendations for how the approach to cycling and micromobility planning can be improved through the AGTM. These recommendations are also applicable to the Austroads *Guide to Road Design* (AGRD). The impacts of these recommendations need to be considered to assess whether immediate changes are needed to the AGRD to ensure consistency and avoid any possible contradictions between the Guides. Table 8.1 shows the recommendations that should influence future revisions of the AGRD as well as the recommendations that, if adopted, should trigger an update to the AGRD.

Table 8.1: Recommendations for the AGRD

Section	Recommendation for the AGTM	Relevance to future revisions of the AGRD	Should the recommendation trigger an update of the AGRD?
5.1	Assess new cycle and micromobility infrastructure against recommended principles	The cycling planning and design principles should be incorporated into the AGRD.	
5.2	Reflect updated definitions when referring to cycling and micromobility in planning	The AGRD should include up-to-date definitions within the field of cycling and micromobility and reflect best practice.	
5.3	Consider micromobility in new planning schemes, particularly the wide range of vehicle types and needs	The AGRD should provide design guidance that caters for the growing variety of vehicles that fall under micromobility.	Lane width may need to be recognised in the AGRD if recommendations are adopted.
6.1	Champion a vision and validate approach	The AGRD should reinforce the need to plan and design for a desired vision, rather than adopt a predict and provide approach.	
6.2	Expand use of available cycling-related data sources	The AGRD should direct designers to utilise emerging cycling-related data during the design process.	
6.3	Collect and analyse cycling-related data both before and after installation	The AGRD should encourage a data-driven approach to designing for cycling, as well as for evaluation.	
6.4	Engage with stakeholders authentically, early and often	The AGRD should encourage inclusion of stakeholders early in the design process of cycling and micromobility infrastructure.	

Section	Recommendation for the AGTM	Relevance to future revisions of the AGRD	Should the recommendation trigger an update of the AGRD?
6.5	Combine infrastructure delivery with behaviour change and activation initiatives.	The AGRD should promote a design approach that involves behavioural change aspects to help gain buy-in from residents.	
6.6	Assess which user types are being targeted to use the facility and design appropriately.	The AGRD should include design metrics that cater for people of all ages and abilities.	
6.7	Incorporate the use of the CLoS tool when planning and designing for cycling.	The AGRD should adopt the CLoS tool to aid designers throughout the cycle infrastructure design process and increase the chances of achieving best practice outcomes.	
6.8	Use road space allocation techniques to ensure sufficient riding space and comfort for people of all ages and abilities.	The AGRD should support traffic-calming measures by allowing for narrowing of traffic lanes and reduction of signposted travel speeds. The AGRD should also help facilitate road space reallocation techniques that repurpose car parking spaces for the implementation of active transport infrastructure.	Yes, minimum acceptable lane widths in future revisions of the AGRD should be reduced so that they are in line with the AGTM, which suggests narrowing lanes where possible.
6.9	Consider managing and mitigating user conflicts when designing the path network – shared paths should not be the default option.	The AGRD should promote the design of separated cycling and walking infrastructure where feasible.	Yes, new recommended minimum width of shared paths in AGTM conflicts with existing guidance in AGRD.
6.10.1	Provide increased priority for bicycles and micromobility at intersections and crossings.	The AGRD should provide best practice guidance for cycling infrastructure within intersections and crossings, which are the most dangerous conflict points for bicycle riders.	
6.10.2	When designing roundabouts, consider entry treatments and/or grade separation for people riding.	The AGRD should promote and enable the design of roundabouts with prioritised, dedicated infrastructure for bicycle riders that separates them from vehicles.	Yes, noting that AGRD Part 4B removed commentary and figures relating to bicycle lanes within roundabouts. AGRD will need to be updated to reflect best practice separated cycle facilities in roundabouts.
6.11	Provide parking and infrastructure for micromobility in activity centres based on cycle planning principles and diverse vehicle dimensions.	The AGRD should provide guidance for micromobility infrastructure in and around activity centres.	
6.12	Incorporate traffic reducing or calming measures on local streets to prioritise cycling and micromobility.	The AGRD should provide designers with a suite of traffic-calming treatment options that can be implemented on local streets.	
6.13	Update wayfinding principles and consider pavement marking for visual aids.	The AGRD should provide guidance on how to integrate accessible and effective wayfinding facilities into the design process.	
6.14	Provide parking for a range of micromobility modes in activity centres.	The AGRD should include guidance for how to include versatile micromobility parking options within key activity centres.	

