Inquiry into e-mobility safety and use in Queensland

Submission No:	1099
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Submitter Comments:	

Introduction and overview

At this point in history, e-scooters are doing to the footpath (and streets) what Uber (and other rideshare apps) did to the Taxi Industry: causing disruption and change through new technology, fitting of the definition of ***'disruptive technology'*** (https://dictionary.cambridge.org/dictionary/english/disruptive-technology). As an overview of the current situation, this 12-minute video from the US CNBC gives a good summary overview of Personal Mobility Device (PMD) issues in the US https://www.youtube.com/watch?v=9LtLVNUcnc8, mirroring Australian issues. Queensland has embraced this technology and has been leading the way nationally in responding and managing this new technology, which is now clearly here to stay.

The aim of this submission is to draw attention to **research directions and lines of inquiry** that may be used to help identify 'workable' solutions, that can be put forward as recommendations by the Committee. Throughout this submission I have made suggestions of subject matter experts who should be given consideration for an invitation to appear before the Committee (highlighted in green) and pertinent questions that the Committee may wish to consider asking at the public hearings (highlighted in blue). The submission also makes references to both international cities and Queensland case studies that the Committee may consider visiting for research purposes (highlighted in yellow). This submission does not duplicate information already provided but has put forward new ideas and additional information for the Committee's consideration. Although many of these ideas will not solve all the issues immediately (noting there will always be outliers and those intent on rule-breaking), these ideas could provide incremental safety improvements initially, followed by long-term change if supported and implemented state-wide.

The information in this submission has been structured in line with the Inquiry's Terms of Reference:

1. Benefits of e-mobility (including both Personal Mobility Devices (PMDs), such as e-scooters and e-skateboards, as well as e-bikes) for Queensland - including sections on: the ***cost of living*** *benefits,* ***tourism*** *industry benefits and the* ***safety benefits*** *of PMD-permitted infrastructure (physical separation). The safety benefits include multiple sub-sections: rationale and* ***technical publications****, locations (precedent and constructability), finding space for bicycle lanes,* ***retrofitting*** *separation to on-road bicycle lanes, reductions in PMD* ***usage of footpaths*** *and converting shared paths into separate paths*.

2. Safety issues associated with e-mobility use, including increasing crashes, injuries, fatalities, and community concerns; - including sections on: *PMD* ***parking (and footpath) safety****, utilising* ***bicycle parking*** *for PMDs, current Australian PMD* ***safety research****, pedestrian & PMD* ***crash risk****, PMD* ***speed data****, design and operation of PMDs, full face helmets/PMD seats and PMD crashes where* ***alcohol consumption and inebriation*** *are a contributing factor.*

4. Suitability of current regulatory frameworks for PMDs and ebikes, informed by approaches in Australia and internationally - including sections on: ***Registration*** *and regulatory/safety issue of* ***roads with no footpaths.***

5. Effectiveness of current enforcement approaches and powers to address dangerous riding behaviours and the use of illegal devices - including sections on: ***Enforcement Effectiveness,*** *financial incentives and disincentives ('carrots' and 'sticks') to* ***limit the take-up of non-street-legal PMDs****, and use of* ***enforcement revenue****.*

8. Broad stakeholder perspectives, including from community members, road user groups, disability advocates, health and trauma experts, academia, the e-mobility industry, and all levels of government - including sections on: ***Lack of data*** *– availability,* ***relative crash risk*** *data,* ***private PMD ownership*** *'snapshot', Technology and Innovation****.***

This submission has not made any comment on the following Terms of Reference items, as they are already more than adequately addressed in the submitted TMR written brief to the Inquiry:
3. Issues associated with e-mobility ownership, such as risk of fire, storage and disposal of lithium batteries used in e-mobility, and any consideration of mitigants or controls;
6. Gaps between Commonwealth and Queensland laws that allow illegal devices to be imported and used;
7. Communication and education about device requirements, rules, and consequences for unsafe use;

PMDs are an affordable transport option, offering cost-of-living relief for residents and convenience for visitors to Queensland. The development of PMD-permitted infrastructure, such as physically separated bicycle lanes and paths, improves safety for PMD riders, cyclists, and pedestrians, with many successful examples already in place across the state. While PMD parking on footpaths can create clutter hazards, these issues can be addressed through new requirements and the use of bicycle parking infrastructure. Research indicates that PMDs operate similarly to bicycles, which have long been legal on Queensland footpaths, allowing existing infrastructure to be used. However, PMDs are more vulnerable to pavement defects, highlighting the need for careful planning and maintenance. This inquiry provides an opportunity to review and refine existing regulations, leveraging research findings to expand or improve systems where necessary. Questions have been raised about the potential consequences of proposed solutions, and self-enforcing systems have been suggested to reduce the enforcement burden on police while directing safety efforts where they are most needed.

To quote Professor Geoff Rose of the ***Monash Institute of Transport Studies****, Civil Engineering Department, Monash University* (https://www.ntc.gov.au/submission_data/124): *"The challenges facing our urban areas require fresh thinking because the* ***existing paradigm is not delivering the outcomes expected or needed by the community****. The concepts and ideas presented here need further development but* ***are based on sound principles which would provide a defensible basis for the evolution of policy****. Managing this socio-technical transition with clearer* ***consideration of management of both kinetic energy and mobility space*** *requires further evidence to inform policy development.* ***Pilot or demonstration projects****, which are rigorously evaluated, would have a valuable role to play and need to be embraced as a priority in order to develop measured policy response to these emerging innovative types of vehicles."*

1. Benefits of e-mobility (including both Personal Mobility Devices (PMDs), such as e-scooters and e-skateboards, as well as e-bikes) for Queensland

Cost of living benefits of private PMDs

Research undertaken in 2022 by Griffith University on the private ownership and use of personal mobility devices (PMDs) in Southeast Queensland found that the first and second preference reason to use a privately owned PMD was because it was considered **cost-effective transportation**. Given the current '**cost of living'** issues that many people in Queensland are facing at the moment, this may reflect some of the popularity of private PMDs. However, it should be noted that this research was undertaken prior to the introduction of 50c fares on public transport, which has also been a Queensland Government '**cost of living'** initiative.

The table below is a direct extract from the research report: *Understanding private ownership and use of personal mobility devices (PMDs) in South East Queensland* by Abraham Chik-Keung Leung, and Matthew Burke, published in 2022 at the 26th International Conference of Hong Kong Society for Transportation Studies (https://research-repository.griffith.edu.au/server/api/core/bitstreams/f39c8b97-7f3f-4009-a6b5-e303508d2d5b/content)

Table 2. Top five reasons to use privately owned PMD

Rank	Reasons	Preference rank 1st	2nd	3rd	4th	5th	Weighted total score*
1	*Cost effective*	22	25	16	15	11	299
2	*Recreation*	24	11	7	12	9	218
3	*Replace Car*	14	13	14	16	14	210
4	*Replace PT*	16	8	13	13	9	186
5	*Less Effort*	7	17	9	14	12	170
6	*Avoid Parking*	10	8	10	15	8	150
7	*Avoid Traffic*	4	6	14	11	16	124
8	*Environmental*	3	14	9	6	14	124
9	*Longer Distance*	8	6	10	9	8	120
10	*Own to use e-mobility more often*	3	6	5	7	7	75
11	*Health*	3	4	6	1	2	53
12	*COVID*	5	1	4	1	5	48
13	*Fitness*	1	3	5	2	1	37
14	*Hilly*	1	3	2	4	6	37
15	*Ride with friend/family*	1	2	2	1	2	23
	Other	6	1	2	1	4	46

(*5 scores given for 1st preference, 1 score given for 5th preference)

The research authors, Dr Abraham Leung and Professor Matt Burke of Griffith University (https://www.griffith.edu.au/cities-research-institute/research/transport-group) are both experts in this field and should be given consideration for an invitation to appear before the Committee.

- Question to Emergency Services: *Given the low cost of PMDs, is there any evidence to suggest that battery fires are more likely to occur in low-income shared housing with multiple e-devices?*

US research (https://doi.org/10.17226/26756) has found that: "*Lower income e-scooter users in Portland were more likely to say that their e-scooter trip replaced walking or transit, in contrast higher income Portlanders were more likely to say that it replaced a car trip. These findings about trip replacement are underscored by the distribution patterns of e-scooters and e-scooter rider ship within cities, including both where e-scooter companies want to concentrate their fleets and where fleets naturally concentrated during the day.*"

Tourism Industry benefits of PMDs

Dr Richard Buning (https://business.uq.edu.au/profile/1340/richard-buning) is a Senior Lecturer within the tourism discipline in the UQ Business School and the research lead for the **UQ Micromobility Research Cluster**. Specific publications of relevance to the work of this committee are listed below:

Buning, Richard J., Hardy, Anne, Corcoran, Jonathan, Pojani, Dorina, Zou, Zhenpeng and Chen, Milly (2025).Charting a research agenda for micromobility and tourism. Annals of Tourism Research Empirical Insights, 6 (1) 100164, 1-5. doi: 10.1016/j.annale.2024.100164

Buning, Richard J., Haworth, Narelle and Lieske, Scott (2024, 09 19).E-scooter riders flouting rules, blocking footpaths and causing accidents? We need to use smart solutions (and bust the myths) *The Conversation*

Buning, Richard J. and Pham, Wendy (2024, 03 14).The six reasons why Brisbane residents and visitors don't ride e-scooters *Zag Daily*

Buning, Richard (2023, 10 26).Micromobility clearly boosts tourism in Brisbane *Zag Daily*

Buning, Richard J. and Pham, Wendy (2023, 09 11).Five years on, Brisbane's e-scooters and e-bikes are winning over tourists and residents as they open up the city *The Conversation*

Buning, Richard, Corcoran, Jonathan, Rahbar, Maisie, McKercher, Bob, Pojani, Dorina, Sigler, Thomas, Zou, Frank and Hardy, Anne (2023, 01 25).Why e-scooters are the 'public mobility glue' for urban transport *Contact Magazine*

Scott Lieske, Buning, Richard, Pyrohova, Svitlana, Bean, Richard and Jindalucksawong, Paul (2024).E-scooter movement data analysis; Exploring use of active transport facilities, travel speeds, helmet use, and scooter types. Unpublished: Unpublished.

Buning, Richard J., Pham, Wendy and Chen, Milly (2023).So, what do you think about eScooters and eBikes?: Understanding visitor and resident experiences and perceptions with micromobility in Brisbane. Brisbane, Qld, Australia: The University of Queensland, Business School.

Dr Buning has undertaken extensive research on PMDs (both private and public/shared) and should be given consideration for an invitation to appear before the Committee.

Safety benefits of PMD-permitted infrastructure (physical separation)

Rationale and technical publications

It is possible (and can be cost-effective) to provide physical separation to on-road bicycle lanes, enabling them to become PMD-permitted bicycle lanes (TORUM-QRR s252C). There are both technical publications available and several Queensland case studies (and current projects) available to see these in operation. The research shows that provision of PMD-permitted bicycle lanes results in fewer PMDs using the footpath, resulting in less conflict with pedestrians. PMD-permitted bicycles lanes that are physically separated from general motor vehicle traffic also provide safety benefit to bicycle riders.

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"With **similar operating speeds and characteristics**, e-scooter riders and bicyclists have **similar infrastructure needs**."*

The Royal Australasian College of Surgeons (RACS) recognises the impact that e-mobility devices are having on individuals and health systems when they are involved in a crash. To improve e-mobility safety RACS, in conjunction with the Australasian Injury Prevention Network, have developed a position paper with a series of recommendations, available on this web-site: https://www.surgeons.org/about-racs/position-papers/electric-mobility-in-australia-2022

RACS supports this Infrastructure recommendation to improve e-mobility safety: "*Greater provision of **protected** and connected infrastructure, and clear signage, for e- mobility device use, including **non-shared paths that safely separate different transport modes**."*

Austroads ***Integrating Safe System with Movement and Place for Vulnerable Road Users*** Report (https://austroads.gov.au/publications/road-safety/ap-r611-20) documents Safe System requirements for interactions between bicycles and motor vehicles in on-road environments are separation and speed reductions (https://austroads.gov.au/publications/road-safety/web-r611-20). Specifically, it states that:

*"Safe System-aligned measures for pedestrians and cyclists **require either full separation of pedestrians and cyclists from vehicles** or, where this cannot practically be achieved, **low-risk travel speeds**, typically not exceeding 30 km/h."*

*"**Full separation, by definition, eliminates the likelihood of crashes**, while travel speeds not exceeding 30 km/h help to ensure impacts at legal speeds have **a low risk of death or severe injury** to vulnerable road users."*

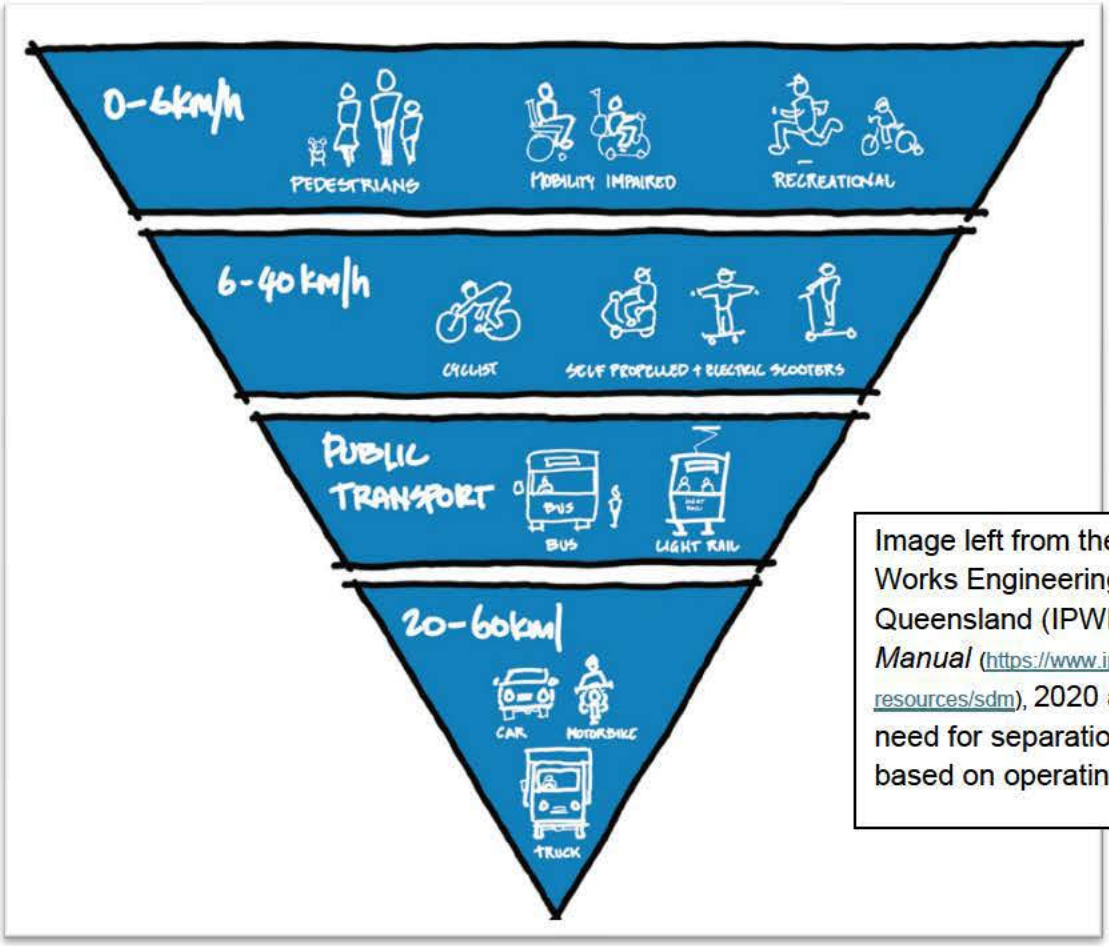


Image left from the Institute of Public Works Engineering Australia, Queensland (IPWEAQ) *Street Design Manual* (https://www.ipwea-qnt.com/products-resources/sdm), 2020 also recognises the need for separation of path users based on operating speed.