Section	Recommendation for the AGTM	Relevance to future revisions of the AGRD	Should the recommendation trigger an update of the AGRD?
6.15	Elevate the role and significance of cycling and micromobility in delivering new developments.	The AGRD should promote the inclusion of cycling and micromobility facilities in the design of new developments to increase the likelihood of active transport habits.	

9. Conclusion

Cycling and micromobility are increasingly recognised as vital components of sustainable, healthy and equitable transport systems in Australia and New Zealand. Cycling and micromobility offer numerous benefits, including:

- improved public health
- enhanced safety
- greater social equity
- improved transport accessibility
- enhanced street activation and street life
- increased economic activity
- reduced traffic congestion and pollution.

To support the delivery of these outcomes and the clear policy agenda from current governments, this report proposes updates across the AGTM to better support and promote the delivery of cycling and micromobility infrastructure in Australia and New Zealand.

The project makes strategic recommendations that are cross-cutting and are designed to inform future guidance. All recommendations are based on research, stakeholder consultation and a review of best practice literature. The recommendations are designed to ensure that the AGTM remains relevant and reflects best practice in cycling and micromobility planning.

The 3 strategic recommendations that inform how the AGTM considers cycling and micromobility are as follows:

1. Provide stronger links to best practice cycle planning and design principles. Principles for network planning for bicycle and micromobility riders should be consistent across all schemes and projects. The recommended principles are based on CROW-Fietsberaad (2016) but can be tailored to align with practice documents in local jurisdictions. The recommended principles are Direct, Safe, Connected, Comfortable, Attractive and Adaptable. Guidance is provided in this report on how these principles can be considered at a network level as well as a design and operations level.
2. Recognise that considered terminology can help deliver projects. Inclusive language ensures that all users feel welcome and valued. Road planning and design are subject to numerous language norms that are both inclusive and exclusionary and that are often sourced from regulatory or legal terms. Therefore, there is a need for adopting appropriate terminology depending on the audience and the context, and terms may vary between planning and traffic management on the one hand, and road design and certification on the other. The update should include a glossary with common terms for users and vehicles as well as better consideration for cycling within the terms ‘vehicles’ and ‘traffic’.
3. Update the scope of the AGTM to include wider micromobility options. The rise in faster, smaller and more diverse devices requires some additional considerations for the planning and design of cycling infrastructure. Some considerations include the allocation of extra lane width to accommodate larger devices, the creation of safe intersections and transitions, and clearly identifying where micromobility should be riding. This report adopts the position that the bicycle network is normally the best, safest and most comfortable place for people to ride e-scooters and other micromobility devices (while recognising that in New Zealand, it is currently illegal to ride an e-scooter in a cycle lane and e-bikes are not limited to 25 km/h).

Alongside the 3 strategic recommendations, a number of detailed changes are proposed to be made throughout the AGTM. This report presents a summary of these changes and their rationale, including:

- Champion a vision and validate approach.
- Expand use of available cycling-related data sources.
- Collect and analyse cycling-related data both before and after installation.
- Engage with stakeholders authentically, early and often.
- Combine infrastructure delivery with behaviour change and activation initiatives.
- Assess which user types are being targeted to use the facility and design appropriately.
- Incorporate the use of the Cycling Level of Service (CLoS) tool when planning and designing for cycling.
- Use road space allocation techniques to ensure sufficient riding space and comfort for people of all ages and abilities.
- Consider managing and mitigating user conflicts when designing the path network – shared paths should not be the default option.
- Provide increased priority for bicycles and micromobility at intersections and crossings.
- Consider entry treatments and/or grade separation for people riding when designing roundabouts.
- Provide parking and infrastructure for micromobility in activity centres based on cycle planning principles and diverse vehicle dimensions.
- Incorporate traffic-reducing or calming measures on local streets to prioritise cycling and micromobility.
- Provide parking for a range of micromobility modes in activity centres.
- Elevate the role and significance of cycling and micromobility in delivering balanced developments.