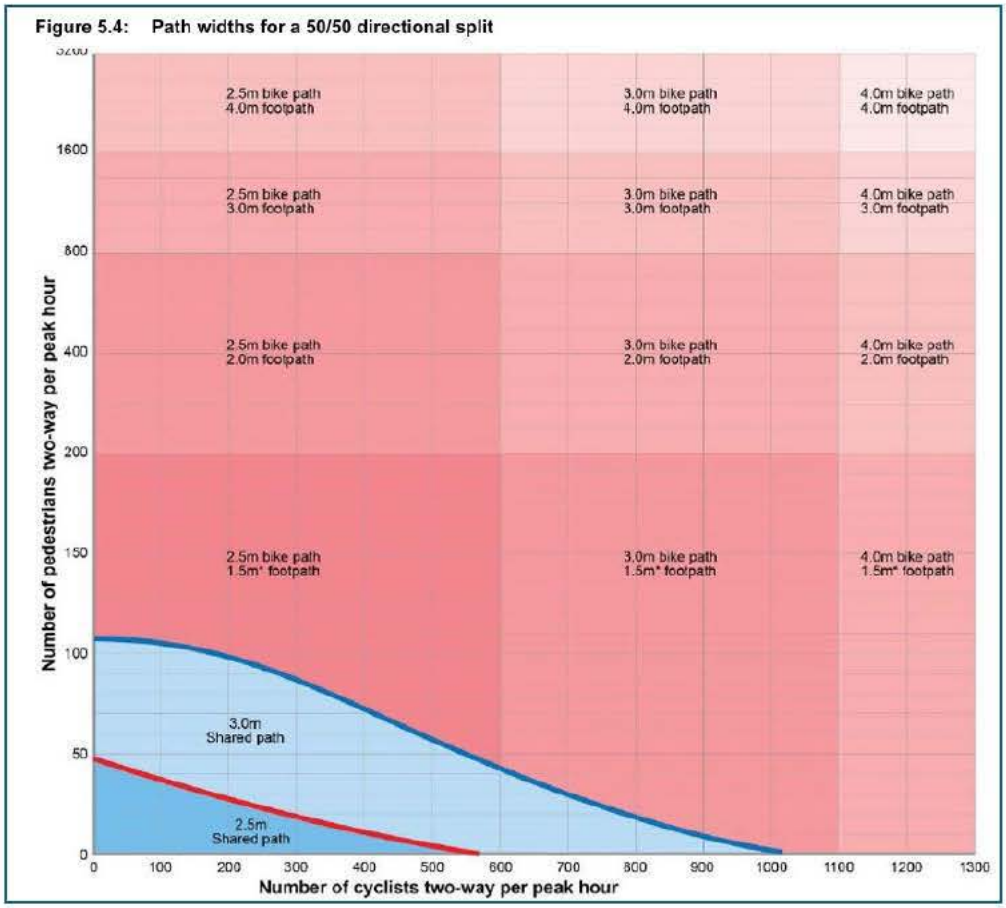


Image left from the Austroads *Guide to Road Design Part 6A Paths for Walking and Cycling* (https://austroads.gov.au/publications/road-design/agrd06a), 2021 also recognises the need for separation of path users based on volume and path width.

A 2024 presentation by Professor Narelle Haworth of CARRS-Q to the Asia Pacific Cycling Conference (https://www.asiapacificcyclingconference.com.au/program) in Brisbane summarised the available research on bicycle lane safety and found that:

- ***Only exclusive (physically separated) bicycle lanes improved safety in all situations***
- *Protected bike lanes (North America cycle tracks) are associated with* ***both decreased likelihood and severity*** *of cyclist-involved crashes*
- *Bike lanes with lighter separation (e.g., parked cars, posts, low curb)* ***were no safer than major roads without bicycle facilities***
- *Protected bike lanes with heavy separation (tall, continuous barriers or grade and horizontal separation) were associated with 90% lower risk*
- ***Bike and e-scooter riders move off the footpath onto protected bike lanes*** *– likely improving pedestrian safety and amenity*
- *Exclusivity, colour, buffers, and protection are often helpful (more so than pavement markings only)*

The TMR Queensland Road Safety Strategy and Action Plan (QRSAP) https://www.tmr.qld.gov.au/Safety/Road-safety/Road-safety-strategy-and-action-plans/Strategy-and-action-plans states:

"To support our vulnerable road users, ***TMR provides physically separated infrastructure between bicycle riders and motor vehicles*** *where possible.*

Where pedestrian demand is also high, ***we separate bicycle and pedestrian facilities****.*

Where it is not possible to separate these user groups, ***we focus on reforming speed limits****."*

The TMR **Cycle Network Local Government Grants Program** (https://www.tmr.qld.gov.au/Travel-and-transport/Cycling/Cycling-grants/Cycling-infrastructure-grants) Active Transport Investment Program Technical Guidance (https://www.tmr.qld.gov.au/_/media/travelandtransport/cycling/cycling-infrastructure-grants/active-transport-investment-program-technical-guidance.docx?rev=519cb4935bb040489303e0dd2b43a483&sc_lang=en&extension=docx&size=8972065&hash=1F1ECF24846626FB3AC34D016FCE07BB) also **prioritises funding** to projects that incorporate physical separation from motorised traffic.

Economic Development Queensland (EDQ) Priority Development Areas (PDAs) are parcels of land within Queensland identified for new development to deliver significant benefits to the community (https://www.edq.qld.gov.au/our-work/priority-development-areas-pda). Several recent projects have embedded physically separated cycle track provision into these projects. Examples include:

- **Hamilton Northshore (2018):**
  - Streetview Harbour Rd https://maps.app.goo.gl/QAZvuGUWeDA5kMzS6
  - Streetview Hercules St https://maps.app.goo.gl/iHVe8w2i69YpCBrE6
- **Carseldine GOP (2020):** Streetview Plaza Pl https://maps.app.goo.gl/Rv7bD89rAkXEhXRL7
- **Aura - Caloundra South (2018):**
  - Streetview Baringa Dr https://maps.app.goo.gl/AxRGwu4GzNofJk4b9
  - Streetview Turquoise Pl https://maps.app.goo.gl/BRLa9uAAUCrnXRDt7
  - Streetview Bells Reach Dr https://maps.app.goo.gl/Uq4eHTNJd7j8QNEv8

Technical Publications available include:

TMR Technical Guideline - Selection and design of cycle tracks - https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Cycling/Selectiondesignofcycletracksguideline.pdf?la=en

TMR Bicycle lane separation devices guideline (extract below) **-** https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Traffic-management/QGTM/QGTM-Pt-10-Guideline-Bicycle-lane-separation-devices.pdf?la=en

Figure 2.1(a) – Key features of preferred treatment

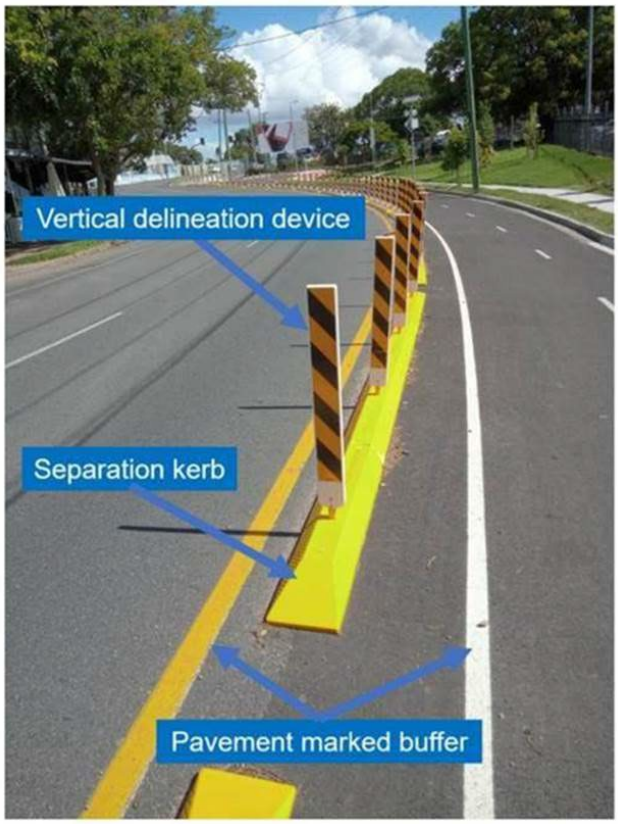


Figure 2.1(b) – Example of mountable separation kerb for driveway access

The locations listed below are all historical **Queensland examples of retrofitted separated cycling infrastructure** that is PMD-permitted, highlighting the prevalence of this infrastructure:

- Airport to Lilly protected cycle lane, Cairns:
  - Streetview 2023 (after) https://maps.app.goo.gl/PE9udnWAhpcwbWpD9
  - Streetview 2022 (before) https://maps.app.goo.gl/LKMdps7uzUYMbcQf7
- Brisbane Rd & River Esplanade, Mooloolaba
  - Project Evaluation: https://www.tmr.qld.gov.au/_/media/travelandtransport/cycling/research/infrastructure-benefit-evaluations/evaluation-mooloolaba-to-minyama-bikeway.pdf?sc_lang=en&hash=C8BAB622CE051591DA8AC20A375CB3C9
  - Streetview River Esp 2017 (after) https://maps.app.goo.gl/j8WUnvmWxCpUeS889
  - Streetview River Esp 2014 (before) https://maps.app.goo.gl/uCSMpEA6UWzowGDV7
  - Streetview Brisbane Rd 2016 (after) https://maps.app.goo.gl/kxB3mf3B2yVeLaFD8
  - Streetview Brisbane Rd 2014 (before) https://maps.app.goo.gl/9XyDyq3VoYsVrUHT6
- CityLink Cycleway, Edward St and Elizabeth St, Brisbane
  - Project web-site: https://yoursay.brisbane.qld.gov.au/citylink-cycleway-trial with plans for expansion: https://bq.org.au/news/brisbanes-citylink-cycleway-expands/

    - Streetview Elizabeth St 2021 (after) https://maps.app.goo.gl/BbEJsxSX7zyYH79U8
    - Streetview Elizabeth St 2020 (before) https://maps.app.goo.gl/EWXhxG9817vm13QA8
    - Streetview Edward St 2021 (after) https://maps.app.goo.gl/K7s2CGLrAwYNEeRa6
    - Streetview Edward St 2020 (before) https://maps.app.goo.gl/TGA1dpJUKkLrE58B7
- Gold Coast Highway (Brisbane Rd) between Jacob Drive and Babbidge St
    - Streetview 2022 (after) https://maps.app.goo.gl/viTQszJcV6dKMmuY9
    - Streetview 2021 (before) https://maps.app.goo.gl/pogDHpJeznDcAcT77
- Woolloongabba Bikeway, South Brisbane
    - Streetview 2019 (after) https://maps.app.goo.gl/gs6vBWHQRkcGnzof6
    - Streetview 2018 (before) https://maps.app.goo.gl/boNVEHxKBrL29aJt6
    - Streetview 2020 (after) https://maps.app.goo.gl/cKVCem5eFHu7ajyr7
    - Streetview 2018 (before) https://maps.app.goo.gl/81EPgC82S96o8Gd56
- North Brisbane Bikeway, Albion, Brisbane
    - Project web-site: https://www.tmr.qld.gov.au/travel-and-transport/cycling/infrastructure-projects/north-brisbane-bikeway
    - Streetview Mawarra St 2020 (after) https://maps.app.goo.gl/Ve2r4y3pXhdUzAy98
    - Streetview Mawarra St 2017 (before) https://maps.app.goo.gl/gxuno6tXxHS45WVb9
    - Streetview Bridge St 2020 (after) https://maps.app.goo.gl/4RPmu5G76nbYopun6
    - Streetview Bridge St 2017 (before) https://maps.app.goo.gl/zbcMSRxdGBtAxsPLA
    - Streetview Dickson St 2021 (after) https://maps.app.goo.gl/C4AepSrRZYzYYJ8m6
    - Streetview Dickson St 2020 (before) https://maps.app.goo.gl/ehe2pKRz2JgBPzGb7
    - Streetview Dickson St 2021 (after) https://maps.app.goo.gl/kaUnYdjg1uqhXHj88
    - Streetview Dickson St 2019 (before) https://maps.app.goo.gl/PJS45hrCJcqSjajj6
- George Street, Brisbane CBD
    - Streetview 2013 (after) https://maps.app.goo.gl/nHNiNKW1tLwzmkos6
    - Streetview 2007 (before) https://maps.app.goo.gl/gvoVLHkoJqmqhUu59
- Mann St, Cairns
    - Project evaluation: https://www.tmr.qld.gov.au/_/media/travelandtransport/cycling/research/infrastructure-benefit-evaluations/evaluationmannstreetcycleway18june2018.pdf?sc_lang=en&hash=A20206C63BA6565503C394FFDA4D0F38
    - Streetview 2019 (after) https://maps.app.goo.gl/yp1dEkmzWPNSRV269
    - Streetview 2015 (before) https://maps.app.goo.gl/QAmtoaGeo15msehu5
- Olsen Ave, Gold Coast:
    - Streetview 2025 (after) https://maps.app.goo.gl/DHdYKGsMTbMfSTc76
    - Streetview 2021 (before) https://maps.app.goo.gl/xpPDxWbuTaDDsiFdA
- Buchanan St, Rothwell:
    - Streetview 2023 (after) https://maps.app.goo.gl/rUxXo9TraRYUz9t4A
    - Streetview 2019 (before) https://maps.app.goo.gl/nnXffTRYTmaCZ4Vz5
- Gynther Rd, Rothwell:
    - Streetview 2017 (after) https://maps.app.goo.gl/3zkG8mL8MQMTX7N6A
    - Streetview 2015 (before) https://maps.app.goo.gl/NE9NMRhsrTxtKuod7
- Sandgate Rd, Nundah:

    - Streetview 2021 (after) https://maps.app.goo.gl/pj8ZVRkjzYifBVQf7
    - Streetview 2020 (before) https://maps.app.goo.gl/XCG4HYHQxaoESL6q9
- Tank St, Brisbane CBD – Streetview 2009 https://maps.app.goo.gl/kjAT9bykyJxNafSv7
- Shafston Avenue, Kangaroo Point, Brisbane
    - Streetview 2013 (after) https://maps.app.goo.gl/onh9Db2zpCQpELAPA
    - Streetview 2009 (before) https://maps.app.goo.gl/63hhkCqZpMKhukFUA
- Bridge Road, Mackay (between Milton Street and Paradise Street)
    - https://www.mackay.qld.gov.au/__data/assets/pdf_file/0005/153374/Active_Towns_annual_report_year_1.pdf
    - https://www.tmr.qld.gov.au/-/media/Travelandtransport/Cycling/Participation-and-encouragement/Active-Towns-Pilot-Evaluation.pdf?la=en
- Aeroglen Cycleway, Cairns https://statements.qld.gov.au/statements/54183
    - Streetview Aeroglen Drive https://maps.app.goo.gl/JzEXe8fJe1rzJsxV9
    - Streetview 2015 Highway https://maps.app.goo.gl/LzhtZMmtDpmLsgQDA
    - Streetview 2015 Hospital https://maps.app.goo.gl/HY2pacmYzDG7PrND9
    - Streetview 2015 RAAF Memorial https://maps.app.goo.gl/taQM9Kx7HkYrt263A
    - Streetview 2015 Esplanade https://maps.app.goo.gl/pY2RhfLihppKDDGb7
    - Streetview 2015 Esplanade https://maps.app.goo.gl/fDmFTn4dke47ib5FA

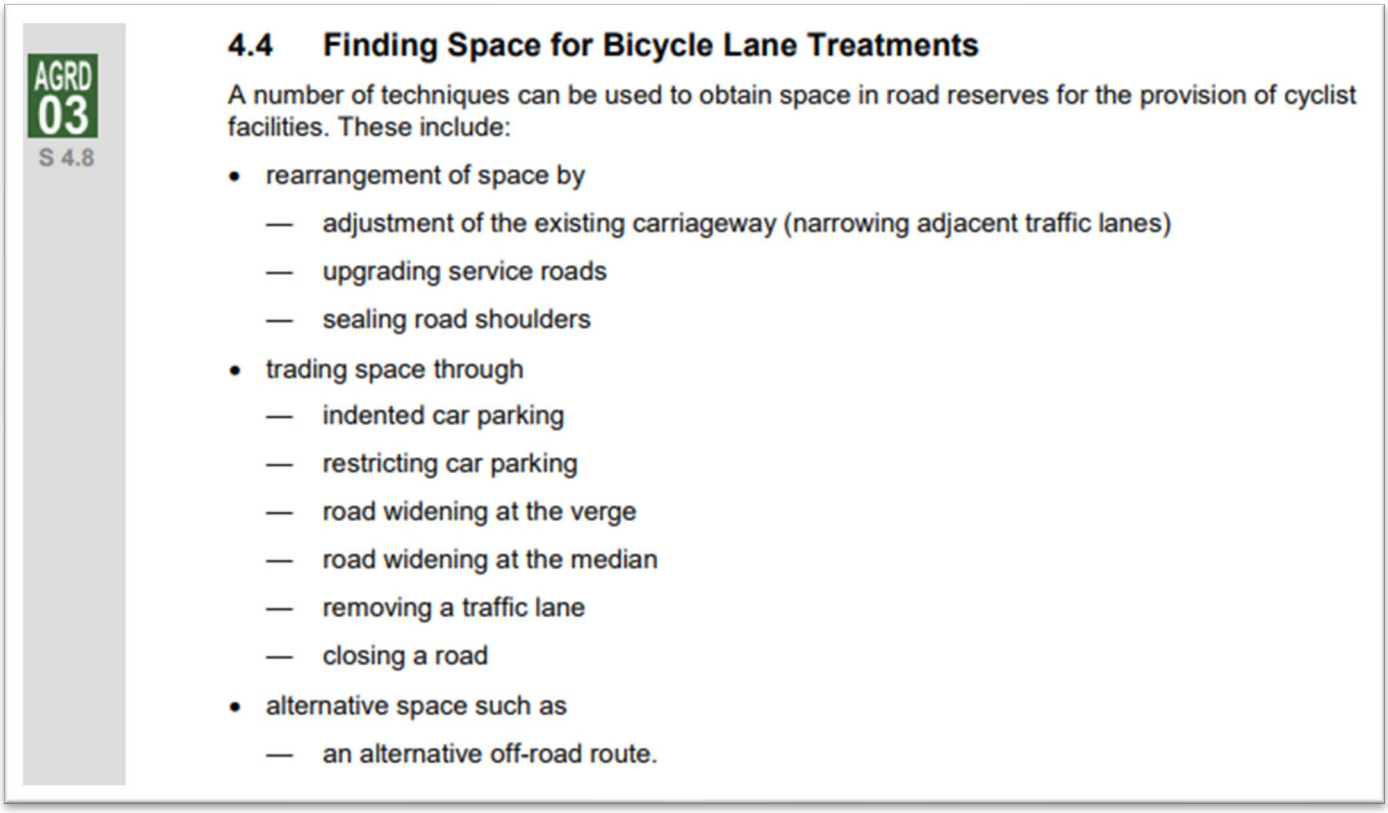
Dr Kelly Bertolaccini (https://experts.griffith.edu.au/28105-kelly-bertolaccini) of Griffith University has research experience on the topic of retrofitting cycling infrastructure in Queensland and should be given consideration for an invitation to appear before the Committee.

The Brisbane City Council Sylvan Road Bikeway and Local Network Improvements Project is an example of a **retrofit separation project currently underway** working to provide a separated active transport connection between the Western Freeway Bikeway and the Bicentennial Bikeway for people of all ages and abilities. Additional information is available here: https://yoursay.brisbane.qld.gov.au/sylvan-road-bikeway-and-local-network-improvements-project & https://www.pennywolff.com/news/sylvan-road-bikeway-and-local-network-improvements-project

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"E-scooter users have **consistently requested bicycle infrastructure** to feel safe riding e-scooters in the street (Glenn et al. 2020; Portland Bureau of Transportation and Alta Planning & Design 2020; Denver Public Works 2019; Chang et al. 2019; Bird Rides, Inc. 2019; Young et al. 2019). **E-scooter users' preference to ride in bicycle lanes aligns with pedestrians' desire that e-scooter users not ride on sidewalks**."*

Finding space for bicycle lane treatments

The extract below of Section 4.4 of the *Cycling Aspects of Austroads Guides (2017 Edition)* (https://austroads.gov.au/publications/road-design/ap-g88-17) publication provides ten methods for **finding space for bicycle facilities in road reserves**. Some of these methods can also be applied to retrofitting separation to on-road bicycle lanes.



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4.4 Finding Space for Bicycle Lane Treatments

A number of techniques can be used to obtain space in road reserves for the provision of cyclist facilities. These include:

- rearrangement of space by
  - adjustment of the existing carriageway (narrowing adjacent traffic lanes)
  - upgrading service roads
  - sealing road shoulders
- trading space through
  - indented car parking
  - restricting car parking
  - road widening at the verge
  - road widening at the median
  - removing a traffic lane
  - closing a road
- alternative space such as
  - an alternative off-road route.

It should be noted that bicycle lane treatments are already well-established practice and are in use in Queensland and across Australia.

This open-source map provides an indication of the length of cycle paths and safe streets in every Australian council, including on-road bicycle lanes: https://australiancyclewaystats.jakecoppinger.com/

Retrofitting separation to on-road bicycle lanes

According to Brisbane City Council Meeting Minutes from 30 August 2022 (https://docs.brisbane.qld.gov.au/Council%20and%20Committees/2022/09-Sep/06%20Sep/Council/Council%20-%20Minutes%20-%20Ordinary%20-%2030%20August%202022.docx), a 12-month trial of on-road bicycle lane retrofit separation devices (RSDs) was undertaken at several locations from 27 May 2021. The retrofit of on-road bicycle lanes with physical separation devices changes it into a PMD-permitted bicycle lane (TOURM s252C).

- Question for Brisbane City Council: *What was the outcome of the 2021 retrofit separation devices (RSDs) project? Is there an active program of retrofit separation devices to on-road bicycle lanes across the Brisbane City Council LGA?*

Photos taken by the submission author, Morningside, Brisbane.

Prominent recent examples of retrofitting separation to on-road bicycle lanes in the Brisbane CBD include the Woolloongabba Bikeway (2019) and the CityLink Cycleway (2021). Photos below taken by the submission author.

In CBD locations with **high density of street furniture** and pedestrian footpath congestion or pavement defects, a separated facility may be preferred by PMDs, Bicycles and Motorised Mobility Devices (MMDs).

Reductions in PMD usage of footpaths

- Question for Brisbane City Council: *What was the key finding from the CityLink Cycleway Evaluation regarding e-scooter usage on the footpath vs on CityLink Cycleway? Were similar results seen at the Woolloongabba Bikeway?*

Some findings are available in this publication: Abraham Leung, Matthew Burke & Brendan O'Keeffe, 2024, *Should we have 'pop-up' bikeways? Insights from Brisbane's CityLink Cycleway Trial*, Australasian Transport Research Forum 2024 Proceedings, 27-29 November, Melbourne, Australia - https://australasiantransportresearchforum.org.au/wp-content/uploads/2025/02/ATRF2024_Resubmission_123.pdf

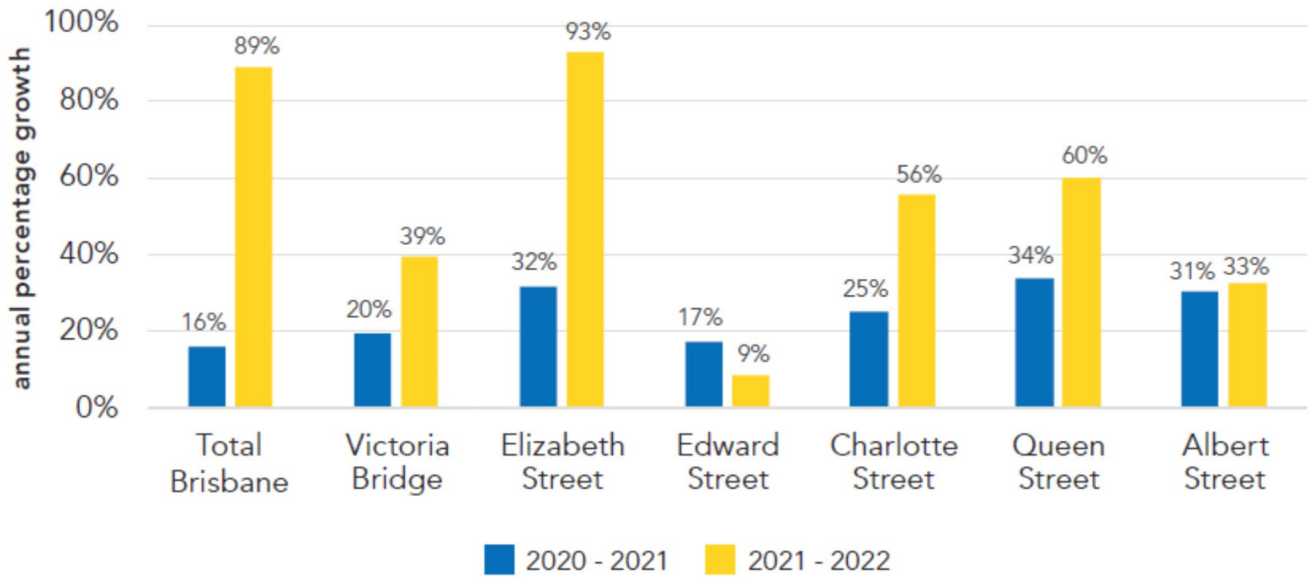


Figure 10: Growth rate of e-scooter trips per street in city centre

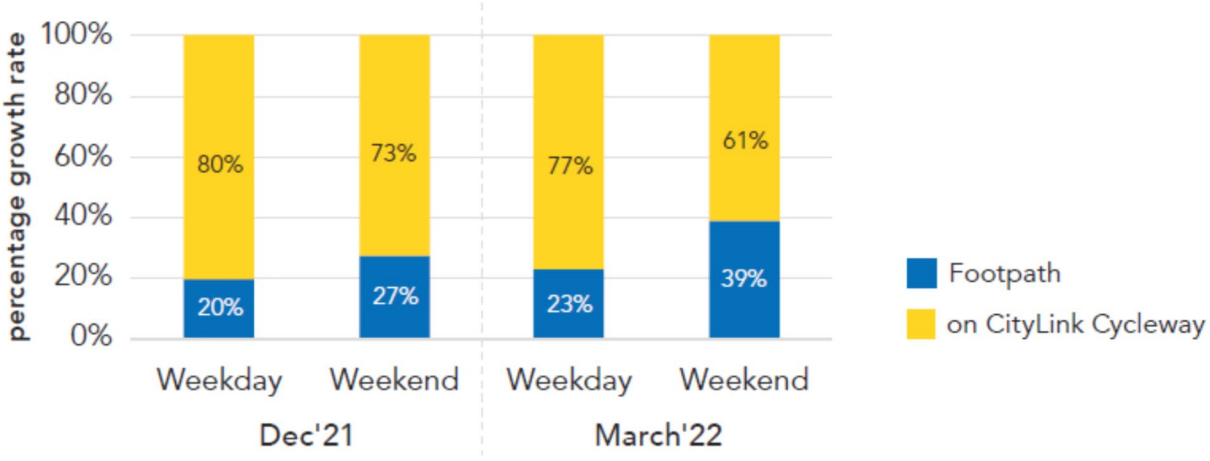


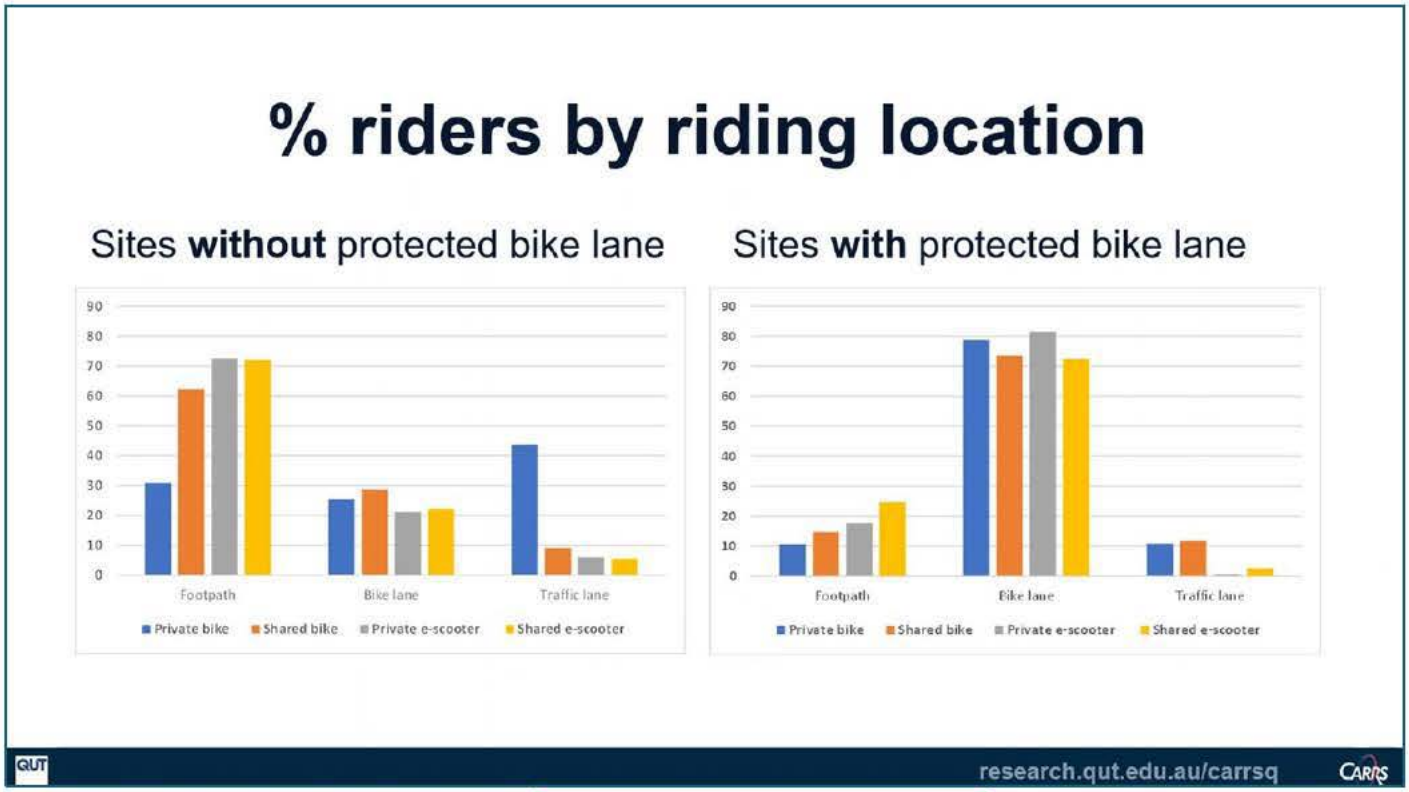
Figure 11: E-scooter usage on Elizabeth Street

Source: Brisbane City Council - CITYLINK CYCLEWAY KEY FINDINGS REPORT OCTOBER 2022

The chart **above** with data from March 2022 shows an average of 30% of e-scooters using the footpath on the CityLink Cycleway. The chart **below** is from data collected at the same location six months later in October 2022 and shows an average of 10% of e-scooters using the footpath.

This illustrates that over this period there was a **significant decrease in e-scooter usage on the footpath**. This is in line with CARRS-Q research (chart below) from Brisbane showing that **when physically separated on-road bicycle lanes are provided, they are preferred to the use of footpaths by both PMDs and bicycles**.

Source: *"Footpath User Management – Pedestrians, Bicycles & Personal Mobility Devices (PMDs): what the data is telling us"* (2023) IPWEA-QNT Annual Conference, Institute of Public Works Engineering Australia, Queensland Branch (IPWEA-QNT), 10-12 October 2023, Gold Coast, Queensland https://ipweaq.eventsair.com/ipweaqnt23/program

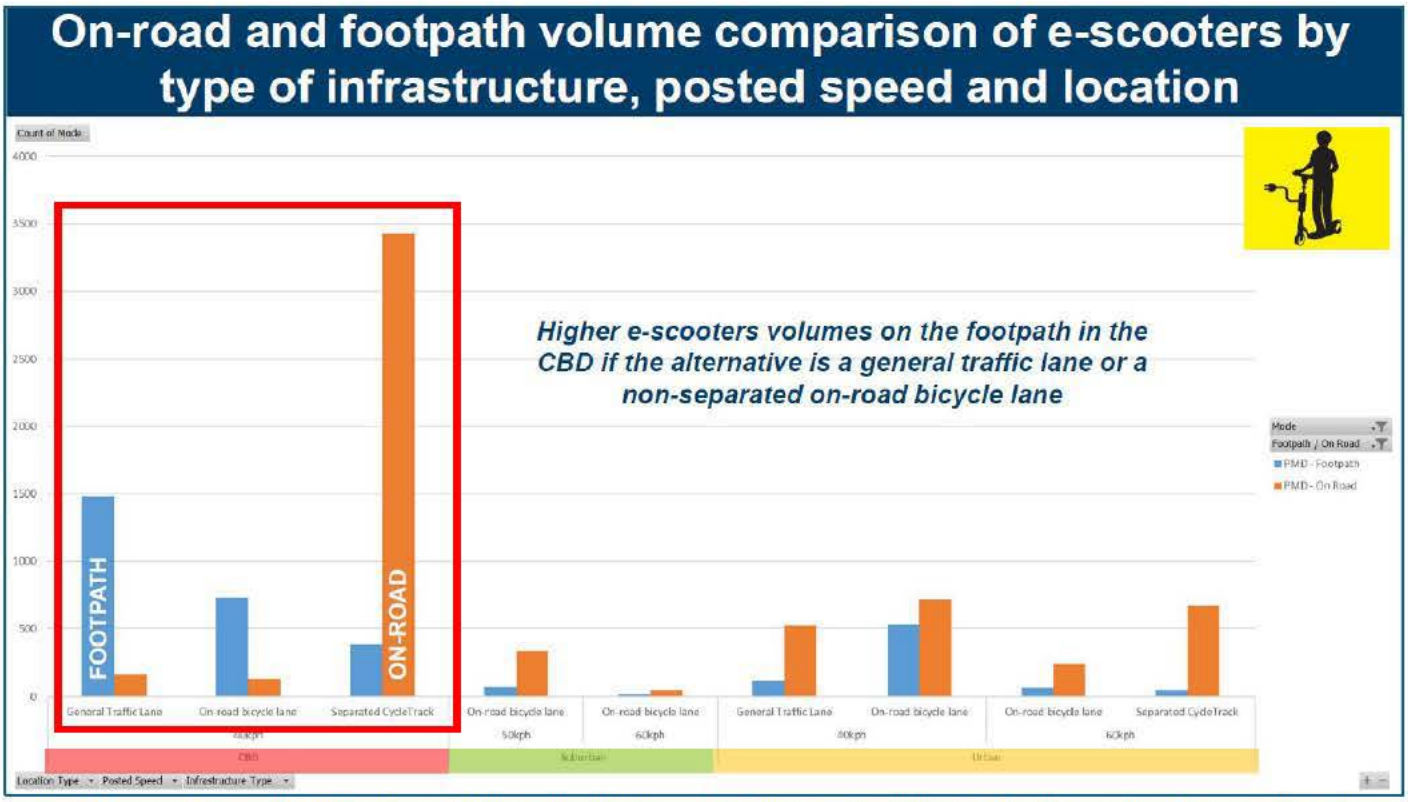


Brisbane data from: Haworth, N. (2023). *Micromobility outcomes in Australia*. Keynote presentation to the Trafinz Conference, Auckland, 7 September 2023. https://airdrive.eventsair.com/eventsairaueprod/production-harding-public/90a0dea51e224eb8a406a8e5b8859b65

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *" A program evaluation of the first pilot in Portland found that* ***sidewalk riding increased when a bike lane was not available or where motor***

***vehicle speeds were higher**. The Portland Bureau of Transportation (2019) also noted that **sidewalk riding served as an indication** that e-scooter riders did not feel safe riding with motor vehicles in the roadway."*

This is also supported by data (chart below) from Brisbane that shows relative volumes of PMDs **on the footpath** (**blue**) and PMDs **on the road** (**orange**) at various locations over several days in 2022. This chart shows revealed preference data that **when physically separated on-road bicycle lanes are provided, they are preferred to the use of footpaths**.



Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

This finding is also reflected in additional research form the US, key extracts below:

- Insurance Institute for Highway Safety (2023) *"Low caps on e-scooter speeds encourage sidewalk riding"* https://www.iihs.org/news/detail/low-caps-on-e-scooter-speeds-encourage-sidewalk-riding
- Cicchino, Jessica B. / Chaudhary, Neil K. / Solomon, Mark G. (2024) *"How are e-scooter speed limiter settings associated with user behavior? Observed speeds and road, sidewalk, and bike lane use in Austin, TX, and Washington, DC"* https://www.iihs.org/research-areas/bibliography/ref/2284

To help understand the effect of different maximum speeds, IIHS researchers compared rider behavior in Austin, Texas, and Washington, D.C. Austin caps shared e-scooter speeds at 20 mph. In D.C., the maximum is 10 mph — one of the lowest in the United States. Neither city has an effective way to require speed limiters on privately owned scooters.

In both cities, ***e-scooter riders overwhelmingly rode in bike lanes where they were available****. Where there were no bike lanes, however, D.C. riders were 44 percent more likely than Austin riders to choose to ride on the sidewalk.*

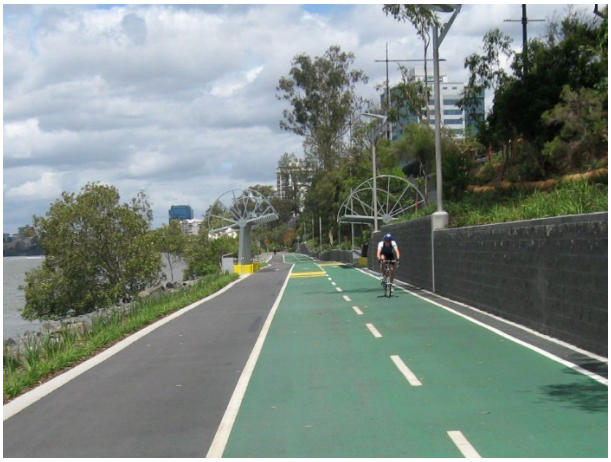
D.C. riders were more likely to favor the sidewalk even though vehicle traffic was heavier at the 16 Austin observation sites. There also were many more pedestrians and cyclists at the 16 D.C. sites. Overall, however, ***riders tended to choose the sidewalk when motor vehicle traffic was heavier, as well as on arterials and two-way roads****. In contrast, the researchers saw an increase in e-scooter riders in vehicle travel lanes on weekends, possibly because of lighter traffic.*

Key finding: "E-scooter users clearly take risk into account when choosing where to ride," said Cicchino. "Many are also conscious of the risk of hitting a pedestrian. E-scooter speeds were lower on sidewalks than on roads or bike lanes in both Austin and D.C."

Converting shared paths into separate paths

The conversion of shared paths into separated paths can significantly reduce conflict between pedestrians and the faster-moving bicycles and PMDs. Brisbane examples below:

Bicentennial Bikeway, Toowong, Brisbane. Left photo 2009 (shared) & right photo 2015 (separated)

Goodwill Bridge, Brisbane. Left photo 2009 (shared) & right photo 2019 (separated)


- Question for Bicycle and PMD Industry representatives: *Do you advocate to local and state governments for converting 'shared paths' into 'separated paths'? Do you advocate for local and state governments to instal physically separated on-road bicycles lanes and retrofitting separation to existing on-road bicycle lanes?*
- Question for Local Government representatives: *Do you have an active program of converting 'shared paths' into 'separated paths'? Do you have an active program of installing physically separated on-road bicycles lanes and retrofitting separation to existing on-road bicycle lanes?*

2. Safety issues associated with e-mobility use, including increasing crashes, injuries, fatalities, and community concerns

PMD Parking (and footpath) Safety

The following section draws heavily from PMD parking research out of the US, including:

- National Academies of Sciences, Engineering, and Medicine 2022. ***E-Scooter Safety: Issues and Solutions*.** Washington, DC: The National Academies Press. https://doi.org/10.17226/26756.
- Klein, N., Brown, A. & Thigpen, C., (2023) *"**Clutter and Compliance: Scooter Parking Interventions and Perceptions**"*, Active Travel Studies 3(1). doi: https://doi.org/10.16997/ats.1196
- Hemphill, R., MacArthur, J., Longenecker, P., Desai, G., Nie, L., Ibarra, A., & Dill, J. (2022). "**Congested sidewalks: The effects of the built environment on e-scooter parking**" compliance. *Journal of Transport and Land Use*, *15*(1), 481–495. https://doi.org/10.5198/jtlu.2022.2110
- National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide WORKING PAPER: "***Shared Micromobility Permitting, Process, and Participation***" (2022) https://nacto.org/wp-content/uploads/2022_NACTO_UBDG_Regulating-Micromobility.pdf

Summary findings (both issues and solutions) that have **applicability in Queensland** are extracted below.

- Unliked parked cars, public/shared e-scooters can be **'relocated' either intentionally or unintentionally** (knocked over) after being parked, causing footpath obstruction and complicating enforcement.
    - Falling e-scooters are an injury (and trip) risk to path users
    - People with **vision loss** or who use **mobility aids** (e.g. wheelchairs or walking frames) may have difficulty or be completely unable to rectify a fallen e-scooter blocking the footpath
- *One key advantage of physical PMD parking infrastructure, is that it **communicates parking regulations to riders and the wider public**, unlike digital-only solutions.* This makes the infrastructure intuitive to use and **self-explanatory**, minimising the need for enforcement.
- Parking rules should be made ***obvious and intuitive*** to assist with compliance and limit enforcement requirements (workloads).
- *While in-app messages and sidewalk decals can encourage marginal changes in parking behaviour, **the introduction of 'lock-to' requirements had the greatest improvement in parking compliance and shift in parking locations in the US.***

- Multiple US research studies (referenced above) point to installing more bike racks and introducing a **'lock-to'** or **'tethering'** requirement as being particularly effective:
  - *More than 35% of micromobility vehicles were parked at bike racks or corrals.* ***In San Francisco, where e-scooters are required to use a locking or tethering mechanism, this proportion was almost 98%.***
  - In addition, **Sacramento, Chicago, Minneapolis & Washington DC** have also implemented 'lock-to' requirements
  - In **Chicago**, the introduction of physical locks resulted in ***97.3% compliance in parking audits*** *and a dramatic* ***reduction (78%) in complaints*** (Chicago Department of Transportation, 2021).
  - Following the implementation of the **lock-to requirement in DC**, the **rate of parked scooters impeding pedestrian access decreased by over half**, and there was an observed **one-third decrease in noncompliant parking**.

According to the 13 Dec 2019 Neuron Mobility submission in response to NTC's Consultation RIS on the (https://www.ntc.gov.au/system/files/webform/submission_cris_pmd/786/Neuron%20Mobiliy%20submission%20in%20response%20to%20NTC's%20Consultation%20RIS%20(13%20Dec%202019).pdf) *'Barriers to the safe use of innovative vehicles and motorised mobility devices'* (https://www.ntc.gov.au/transport-reform/ntc-projects/Barriers-to-the-safe-use-of-innovative-vehicles-and-motorised-mobility-devices): *"In general, Neuron's scooter* ***weighs between 20-22kg****".*

- Question to QPS: *Regarding unsecured parking of e-scooters on the footpath (image below): If a motor vehicle driver were to lose control and mount the footpath (as did happened in Brisbane on Edward St in March 2024) at a location where public/shared e-scooters were parked (weighing between 20-22kg), is there a risk these e-scooters would become projectiles if struck by the out-of-control vehicle? If so, would public safety be improved with a 'lock-to' or 'tethering' requirement?*

- Question to the public/shared e-scooter operators: *Does your company operate in the US Cities of San Francisco, Sacramento, Chicago, Minneapolis, Washington DC or any other cities that have an existing 'lock-to' or 'tethering' requirement? If so, would it be possible for those PMDs to be used in Queensland also?*

Illustration of e-scooter parking options, extracted from *Klein, N., Brown, A. & Thigpen, C., (2023) "Clutter and Compliance: Scooter Parking Interventions and Perceptions"*

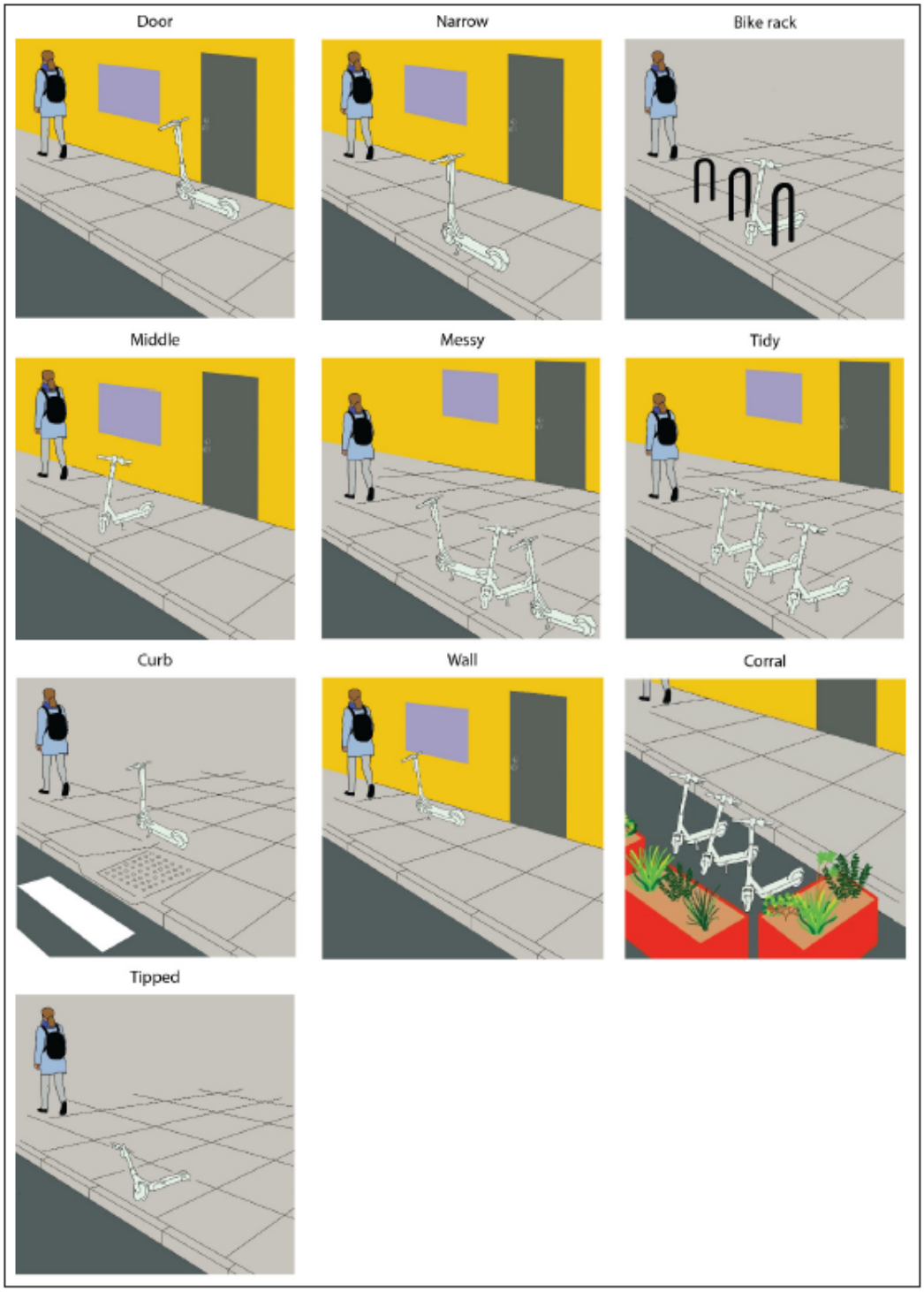


Figure 6: Scenarios displayed in survey to test knowledge of parking regulations and assess perceptions of clutter.

Utilising bicycle parking for PMDs

The photos taken (by the submission author) in Brisbane city clearly demonstrate that designated bicycle parking in the 'street furniture' zone of the road verge-side can be used to securely park e-scooters and maintain a clear 'walking space' that is also clear of the 'footpath dining' zone adjacent to the property boundary.

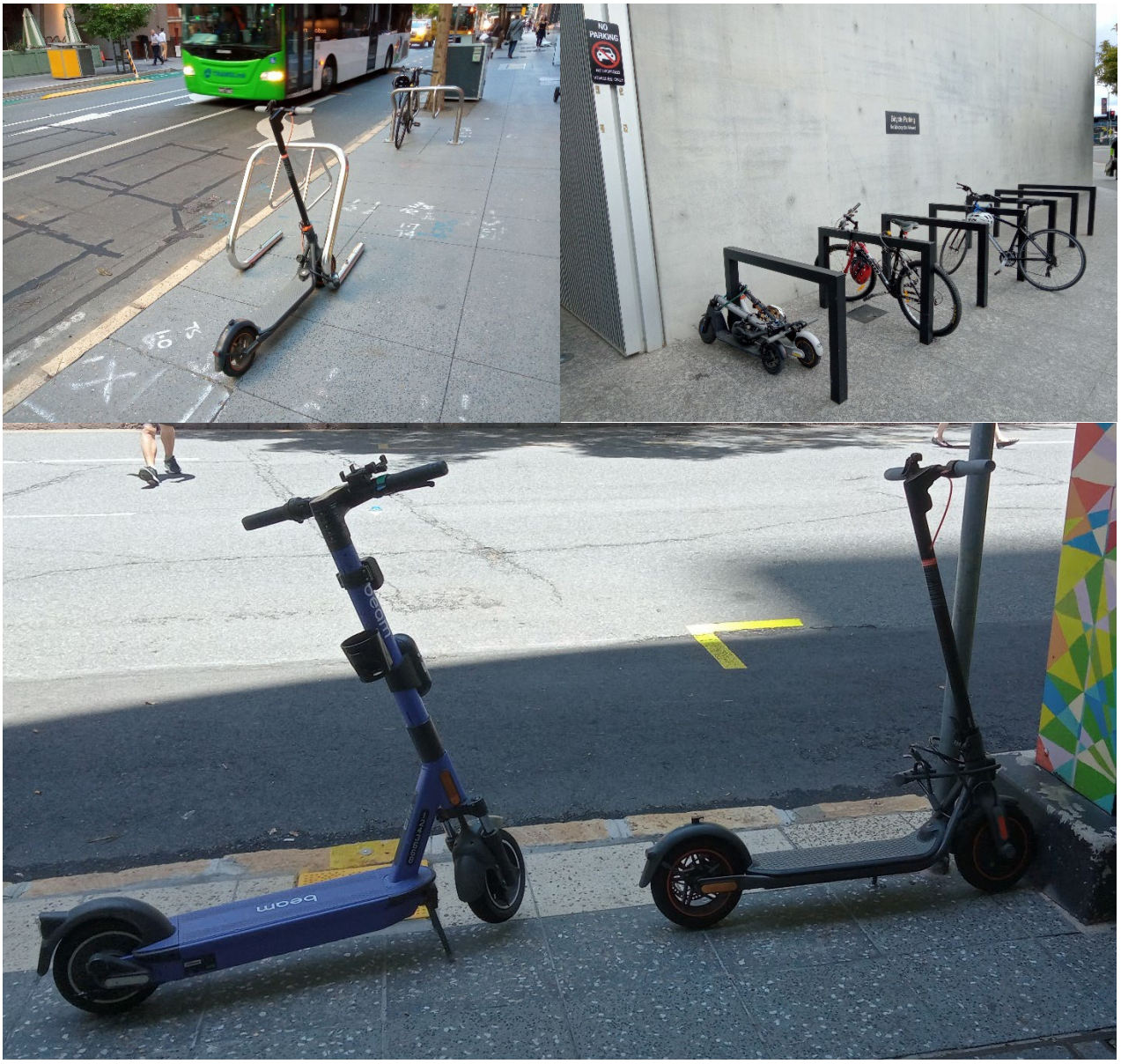


Image extracted from: TfNSW Walking Space Guide (https://www.movementandplace.nsw.gov.au/design-principles/supporting-guides/walking-space-guide-towards-pedestrian-comfort-and-safety)

Under the TMR Cycle Network Local Government Grants Program (https://www.tmr.qld.gov.au/travel-and-transport/cycling/cycling-grants/cycling-infrastructure-grants), eligible projects include *'mid-trip and end of trip facilities'* (bicycle parking), which can also be used by PMDs. This is an existing government program that makes funding available to Local Governments to install bicycle parking.