There is a general need to close the gap between the importance of cycling and micromobility as a mode of transport compared with the more vehicle-centric approach in existing AGTM guidance. The first step is to highlight this gap and then work to resolve it over time, noting that this project sets the agenda for doing so. Effective guidance is crucial to reaping the full benefits of cycling.

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Appendix A Cycling Level of Service Tool

The tool can be downloaded from the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure A.1: Cycling Level of Service Tool

Key Requirement	Factor	Principle explanation	Indicators	Critical*	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Directness	Time: Delay at intersections	The length of delay caused by intersections should be minimised. This includes assessing impact of multiple or single stage crossings, signal timings, etc.	6. Delay at intersections.		Delay for riders at intersections is greater than for motor vehicles.	Delay for riders at intersections is similar to delay for motor vehicles.	Delay is shorter than for motor vehicles or riders are not required to stop at intersections (e.g. bypass at signals).		
	Time: Delay on links	The length of delay caused by not being able to bypass slow moving traffic.	7. Ability to maintain own speed on links.		Riders travel at speed of slowest vehicle (including a bicycle) ahead.	Riders can usually pass slow traffic and other riders.	Riders can always choose an appropriate speed.		
	Gradients	Routes should avoid steep gradients where possible. Uphill sections increase time, effort and discomfort. Where these are encountered, routes should be planned to minimise climbing gradient and allow users to retain momentum gained on the descent.	8. Gradient.		Routes should not be steeper than 5%.	Routes should not be steeper than 3%.	Routes should not be steeper than 1%.		
Safety	Reduce/ remove speed differences where riders are sharing the carriageway	Anywhere riders and motor vehicles are sharing the carriageway, the key to reducing severity of collisions is reducing the speeds of motor vehicles so that they more closely match that of riders. This is particularly important at points where risk of collision is greater, such as at intersections.	9. Motor traffic speed on approach and through intersections where riders are sharing the carriageway through the intersection.	85th percentile > 60kph.	85th percentile >50kph.	85th percentile 30kph – 40kph.	85th percentile <30kph.		
	Avoid high motor traffic volumes where riders are sharing the carriageway	Riders should not be required to share the carriageway with high volumes of motor vehicles. This is particularly important at points where risk of collision is greater, such as at intersections.	10. Motor traffic volume on sections of shared carriageway, expressed as vehicles per peak hour.	>1000 VPH, or >5% HV.	> 400 VPH (in both directions) and between 2 – 5% HV.	200 – 399 VPH (in both directions) and < 2% HV.	0 – 199 VPH in both directions.		

Key Requirement	Factor	Principle explanation	Indicators	Critical*	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Safety	Risk of collision	Where speed differences and high motor vehicle flows cannot be reduced riders should be separated from traffic. This separation can be achieved through light or more robust levels of infrastructure. Such separation should reduce the risk of collision from beside or behind the rider.	11. Separation to reduce risk of collision alongside or from behind.	Riders sharing a carriageway in nearside lane and design speed over 30kph.	Riders sharing a carriageway in nearside lane and design speed over 30kph or a painted bike lane of not less than 2m up to speed 40kph.	Riders in cycle lanes of not less than 2m wide and 1m buffer to general traffic up to a speed of 40kph.	Riders separated from motor traffic via dedicated off-road cycle tracks or on-road protected bicycle lanes.		
	Risk of collision	A high proportion of collisions involving cyclists occur at intersections. Intersections therefore need particular attention to reduce the risk of collision. Intersection treatments include: Minor/side roads – rider priority and/or speed reduction across side roads, Major roads – separation of riders from motor traffic through intersections.	12. Conflicting movements at intersections.	No separation from general traffic and/or no measures in pace to slow down turning vehicles.	Side roads are frequent and/or have no measures in place to slow down turning traffic. At intersections (including the approach), conflicting movements not separated.	Side roads are infrequent with measures in place to slow down turning traffic such as reducing the turning radius. At signalised intersections, riders are separated from general traffic and have an advanced head start where signalised.	Side roads are infrequent and measures are in place such as full or partial setbacks or raised side road crossings. At signalised intersections, riders are fully separated from conflicting movements in time as well space.		
	Avoid complex design	Avoid complex designs which require users to process large amounts of information. A safe and cohesive cycle route design should be self explanatory and self evident to all road users.	13. Legible road markings and road layout.		Faded, old, unclear, complex road markings/unclear or unfamiliar road layout.	Generally legible road markings and road layout but some elements could be improved.	Clear, understandable, simple road markings and road layout.		

Key Requirement	Factor	Principle explanation	Indicators	Critical*	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Safety	Consider and reduce risk from kerbside activity	Routes should be assessed in terms of all multi functional uses of a street including car parking, bus stops, parking, including collision with opened door.	14. Conflict with kerbside activity.	Painted cycle lane without a buffer alongside parking/loading.	Minimum 2m bike lanes with < 0.8m buffer alongside kerbside activity.	Minimum 2m bike lanes with 0.8m – 1.2m buffer alongside kerbside activity .	Minimum 2m bike lanes with 0.8m – 1.2m buffer with kerbside no or very limited activity (disabled bay, occasional loading).		
	Reduce severity of collisions where they do occur	Wherever possible routes should include “evasion room” (such as grass verges) and avoid any unnecessary physical hazards such as parked cars, guardrail, build outs, etc. to reduce the severity of a collision should it occur.	15. Evasion room and unnecessary hazards.		Riders at risk of being trapped by physical hazards along more than half of the route.	The number of physical hazards will be further reduced.	All physical hazards will be avoided.		
Comfort	Surface quality	Density of defects including non cycle friendly utility covers and drainage pits, potholes, cracking and other minor surface defects.	16. Major and minor defects.		Numerous minor defects or any number of major defects. Any slippery surfaces.	Minor and occasional defects that do not result in an uneven surface.	Smooth high grip level surface.		
		Transitions across access providing smooth and level surfaces.	17. Surface types.		Any bumpy or sudden change in level across access points.	Change in level across access points over suitable length to avoid bumps.	No change in elevation across access point.		
	Effective width without conflict	Riders should be able to comfortably cycle without risk of conflict with other users both on and off road.	18. Desirable minimum widths to incorporate all bicycle and micromobility devices as specified in Austroads classifications.		No opportunities for riders to ride alongside or to overtake.	Less than 50% of the route has opportunities to ride alongside or to overtake.	Riders have consistent opportunities to ride alongside or to overtake.		
	Wayfinding	Non local cyclists should be able to navigate the routes without the need to refer to maps.	19. Signage and decals.		Route signing is poor with signs missing at key decision points.	Gaps identified in route signing which could be improved.	Route is well signed with signs located at all decision points and major intersections.		