Brisbane City Council also has an **interactive map of bicycle parking locations** available on their web-site to enable people to find out where you can park and lock your bicycle at bike racks across Brisbane: https://www.brisbane.qld.gov.au/transport-and-parking/bikeways-in-brisbane/bicycle-parking-and-facilities#parkinglocations

Current Australian PMD safety research

Professor Narelle Haworth (https://research.qut.edu.au/carrsq/staff/narelle-haworth/) works at CARRS-Q, the Centre for Accident Research and Road Safety-Queensland and has 30 years' experience in road safety research. She is a member of the US National Academy of Science TRB Committees AC000 - Safety and Operations Group and ACH20 - Standing Committee on Bicycle Transportation. Until recently she was Chair of the Committee on Motorcycles and Mopeds. A major thrust of her work has been to make policymakers aware of the relevance and impact of research on road safety practice, and to reinforce the need to focus on the most effective measures, notably speed reductions and road infrastructure as safety improvements. Specific publications (https://eprints.qut.edu.au/view/person/Haworth%2C_Narelle.html) of relevance to the work of this committee are listed below:

- The Safer Scooting Study - https://research.qut.edu.au/carrsq/projects/the-safer-scooting-study/
- Nathalie Ssi Yan Kai, Narelle Haworth & Amy Schramm (05 Apr 2024): ***Understanding nonuse of mandatory e-scooter helmets***, Traffic Injury Prevention, DOI: 10.1080/15389588.2024.2335677 https://doi.org/10.1080/15389588.2024.2335677
- Haworth, Narelle & Schramm, Amy (2023) ***Factors associated with helmet use by e-scooter riders.*** In Bates, Lyndel & Johnson, Marilyn (Eds.) *Proceedings of the 2023 Australasian Road Safety Conference.* Australasian College of Road Safety (ACRS), Australia, pp. 221-223.
- Schramm, Amy & Haworth, Narelle (2023) ***Self-reported e-scooter rider and non-rider near-misses and crashes.*** In Bates, Lyndel & Johnson, Marilyn (Eds.) *Proceedings of the 2023 Australasian Road Safety Conference (ARSC).* Australasian College of Road Safety (ACRS), Australia, pp. 434-435.
- Sucha, Matus, Drimlova, Elisabeta, Recka, Karel, Haworth, Narelle, Karlsen, Katrine, Fyhri, Aslak, Wallgren, Pontus, Silverans, Peter, & Slootmans, Freya (2023) ***E-scooter riders and pedestrians: Attitudes and interactions in five countries.*** *Heliyon*, *9*(4), Article number: e15449.
- Haworth, Narelle, Schramm, Amy, & Twisk, Divera (2021) ***Changes in shared and private e-scooter use in Brisbane, Australia and their safety implications.*** *Accident Analysis and Prevention*, *163*, Article number: 106451.
- Haworth, Narelle (2021) ***E-scooters in Brisbane: An overview of CARRS-Q research findings.*** In *Brisbane CBD Bicycle Users Group*, 2021-07-28 - 2021-07-28, Brisbane, Australia. (Unpublished)
- Haworth, Narelle, Schramm, Amy, & Twisk, Divera (2021) ***Comparing the risky behaviours of shared and private e-scooter and bicycle riders in downtown Brisbane, Australia.*** *Accident Analysis & Prevention*, *152*, Article number: 105981.

- Haworth, Narelle & Schramm, Amy (2019) ***Illegal and risky riding of electric scooters in Brisbane.*** *Medical Journal Of Australia*, *211*(9), pp. 412-413.
- Comparing e-scooter safety in the ACT and other jurisdictions
- Vulnerable Road User Virtual Reality Scenarios

Professor Narelle Haworth has undertaken extensive road safety research on PMDs (both private and public/shared) and should be given consideration for an invitation to appear before the Committee.

Professor **Geoff Rose** is the Director of the Institute of Transport Studies in the Department of Civil Engineering at Monash University (https://research.monash.edu/en/persons/geoffrey-rose). Geoff's recent research has focused on enhancing understanding of usage patterns and policy issues associated with **motorised mobility scooters, electric bicycles** and motorcycles. He is also undertaking research on factors influencing usage of parking for cars and bicycles at railway stations, opportunities to improve the performance of urban railway level crossings, and the legislative requirements on-site parking at new apartment developments.

Professor **Geoff Rose** is an expert in this field and should be given consideration for an invitation to appear before the Committee.

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *" Some evidence of a **novelty effect** has been documented in several studies that found that **a high proportion of injuries occurred in first-time e-scooter riders**. It is plausible, then, that when shared rental e-scooters are **first introduced to a jurisdiction, crash and injury rates may be higher** because the population is likely inexperienced with e-scooter operation and safety best practices, and drivers are less aware of them. As more years of data are collected, research can examine and contextualize injury rates on the basis of when shared e-scooters were introduced to particular areas."*

- Question to TMR: *Is there PMD crash data available? It was not provided in the initial written brief to the Inquiry.*
- Question to TMR: *What is the most common PMD crash type and contributing circumstances? Are the majority single-vehicle crashes or crashes with either path users (pedestrians) or road users (motor vehicles and bicycles)?*
- Question to the public/shared e-scooter operators: *Do you have a 'fall-detection' feature on your devices? Is this data available for crash analysis ('hotspot' identification)?*

Pedestrian & PMD crash risk

If the crash data analysis reveals that there is a significant issue of PMD and pedestrian crashes, there is information available on preferred infrastructure solutions for speed management on shared paths: **TMR**

Technical Guideline - Speed management on shared paths: https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Cycling/Speed-management-on-shared-paths.pdf?la=en

Also of interest is the extract below from the 13 Dec 2019 Suncorp Group Limited submission (https://www.ntc.gov.au/system/files/webform/submission_cris_pmd/779/Submission%20to%20NTC%20paper%20on%20barriers%20to%20the%20safe%20use%20of%20PMDs%2013.12.19.pdf) in response to NTC's Consultation RIS on the *'Barriers to the safe use of innovative vehicles and motorised mobility devices'* (https://www.ntc.gov.au/transport-reform/ntc-projects/Barriers-to-the-safe-use-of-innovative-vehicles-and-motorised-mobility-devices) provides an insightful summary of the issue of liability and cost of PMD injuries to third parties:

Injuries to third parties:

The most problematic aspect of the introduction of PMDs is when an innocent third party, such as a pedestrian is injured due to the negligence of the operator. Due to the PMDs capacity for high speed and the increased momentum they generate, there is a greater risk of significant injury to a third party than a traditional scooter or bicycle.

Innocent parties who are injured are entitled to have all medical costs and lost income provided by the negligent party or their insurer. The assertion that innocent victims are fully protected by the public liability insurance of e-scooter providers fails to recognise the significant barriers faced by a victim if they wish to access compensation through the mechanism of this insurance policy.

It generally requires the innocent injured party to commence common law proceedings, with the onus being on them to prove the negligence of the operator and to prove they have suffered a loss. For moderate and minor injuries (as most commonly occur), it is frequently not worth the time, effort and financial risk associated with initiating such action.

It also makes an equally insightful recommendation on how government could address this (extract below):

Recommendation

Suncorp recommends consideration be given to applying a surcharge on every e-scooter rental, with these funds being directed towards e-scooter injury health costs. Rather than create a separate scheme, these funds could be directed to the public health budget. The surcharge would be charged by the provider (e.g. Lime) and passed onto the government with the rate being guided by actuarial analysis of the anticipated cost.

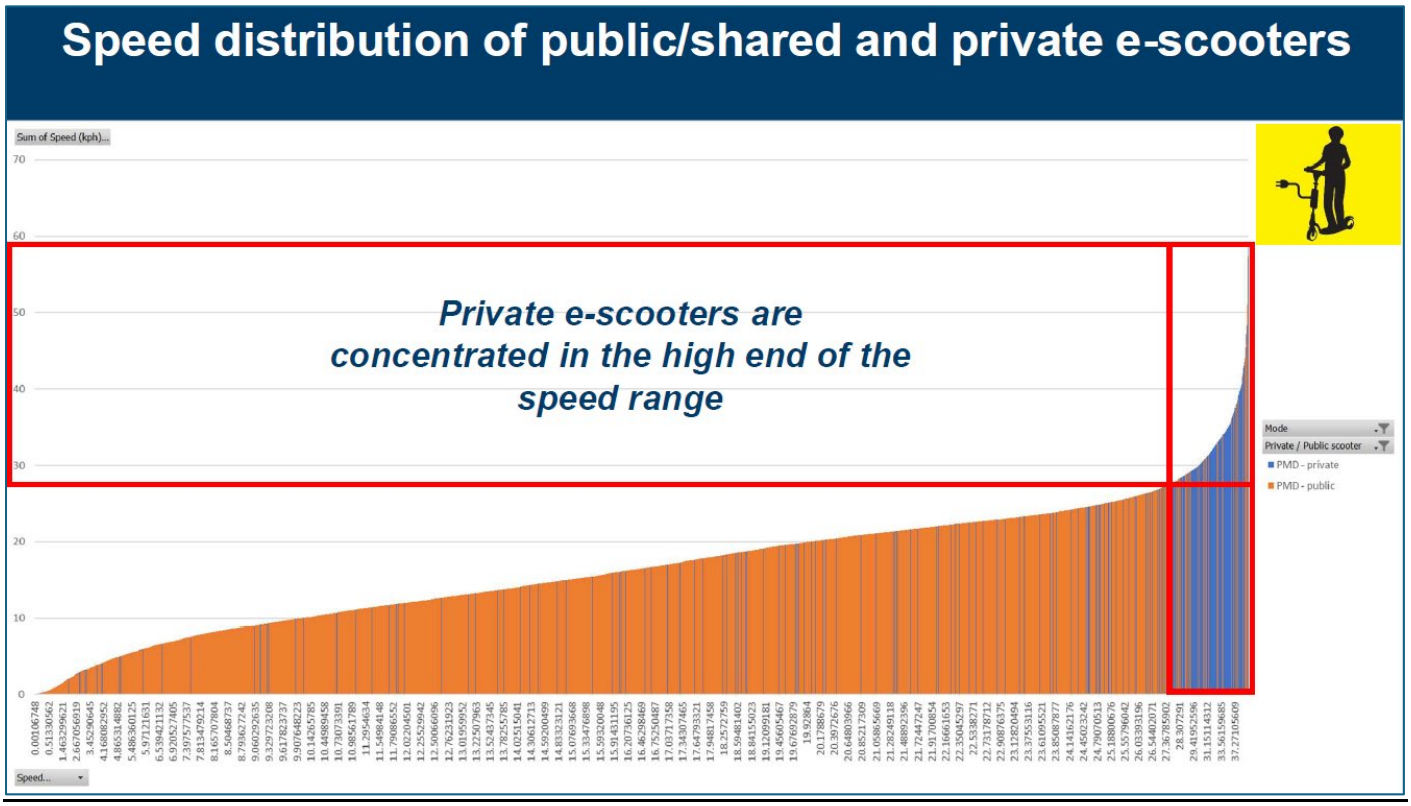
Currently the Queensland Government puts surcharges or levies on several taxes and charges, including the Emergency Management Levy, the Waste Levy, and the building and construction levy. Additionally, there is an offender levy applied in criminal court cases. This practice is not unprecedented in Queensland.

It may be feasible for the state government to place a surcharge or levy on both the rental of public/shared e-scooters and the purchase of privately owned e-scooters. The levy could be significantly higher on PMDs that are not street-legal (sold for use on private property only, and not speed limited), providing a financial disincentive to purchasing them. This revenue could go into a funding program to fund injury costs of **victims of PMD related crashes**, provide subsidies for the purchase of street-legal PMDs, and to fund

proactive PMD safety initiatives, such as installing PMD-permitted bicycle lanes and retrofitting physical separation to existing on-road bicycle lanes.

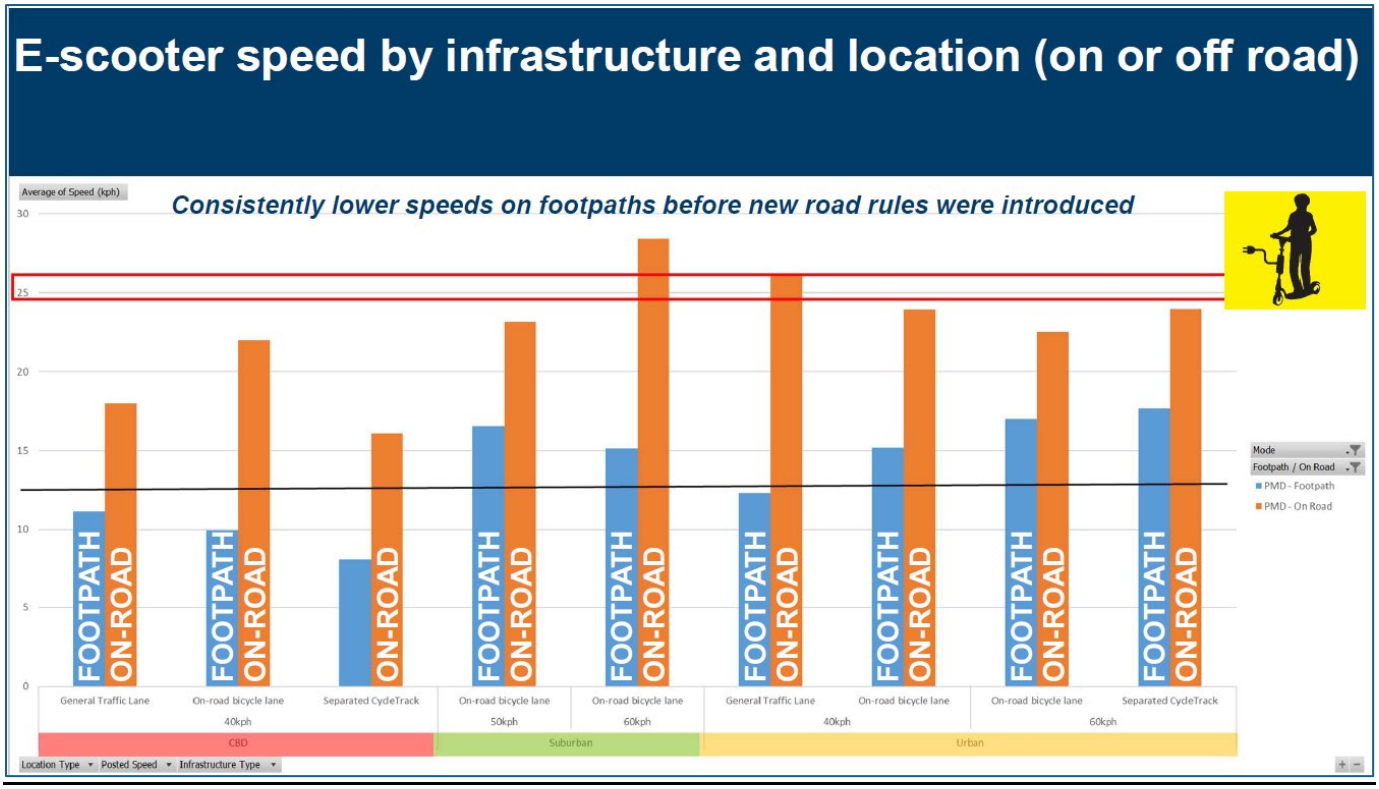
PMD speed data

The chart below shows the **speed distribution** of public/shared PMDs (**orange**) and private PMDs (**blue**) in Brisbane City at various locations over several days in 2022. This chart shows that while on average the speeds appear to be similar, **private PMD** speeds are concentrated in the **higher end of the speed range**.