Key Requirement	Factor	Principle explanation	Indicators	Critical*	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Attractiveness	Social safety and perceived vulnerability of user.	Routes should be appealing and be perceived as safe and usable. Well used, well maintained, lit, overlooked routes are more attractive and therefore more likely to be used.	20. Lighting.		Numerous minor defects or any number of major defects.	Minor and occasional defects.	Smooth high grip surface.		
			21. Natural Surveillance.	Route is entirely away from activity and has no visibility from surrounding areas.	Route is away from activity and/or has restricted visibility from surrounding areas.	Route is not far from activity and is generally visible from surrounding areas.	Route is surrounded by activity and is highly visible.		
	Impact on pedestrians, including people with disabilities.	Introduction of dedicated on-road cycle provision that can enable people to cycle on-road or off-road separated tracks that can remove the need for riders to use the footpaths which are not suitable for shared use.	22. Placeholder: To be developed alongside outcomes of Pedestrian Planning project and updates to the LoS.		Placeholder: To be developed alongside outcomes of Pedestrian Planning project and updates to the LoS.	Placeholder: To be developed alongside outcomes of Pedestrian Planning project and updates to the LoS.	Placeholder: To be developed alongside outcomes of Pedestrian Planning project and updates to the LoS.		
	Minimise street clutter.	Signing required to support scheme layout.	23. Signs informative and consistent but not overbearing or of inappropriate size.		Large number of signs needed, difficult to follow and/or leading to clutter.	Moderate amount of signing particularly around intersections.	Signing for wayfinding purposes only and not causing additional obstruction.		
	Secure cycle parking.	Ease of access to secure cycle and micromobility parking. Where necessary consider non-standard cycle parking for people with disabilities.	24. Diverse parking options for different vehicle classifications of bicycles and micromobility.		No parking opportunities are available apart from general street furniture e.g. lamp and sign posts.	Some secure parking provided but not enough to meet demand nor step free.	Secure parking provided, sufficient to meet demand and step free.		
Adaptability	Evolving cycle needs.	Providing flexible space for current and future user needs.	25. Ability to change the allocation of space without major physical works.		No space available for increasing facilities to meet user demands.	Space could be reallocated for less than 50% of the route.	Clear ability to reallocate space in the future.		
							Audit Score Total		

*For indicators with a critical factor, score is multiplied by three (Red = 0, Amber = 3, Green = 6)

Appendix B An All Ages and Abilities Cycle Facility Selection Tool

The tool can be downloaded from the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure B.1: An All Ages and Abilities Cycle Facility Selection Tool

Speed Limit[1]	Two-way traffic flow (peak hour pcus)	Off-road cycle track	Raised cycle track adjacent to kerb	On-road Protected Cycle Lane	Painted Cycle Lane	Mixed Traffic
20 km/h	< 200					
	200-400					
	> 400					
30 km/h	< 200					
	200-400					
	> 400					
40 km/h	< 200					
	200-400					
	> 400					
50 km/h	< 200					
	200 - 400					
	> 400					
60 km/h	Any					
≥ 80 km/h	Any	*				

Provision should be suitable for most users.

Provision is not suitable for all ages and abilities, and will exclude some users.

Provision not recommended because it will not be suitable for most users.

Provision not suitable.

Notes:

1. If the 85th percentile motor traffic speed data is recorded/available and is more than 10% above the speed limit, the next highest speed limit should be applied.

* Assumes adequate buffer from general traffic.

Appendix C Crossing Selection Guide

The tool can be downloaded from the Austroads website https://austroads.gov.au/publications/active-travel/ap-r724-25.

Figure C.1: Crossing Selection Guide

Speed Limit[1]	Two-way traffic flow (peak hour pcus)	At-grade Cycle Priority Crossing*	Uncontrolled Crossing*	Raised Priority Crossing*	Signal-controlled Crossing	Grade-separated Crossing
30 km/h	< 200		**			
	Any		**			
40 km/h	Any		**			
50 km/h	< 200		**			
	200-400		***			
	> 400					
60 km/h	< 200					
80 km/h	Any					
> 80 km/h	Any					

Provision should be suitable for most users.

Provision is not suitable for all ages and abilities, and will exclude some users.

Provision not recommended because it will not be suitable for most users.

Provision not suitable.

Notes:

1. If the 85th percentile motor traffic speed data is recorded/available and is more than 10% above the speed limit, the next highest speed limit should be applied.

* Provision not recommended where more than one traffic lane per direction is needed to be crossed

** Consider providing a refuge island or kerb extensions if a priority crossing is not feasible and the road width is suitable

*** Refuge island recommended if a raised priority crossing is not feasible, and the road width is suitable

Austroads

Level 9, 570 George Street
Sydney NSW 2000 Australia

Phone: +61 2 8265 3300

austroads@austroads.gov.au
www.austroads.gov.au