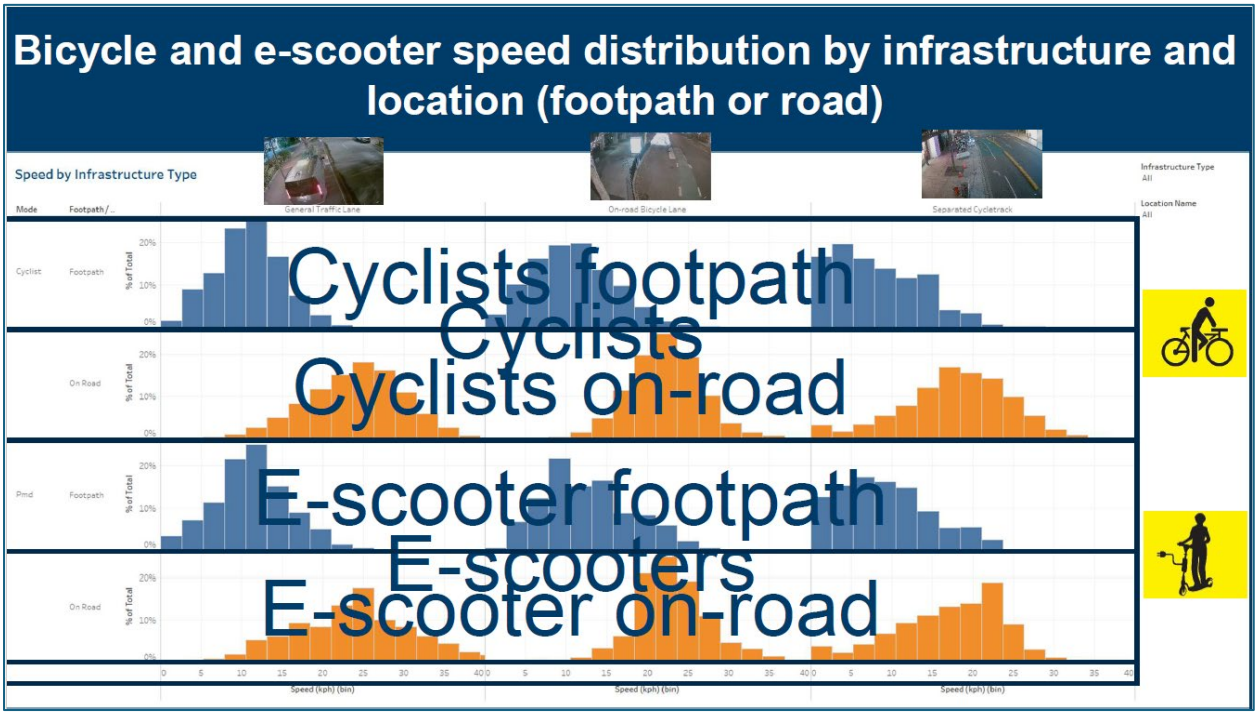
Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

The **chart below** shows the average PMD speeds on-roads (**orange**) and on footpaths (**blue**) in Brisbane City at various locations over several days in 2022. On the chart, the **black line** marks >12kph and the red box marks 25kph. This chart shows that on average in the CBD speeds are compliant with the road rules, but in urban and suburban areas, speeds are significantly higher.



Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

The chart below shows the PMD and bicycle speed distributions on-roads (**orange**) and on footpaths (**blue**) in Brisbane City on various types of infrastructure over several days in 2022. This chart shows that PMD speed are higher than bicycle speed and the speed distribution on footpaths is skewed towards the lower end, whereas on-road it is skewed towards the higher end. This shows the difference in speeds when sharing a footpath with pedestrians compared to sharing a road with motor vehicles.



Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

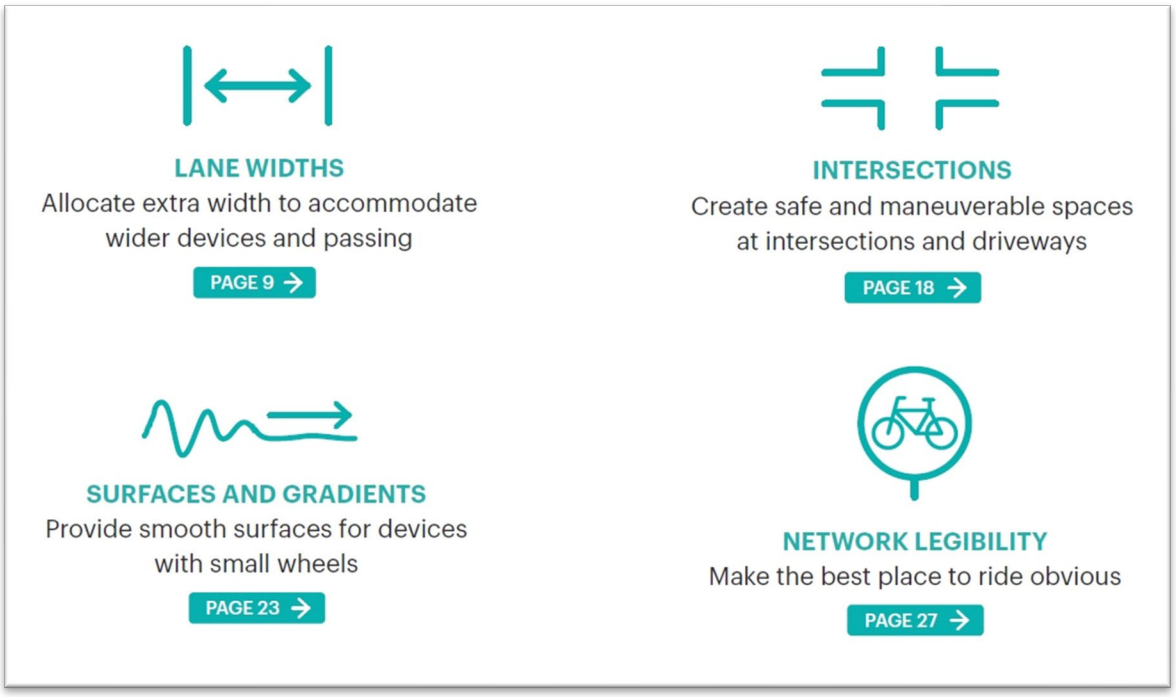
Design and operation of PMDs

- Question to TMR: *In the TMR written brief to the Inquiry there is a reference to preliminary TMR commissioned research by Griffith University into the **safety implications and potential changes to the regulatory dimensions of PMDs** – is this preliminary research able to be provided to the Committee?*

US research undertaken by the **National Association of City Transportation Officials (NACTO)** on the design and operation of infrastructure for PMDs (https://nacto.org/wp-content/uploads/Part-II-Citation-8_-Designing-for-Small-Things-With-Wheels.pdf & https://altago.com/news/alta-nacto-webinar-designing-for-small-things-with-wheels/) provides valuable insights into this issue.

Key findings from the research include (and graphic below):

- *E-scooters **have smaller wheels** than bicycles and handle surfaces, bumps, grates, and gradients differently than devices with larger tires.*
- *To safely accommodate and encourage these new uses and modes, planners and engineers are revisiting bikeway design practices, including passing widths, queueing lengths, turn radii, grade changes, and surface materials.*
- ***In most cases, bike lanes are the best, safest, and most comfortable place for people using the wide array of (often electrified) small things with wheels**.*
- *To ensure bikeway design is inclusive of all potential riders—regardless of which wheeled device they ride—**designers need to accommodate more people using bikeways with higher speed and size differentials**.*
- *As bikeway use grows and people ride a wider mix of devices at different speeds, there is a growing need for space to pass or be passed by devices wider than a bicycle.*
- ***Wider protected bike lanes are especially important for children and caregivers, side-by-side riders, people using adaptive devices**, and people moving goods.*
- ***Design a smooth but not slick surface** - An ideal bikeway has good traction in all weather conditions*
- ***Design grade changes sensitively** - Vertical speed management devices are less comfortable for bike riders and particularly people riding e-scooters and devices that do not have handlebars or mechanical brakes. Avoid abrupt changes in grade where changes in direction also occur.*
- ***Utility patches, stormwater grates, utility covers, and other repairs along bikeways should be held to a high standard and inspected following installation***
- *Providing easily-identified facilities that work for people riding side-by-side, using shared e-scooters, or riding e-cargo bikes will help guide riders into the bikeway and away from the sidewalk*



US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"After PeopleForBikes (https://bna.peopleforbikes.org/#/) conducted a bicycle network analysis (BNA) in more than 500 cities in the United States and Canada, Bird compared e-scooter crash rates for its vehicles with the BNA scores and found that **cities with higher BNA scores showed evidence of being safer for e-scooter use** (Santacreu et al. 2020). Even after the various locations on the roadway cross section where incidents took place were taken into account, adverse road conditions remained a consistent factor in crashes on roads (33%), sidewalks (25%), and bike lanes (25%). **Nearly two-thirds of all incidents in the study were caused by adverse roadway features when accounts of additional adverse infrastructure features were included** (e.g., driveway lips) (Cicchino et al. 2020b)."*

These US findings are reflected in a similar study by the ***European Transport Safety Council - Recommendations on Safety of E-scooters*** (https://etsc.eu/recommendations-on-safety-of-e-scooters/).

Key findings include:

- *E-scooters have been found to be **inherently less stable than bicycles in many circumstances: when accelerating, braking and negotiating uneven road surfaces.***
- *Where data are available, **the rate of collisions resulting in injury has been found to be up to ten times higher for e-scooter riders than for cyclists**.*
- *Both these modes are established safe modes of transport.*

Comparison with e-bikes:

- *While pedal cycles and e-bikes require the rider to pedal to move forward, **e-scooter riders can accelerate to their maximum speed within only a few seconds. They also travel at a faster***

constant speed than a pedal cyclist. *The speed of most e-scooters at 25 km/h is higher than the average speed of many pedal cycles in urban areas which has been measured as 18.2km/h for men and 17.0km/h for women in a range of 18-29-year-old pedal cyclists. They are also constructed very differently, with different safety consequences.*

- *The wheel size and the location of the centre of mass has implications on the stability of a pedal cycle or e-scooter.* ***The larger wheels of a pedal cycle and more centrally located centre of mass make it more stable than an e-scooter*** *especially when navigating changes in the road surface. Speed is almost always a factor in crash frequency and crash severity.*

Crash Risk:

- *Studies have found that in most e-scooter collisions no other road user is involved****. Poor road surface conditions, e-scooter speed, riders intoxicated by alcohol or drugs, inexperienced users and lack of helmet use combined with the instability of an e-scooter contribute to the cause and severity of the injuries.*** *Head injuries are prevalent, followed by injuries to the upper limbs. Other road users have been injured and these are most often pedestrians and cyclists. Casualties involving e-scooters are by no means the major type of casualty in these countries. Casualties involving cars, motorcycles and pedestrians will account for far greater numbers.*
- *Sources for data recording e-scooter collisions are still maturing, but currently underreport casualty numbers. Findings from studies into the numbers and natures of injuries indicate:*
    - *20-50% of casualties attending hospital suffer head injuries, very few riders wore helmets*
    - ***More riders fall in single vehicle collisions than by colliding with another road user***
    - *Intoxication is a problem*
    - ***E-scooter stability over surface irregularities and potholes is improved with a larger wheel size***
    - ***Acceleration and deceleration reduce the stability of an e-scooter***
    - ***E-scooters are inherently less stable than bicycles in many circumstances: when accelerating, braking and negotiating uneven road surfaces.***

E-scooter stability:

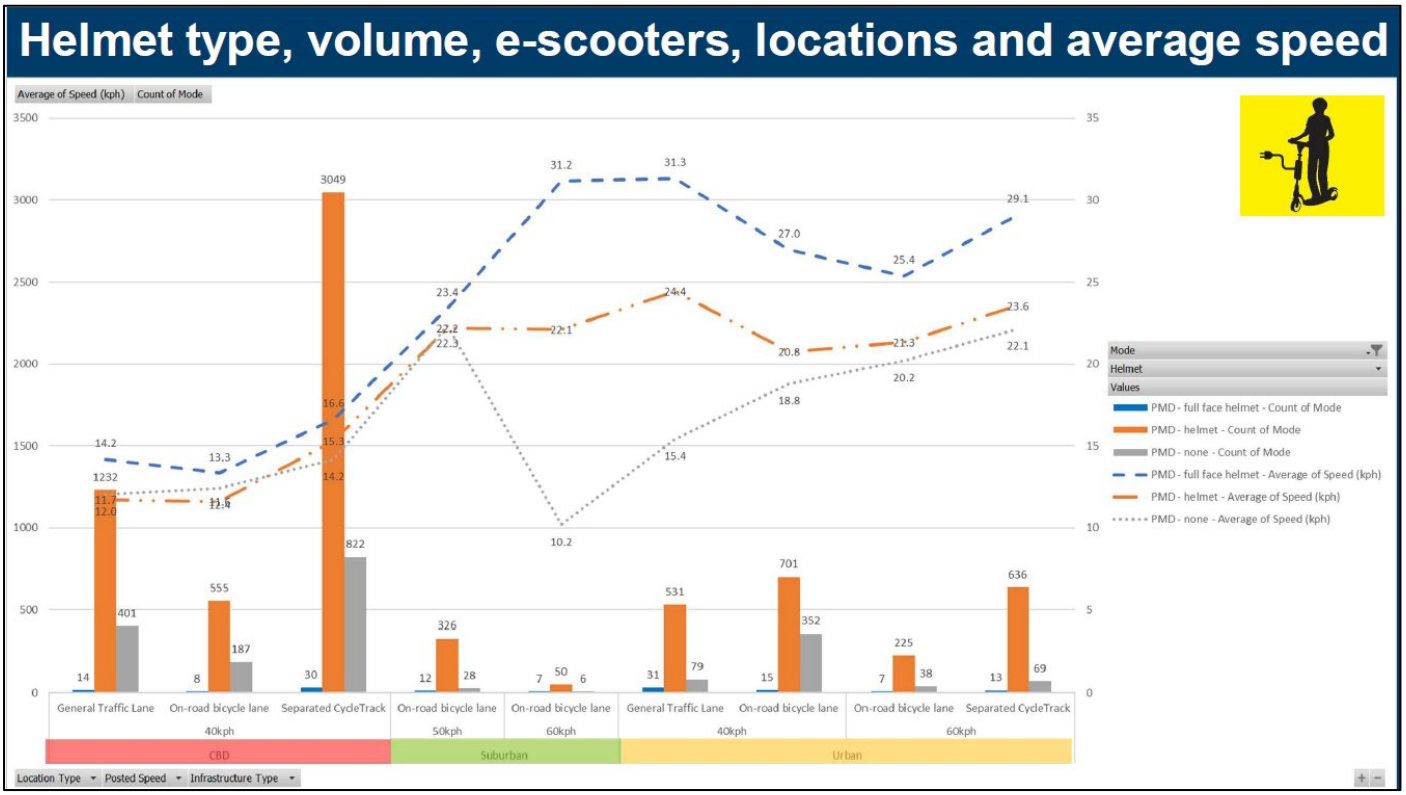
- *Big wheel bicycles were found to be self-stable at speeds of 17.0km/h-27.5km/h. However****, e-scooters were found to be unstable until travelling at 22.4km/h****. This impacted on stability both during deceleration and acceleration on a flat surface.*
- *Slowing-down from a higher, more stable speed, meant transitioning to a slower, less stable speed, making the e-scooter more challenging to control. Deceleration increased any existing oscillation (weave motion). While applying a sudden brake to avoid obstacles, the oscillation amplitude increased much faster, and the chance of losing control became greater.*
- ***The self-stability of e-scooters was found to be more sensitive to decelerations compared to bicycles.*** *A hefty acceleration on an e-scooter could cause a sudden loss of the intrinsic self-stability property, making the rider put more effort into balancing.*

- *The results confirmed that **e-scooters are easy to manoeuvre** as they require much less steering torque than bicycles. However, **the steering of e-scooters is more sensitive to external forces** and is affected more compared to bicycles when encountering obstacles on the road.*

The **RACQ** (https://www.racq.com.au/latest-news/news/2024/11/ns251124-reform-urgently-needed-to-reduce-horrific-e-scooter-injuries & https://www.racq.com.au/latest-news/news/2025/05/racq-welcomes-inquiry-into-e-mobility-safety) is advocating for people who are using private stand-up scooters to be required to wear **full-faced helmets** and for hired scooters to transition to more stable **'sit-down' scooters** that have a lower centre of gravity.

- Question to the public/shared e-scooter operators: *If your fleet contains both PMDs with and without seats, does the usage data suggest that PMDs with seats are used for longer-distance journeys? Is there any crash data available to compare PMDs with seats to those without?*
- Question to the RACQ and CARRS-Q: *Does having a lower centre of gravity (from a seat) interfere in any way with the ability to balance on the e-scooter, making it more difficult to steer, manoeuvre and maintain control of?*
- Question to the RACQ and CARRS-Q: *Is there any road safety research that shows a relationship between additional Personal Protective Equipment (PPE) and increased risk-taking behaviours? For example, a risk compensation effect?*

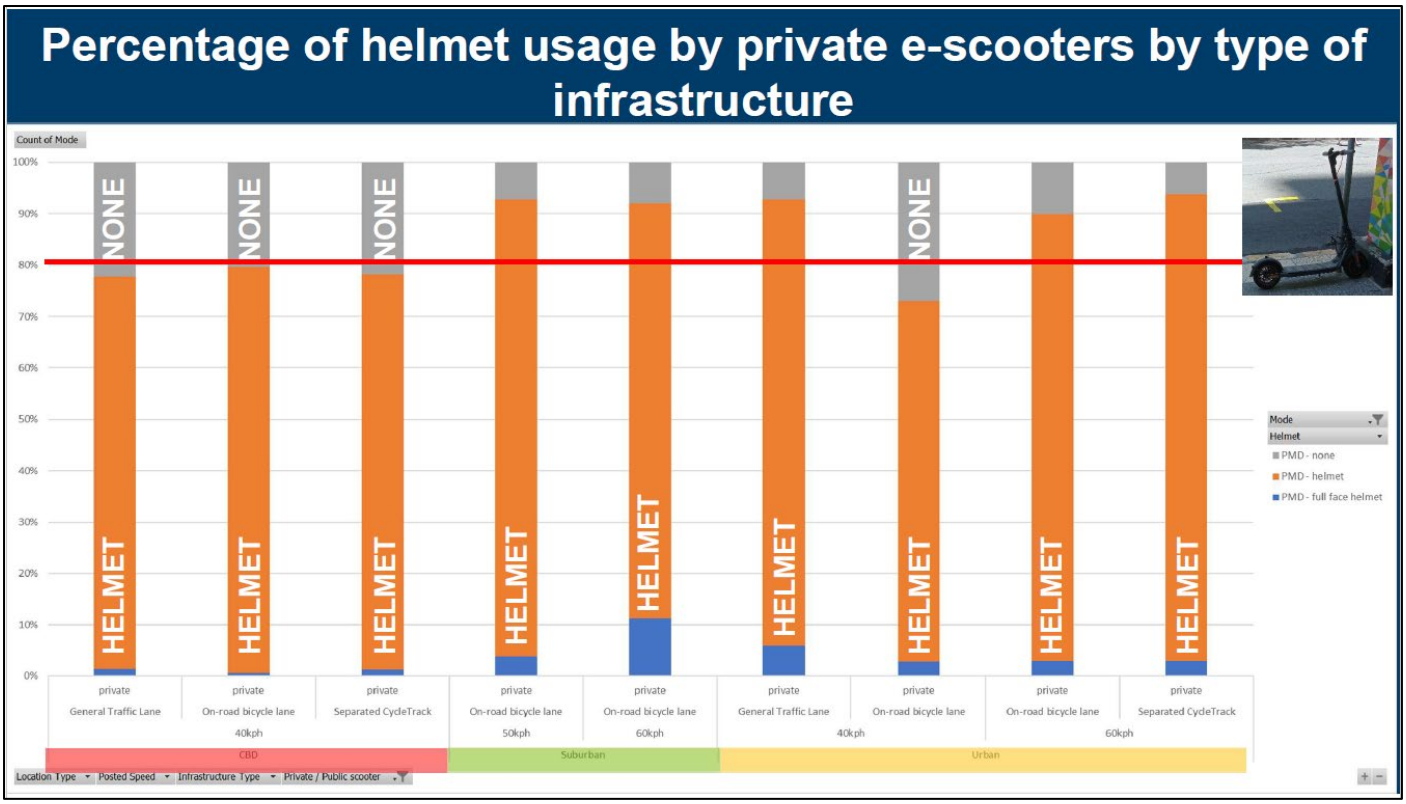
The chart below shows PMD volume, speed and helmet wearing behaviours in Brisbane City at various locations over several days in 2022. The chart shows the type of helmet (**grey** = no helmet, **blue** = full face helmet and **orange** = regular helmet) and average speed by location. The results suggest that outside of the CBD, **PMD riders with full face helmets on average travel faster – this does suggest a 'risk compensation' behavioural effect, where riders wearing more protective equipment may feel comfortable to take more risks by travelling at higher speeds.**



Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

Prior to investing resources into helmet related initiatives, the extent of helmet non-compliance at a network and fleet-wide level, **as a proportion of all PMD trips**, should be taken into consideration.

The two (2) charts below show types of PMD, volume, and helmet wearing behaviours in Brisbane City at various locations over several days in 2022 for **private PMDs** (chart 1) and **public/shared PMDs** (chart 2). These charts show the type of helmet (grey = **no helmet**, blue = **full face helmet** and orange **= regular helmet**). The results suggest that even at the location that has the highest level of non-compliance, this is only <40% of PMD riders, with an average of 20% non-compliance across the network.



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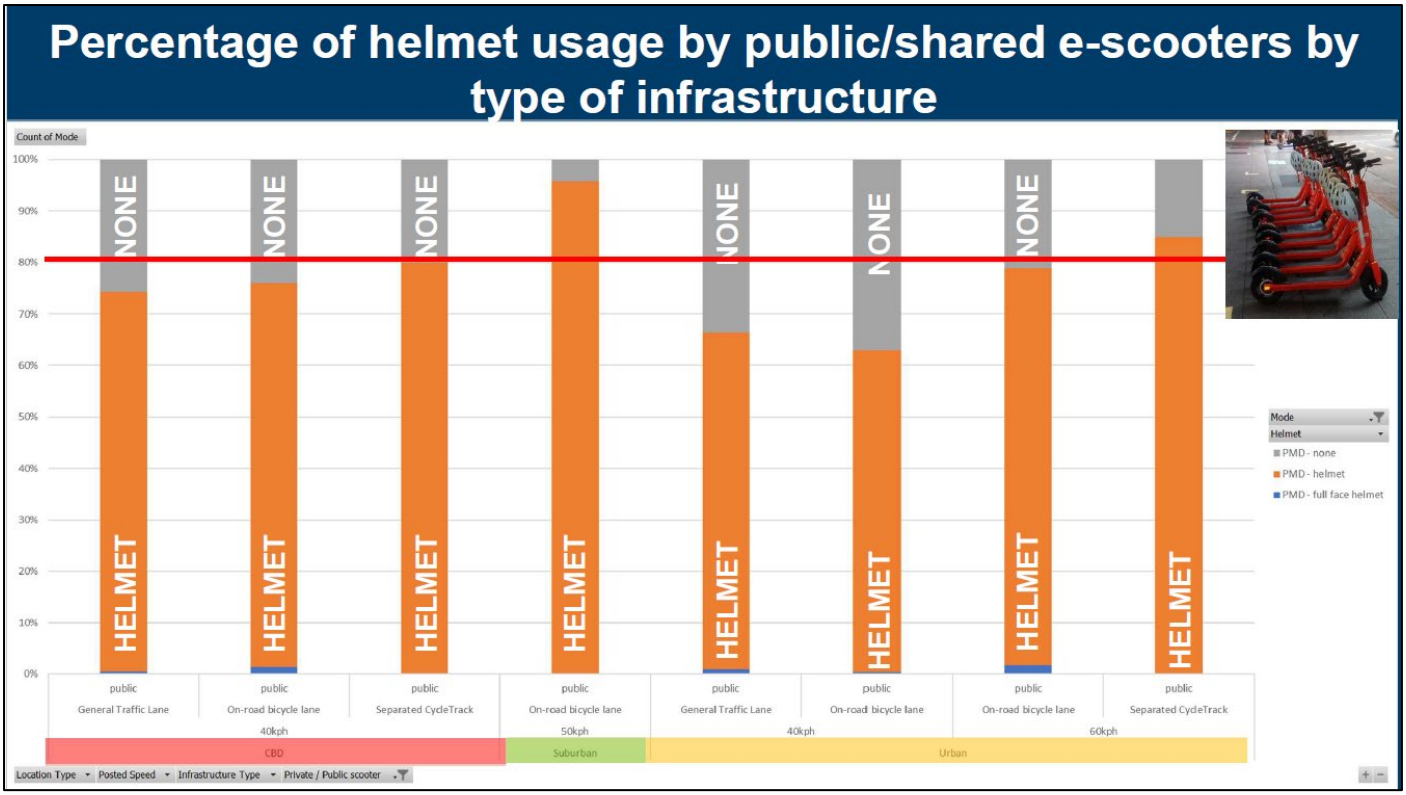


Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

Helmets do not prevent or reduce the severity of all injury types, only head and face. It is an important public safety message that: ***serious injuries can still occur at any speed, even when wearing a helmet, but wearing a helmet is more likely to reduce the severity of head and face related injuries***.

The RACQ research (https://www.facebook.com/racqofficial/videos/heres-why-full-face-helmets-are-a-smart-choice-for-safer-scooting-/1474274926875552/ & https://www.youtube.com/watch?v=GydWu9lwAW0) seems to be focused on reducing the severity of a crash when it happens. This assumes that crashes are inevitable. However, it would be preferable to **prevent crashes** from happening, and to have resources put into **crash prevention rather than crash severity reduction**.

Speed reduction of the PMDs, not only reduces the severity of the crash (by limiting the amount of kinetic energy in the crash forces) but also reduces the likelihood of a crash as the rider has more time to 'take in information' and respond to the situation by reacting and taking evasive or corrective action. **Infrastructure solutions such as separation that does not put the PMD in direct conflict with pedestrians or motor vehicles, eliminates the crash risk with pedestrians or motor vehicles.**

To quote Professor Geoff Rose of *Transport Engineering,* ***Monash Institute of Transport Studies****, Monash University* (https://www.ntc.gov.au/submission_data/124):

" The acceptance of risk is an integral part of human existence. We take risks as a result of the food we eat, the air we breathe and the activities we do, or do not, engage in. Humans do not act to eliminate all risks in their lives. ***Risk management rather than risk minimisation is central. A Safe System approach does not imply all risk is eliminated but rather rigorously managed****.*

When considering kinetic energy management in the context of a safe system, a critical issue is ***the amount of kinetic energy transferred to a human body at the time of a crash.*** *Kinetic energy is traditionally managed by* ***limiting speed, careful design of the road side environment****, vehicle bodies deforming to dissipate energy and personal protective equipment built into the vehicle such as seat belts and air bags."*

Professor **Geoff Rose** of Monash University (https://research.monash.edu/en/persons/geoffrey-rose) is an expert in this field and should be given consideration for an invitation to appear before the Committee.

PMD crashes where **alcohol** consumption and inebriation are a contributing factor

Public/shared e-scooter rental restrictions were introduced in 'Safe Night' precincts in late 2021 (https://www.abc.net.au/news/2021-11-22/brisbane-trials-e-scooter-weekend-lockouts/100634916 https://www.rideneuron.com/service-alert-update-to-e-scooter-operations-in-brisbanes-safe-night-precinct/?cn-reloaded=1). Data from the Jamieson Trauma Institute (https://www.sciencedirect.com/science/article/abs/pii/S0020138323003789) shows the majority of hospital admissions for PMD related injuries are between 6pm-6am on Saturday and Sunday.

- Question to Queensland Health and the Jamieson Trauma Institute: *Given the latest available hospital admission data, would it be beneficial (from a crash reduction perspective) if the* ***time period*** *of these restrictions was reviewed and possibly extended?*
- Question to Queensland Health and the Jamieson Trauma Institute: *Given the latest available hospital admission data would it be beneficial (from a crash reduction perspective) if there was also a system-wide* ***speed reduction*** *on all PMDs during these hours (6pm-6am Saturday and Sunday)?*
- Question to Queensland Health and the Queensland Ambulance Service: *Given the latest available ambulance pickup locations for PMD related injuries and hospital admissions, would it be beneficial if the* ***area*** *these restrictions applied to was reviewed and possibly extended?*

Other findings of interest from the from the Jamieson Trauma Institute research include:

- Males accounted for 64% of presentations (n = 674), those aged 25–34 years were the most common age group (n = 395, 38%), weekends were the most common days for presentation (37%), and although more people self-presented, arrival by ambulance accounted for 44% of cases.
- There was variation across age groups by time of the day when presentations occurred, with a larger proportion of the 18–24 and 25–34-year-olds presenting in the night-time periods between 6pm-12am and 12am-6am than other age groups
- The most common ePMD devices recorded were e-scooters (91%), followed by e-skateboards (4%), e-bikes (4%), Segways (1%) and hoverboards (<1%).
- People aged 18–24 years and those aged 25–34 years were more likely than other age groups to have alcohol use documented. Males were more likely than females to have alcohol use documented.
- The body regions most commonly injured were the head and face (27%) and the upper extremities (arms 23%, hands/wrists 12%).

- It is possible that both greater exposure and propensity for risk-taking are contributing to greater numbers of males being injured while using e-mobility devices.
- This research reveals a prevalence of risk-taking behaviours, alcohol consumption, not wearing a helmet and travelling at high speed, even though these factors were not recorded for large proportion of cases.

Professor Kirsten Vallmuur is the Jamieson Trauma Institute (JTI) chairwoman of trauma surveillance and data analytics and has undertaken extensive analysis of PMD related hospital admission data and should be given consideration for an invitation to appear before the Committee.

4. Suitability of current regulatory frameworks for PMDs and ebikes, informed by approaches in Australia and internationally

Registration of PMDs

I'd like to reference the quote below on the adverse notion of e-bicycle/PMD registration. This is a direct quote from *Bicycle transportation: a handbook for cycling transportation engineers*, 2nd ed, (by Forester,J. Cambridge, Mass : MIT Press, 1994. First ed. published as: *Cycling transportation engineering)*. The author, John Forester has done a significant amount of research in this field. This book, as well as others published by him, would be worth a review.

"Several superstitions have become widespread as a result of the pre-eminence of automobiles, trucks, and buses in highway transportation. The first of these is that the use of the public highways is restricted to vehicles that are registered. Every state has a law requiring that motor vehicles and their trailers be registered. The general rule is that streetcars, trolley buses, horse-drawn wagons, bicycles, pushcarts, horses, street toys, and pedestrians are not registered. There are several reasons for registering motor vehicles. ***They are valuable, self-portable property; they are more dangerous than other vehicles; they may be used in the commission of crimes; they make their driver difficult to identify; they are hard to catch; and some of them are heavy enough to produce exceptionally intense deterioration of the roads. These are all reasons for registration, taxing, and fee collection, but these reasons do not apply to nonmotorized vehicles.*** *There is no justification whatever for the concept that a registration is required to get the right to use the public highways."*

Regulatory and safety issue of roads with no footpaths

In January 2024 a petition was brought to Brisbane City Council: ***"Reduced speed limits on any Brisbane street/road that does not feature a footpath"*** (https://www.epetitions.brisbane.qld.gov.au/petition/view/pid/1275). Extract: *"The petitioners called on Brisbane City Council to implement 40km/h speed limits (or lower) on all streets which do not have a footpath. They are faced with neighbourhood streets that have no footpath to use and are busy with scary, fast and dangerous traffic. They also see people with disability forced onto the road to access shops, services and transport."*

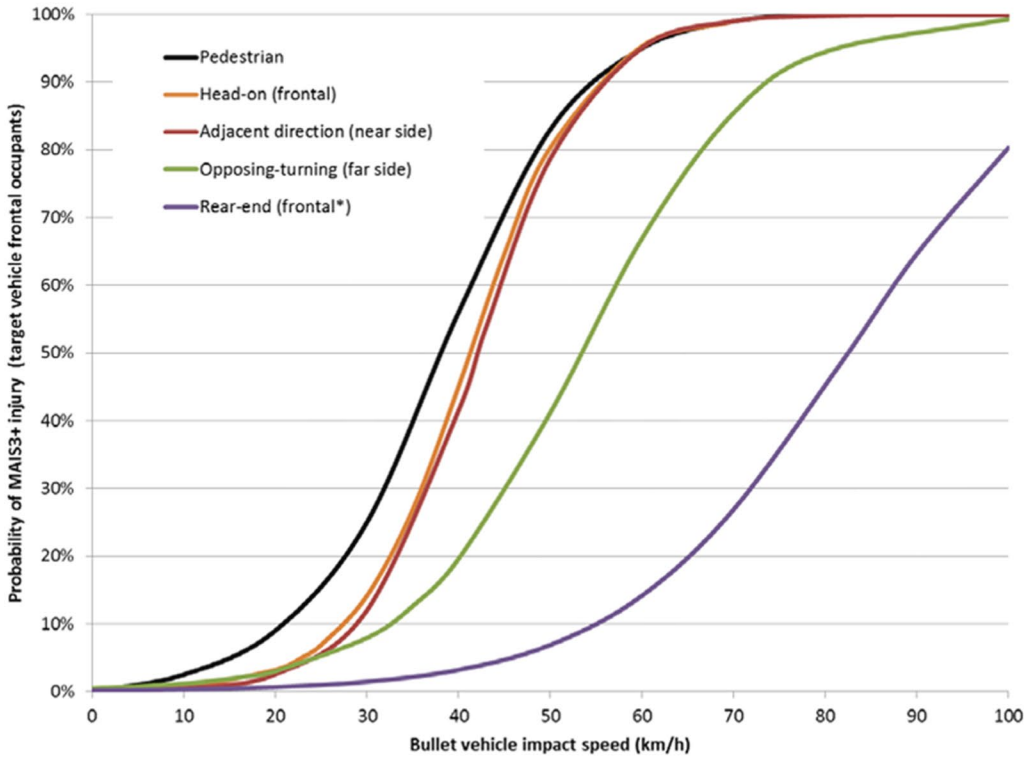
While no action was ultimately taken on this petition, it did raise several valid points:

- There are 6,000 such streets in the Brisbane City Council area without footpaths. **It is unknown how many streets across Queensland do not have footpaths.**
- On roads with no footpaths, there is no alternative but to use the road with motorised vehicles, for all path users, including:

- Pedestrians (of all ages and abilities - including **children and the elderly**),
- Bicycles,
- Wheeled Recreational Devices (WRDs) *such as rollerblades, skateboards, roller skates, foot scooters,*
- Motorised Mobility Devices (MMDs) *such as motorised mobility (shopping) scooters, electric wheelchairs*, and
- Personal Mobility Devices (PMDs) *such as a rideable (e-scooters, e-skateboards, hoverboards, Segways).*

- The speed limit in built-up areas (local streets) in Queensland is 50km/h unless otherwise signed. This speed limit is currently considered appropriate for most local streets in built-up areas throughout Queensland. A question for consideration: **Is this speed still appropriate if the local streets do not have footpaths and all path users must use the road?**
- According to the 2015 Austroads research report *"Improving the Performance of Safe System Infrastructure: Final Report"* (https://austroads.gov.au/publications/road-safety/ap-r498-15), in terms of **crash severity**, at a motor vehicle collision speed of 50kph with a pedestrian, there is a **(minimum) 80% likelihood** of the resulting crash resulting in a **fatality or serious injury**.

Figure 4.4: Proposed model of severe injury probability vs bullet vehicle impact speeds in different crash types



** In rear-end crashes the frontal occupants of the bullet vehicle sustain greater risk of severe injury than those in the target vehicle.*

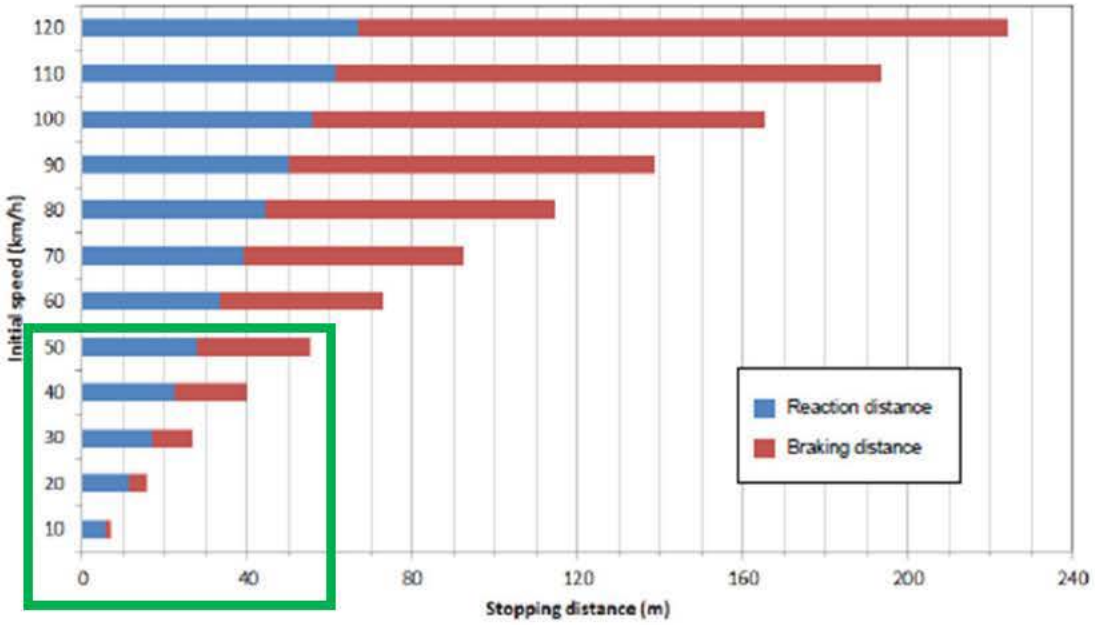
Source: Based on Bahouth et al. (2014), Davis (2001).

The extract below from the Austroads Guide to Road Safety Part 3 (https://austroads.gov.au/publications/road-safety/agrs03) highlights that vehicles travelling at lower speeds require less 'reaction distance' and 'braking distance', **lowering the likelihood of a crash**, as well as the severity (if a crash does happen).

2.1.1 Stopping distance

A fundamental aspect of safe road design is the provision of adequate sight distances where conflict between road users can occur or where there might be an object lying on the road. In Figure 2.2, assumptions are made that drivers and riders can recognise a safety critical situation and respond to the situation in a timely manner (usually a 1.5 to 2.5 second reaction time). If braking, the distance required to bring a vehicle to rest to avoid a collision is reliant on the reaction time, travelling speed of the vehicle and the condition of the pavement surface. As shown in Figure 2.2, higher speeds result in proportionately longer stopping distances.

Figure 2.2: Stopping distance as a function of reaction time and braking on a wet sealed pavement surface



Note: Combined distance travelled by a vehicle during the time it takes for a driver to react (blue segment) and then brake (red segment) at different initial travelling speeds. A reaction time of 2.0 seconds and a friction factor of 0.36 are assumed constant. Situation represents a 90th percentile value and a wet sealed pavement.

The first component of stopping, reaction time, is the time it takes for a driver to see the conflict and react to it by initialising braking. During this time, no braking is actually performed and the vehicle's speed does not change noticeably. The distance covered during the reaction time is linearly proportional to the initial travel speed. The second component of stopping is braking. This is the time from when the driver initializes braking to the time the vehicle stops. Braking distance is proportional to the square of the initial travel speed.

While an increase in travel speed of 5 or 10 km/h may not seem substantial, it has a considerable effect on stopping distance. Figure 2.3 shows how speed decreases under typical braking conditions on a wet, sealed pavement. Very little speed is actually lost in the early stages of braking and most speed is lost in the final stages of braking once a considerable amount of distance has been covered. Therefore any late reaction and braking is likely to be biased towards higher impact speeds.

With reference to the 19th April 2025 fatal e-scooter crash of a 12 year old girl (https://www.facebook.com/QueenslandPolice/posts/the-forensic-crash-unit-is-investigating-after-a-12-year-old-girl-died-following/1076950987799086/) on Vaux Street, Laidley (https://maps.app.goo.gl/x8awu33vyGWEys8T6), this street has a posted speed limit of 60kph and **no footpath**. **It is possible there have been other PMD crashes on roads that also do not have footpaths.**

- Question for QPS & TMR: *Is there merit from a road safety and crash prevention perspective to reduce the default speed limit in built-up areas (local streets) in Queensland on streets that do not have footpaths? Would this reduce crash severity?*

- Question for QPS & TMR: *Would having footpaths on roads reduce the likelihood of motor vehicle collisions (crashes) with PMDs and pedestrians?*

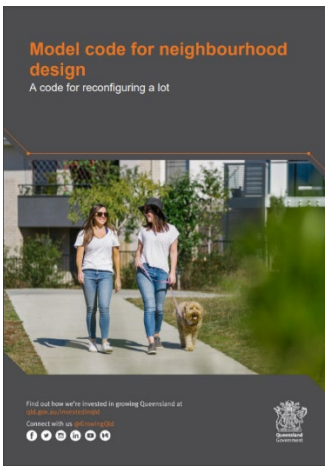
- Question for Local Government Agencies: *If the default speed limit in built-up areas (local streets) in Queensland on streets that do not have footpaths was reduced, would this incentivise Local Governments to install more footpaths in built up areas?*

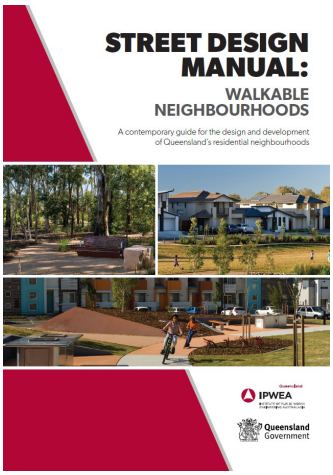
- Question to TMR: *Would it be possible have a dedicated portion of the Camera Detected Offences Program (CDOP) funds allocated annually to fund state-wide footpath installation?*

In 2020, the Queensland Government (https://www.planning.qld.gov.au/planning-issues-and-interests/healthy-and-active-communities) introduced new mandatory provisions for **new residential development** (which included the provision of footpaths) through the Planning Regulation 2017.

NOTE: *This does not apply to existing residential areas.* The aim of the new provisions was to create active healthy communities which encourage people walking and riding a bike.

The mandatory provisions are supported by the State Government's ***Model code for neighbourhood design*** (https://www.housing.qld.gov.au/news-publications/strategies-plans/building-plan/areas-of-reform/model-code-for-neighbourhood-design-and-the-queensland-housing-code) which builds on the Regulation's benchmarks, including further provisions that a local government may include in their planning scheme.





The ***Street Design Manual*** produced by the **Institute of Public Works Engineering Australasia** (https://www.ipwea-qnt.com/products-resources/sdm) also supports the mandatory provisions and the model code.

5. Effectiveness of current enforcement approaches and powers to address dangerous riding behaviours and the use of illegal devices

Enforcement Effectiveness

There may be several viable alternative enforcement options that do not require policing to address illegal behaviours on **both private PMDs and pubic/shared PMDs**. The rising use of non-street-legal (non-speed limited) **private PMDs** in crashes may be able to be addressed through use of incentives and disincentives ('carrots' and 'sticks') to aid enforcement effectiveness and change the fleet composition over time. There may also be opportunities to have the **public/shared e-scooter** operators make minor changes to the rental process to improve helmet wearing and road rule compliance. ***Self-explaining and self-enforcing*** systems may be preferable as they typically require minimal upkeep.

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that ***"Although the pay-per-minute method is widely used by shared e-scooter operators, some researchers assert that this payment method encourages high unsafe speeds."***

- Question to QPS & public/shared e-scooter operators: *Is there any evidence to indicate that the current charging a rental fee per minute incentivises riders to undertake time-saving illegal behaviours, such as speeding on footpaths, ignoring STOP signs or running red lights? Is it possible that an 'all day' or 'half-day' rental fee may remove this incentive?*

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"The lack of advanced planning for many scooter trips does not allow for helmet use."*

- Question to the public/shared e-scooter operators: *At the moment, when renting an e-scooter the rider needs to indicate if they are wearing their own helmet or using the helmet provided. Would it be possible to modify the app so that e-scooters could only be rented after the rider has uploaded a 'selfie' of themselves wearing a helmet?*

While there have been some suggestions that undesirable or dangerous behaviours on PMDs could be addressed in a similar manner to motor vehicle 'hooning', there may be issues of practicality and effectiveness that need further investigation – specifically issues of safe storage and ease of replacement.

- Question to e-scooter Industry representatives: *If e-scooters were to be **confiscated** by Police due to illegal conduct, would it be easy to source a replacement device? That is, are e-scooters readily available and in a variety of different price ranges?*

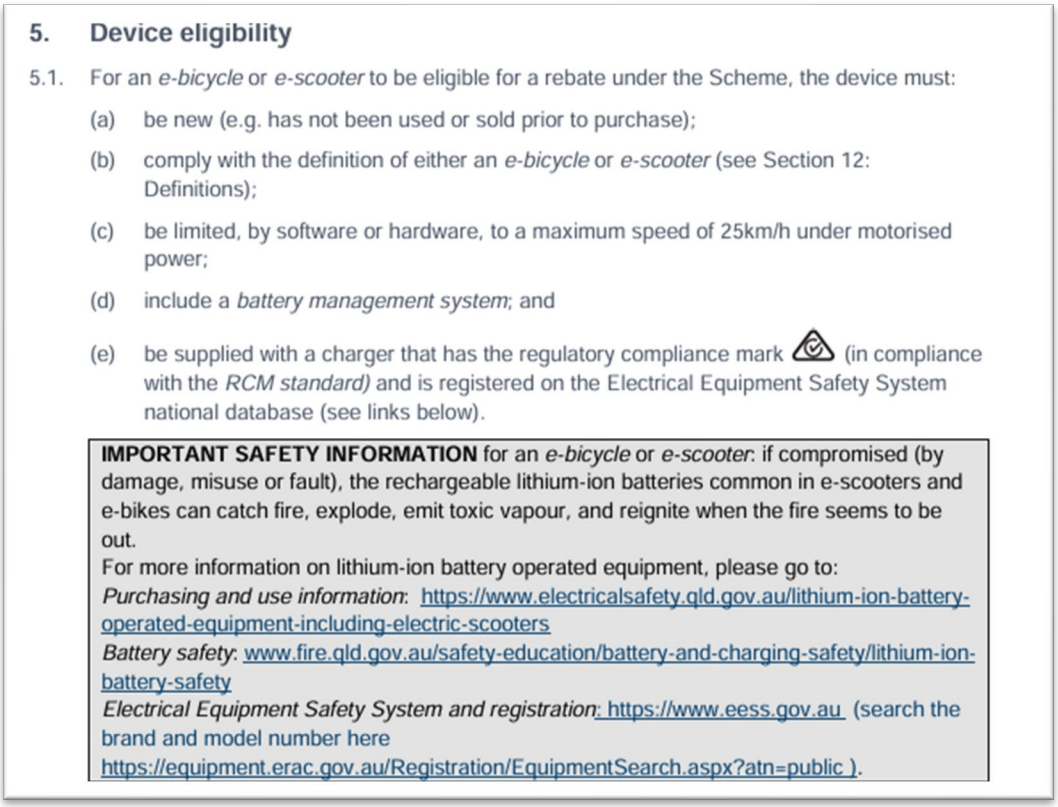
Financial incentives and disincentives ('carrots' and 'sticks') to limit the take-up of **non-street-legal** PMDs

As a disincentive ('stick') it may be feasible for the state government to place a significant **surcharge or levy** on the sale PMDs that are not street-legal (that is, those not speed limited to 25kph, sold legally for use on private property only), providing a financial disincentive to significant state-wide uptake of them. This could also be applied to all e-bicycles sold that do not meet the existing EN15194 or MCRP requirement.

As an incentive ('carrot') **to complement this**, it is possible for the state government to offer a **rebate or subsidy** on the purchase of street-legal (speed limited to 25kph) privately owned PMDs. This would increase the **affordability (cost of living)** and popularity of street-legal PMDs and incentivise the industry to develop additional PMDs with built-in speed limiters. There is already a precedent for this: in late 2024 the Queensland Government introduced an 'E-Mobility Rebate Scheme' (https://www.qrida.qld.gov.au/program/e-mobility-rebate-scheme, https://www.qrida.qld.gov.au/sites/default/files/2024-09/E-MobilityRebateScheme_Guidelines_PDF281KB.pdf & https://www.99bikes.com.au/qld-e-mobility-rebate-scheme). By all reports, the scheme was very popular, and all funds allocated were expended. The rebate was conditional on purchasing a street-legal PMD (extract below). Data on the PMDs purchased was also collected as part of the application process.

- Question to TMR: *Is there any information available about the PMDs purchased as part of the 2024 e-mobility rebate scheme? Was there an evaluation done of the 2024 e-mobility rebate scheme?*

The revenue from the surcharge/levy on the not street-legal PMDs could go into the rebate scheme for street-legal PMSs to **make it cost-neutral**, or it could go into a funding program to cover injury costs of victims of PMD related crashes and to fund proactive PMD safety initiatives, such as installing PMD-permitted bicycle lanes and retrofitting physical separation to existing on-road bicycle lanes.



5. Device eligibility

5.1. For an *e-bicycle* or *e-scooter* to be eligible for a rebate under the Scheme, the device must:

(a) be new (e.g. has not been used or sold prior to purchase);

(b) comply with the definition of either an *e-bicycle* or *e-scooter* (see Section 12: Definitions);

(c) be limited, by software or hardware, to a maximum speed of 25km/h under motorised power;

(d) include a *battery management system*; and

(e) be supplied with a charger that has the regulatory compliance mark (in compliance with the *RCM standard)* and is registered on the Electrical Equipment Safety System national database (see links below).

IMPORTANT SAFETY INFORMATION for an *e-bicycle* or *e-scooter*: if compromised (by damage, misuse or fault), the rechargeable lithium-ion batteries common in e-scooters and e-bikes can catch fire, explode, emit toxic vapour, and reignite when the fire seems to be out.
For more information on lithium-ion battery operated equipment, please go to:
Purchasing and use information: https://www.electricalsafety.qld.gov.au/lithium-ion-battery-operated-equipment-including-electric-scooters
Battery safety: www.fire.qld.gov.au/safety-education/battery-and-charging-safety/lithium-ion-battery-safety
Electrical Equipment Safety System and registration: https://www.eess.gov.au (search the brand and model number here https://equipment.erac.gov.au/Registration/EquipmentSearch.aspx?atn=public).

Use of Enforcement Revenue

In Queensland, under the Camera Detected Offence Program (CDOP - https://www.tmr.qld.gov.au/cameras), it is a requirement that the funds are used only for:

- road safety education and awareness,
- practices and behaviours that improve road safety,
- rehabilitating persons who have been injured in a road crash, and
- infrastructure and technologies to improve the safety of state-controlled roads

Question to TMR: *Would it be possible to use funds from PMD enforcement revenue (or surcharges/levies on the sale and hire of PMDs) to fund state-wide installation of PMD permitted bicycle lanes (as per TORUM s252C) and retrofitting of separation to on-road bicycle lanes to make them PMD permitted?*

Question to TMR: *Would it be possible have a dedicated portion of the CDOP funds allocated annually to fund state-wide installation of PMD permitted bicycle lanes (as per TORUM s252C) and retrofitting of separation to on-road bicycle lanes to make them PMD permitted?*

Question to Local Government Agencies: *Would funding from TMR to LGAs incentivise the installation of PMD permitted bicycle lanes (as per TORUM s252C) and retrofitting of separation to on-road bicycle lanes to make them PMD permitted? If not, what are the other significant barriers that need to be overcome?*

In terms of funding and allocation of resources, US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that:

- *Roadway markings and maintenance practices (e.g., modifying maintenance schedules to clear debris, improving pavement quality, use of signage and pavement markings) to address safety were also reported less often than other approaches. **This may indicate a disconnect between practices most used and those most needed, given that a large number of e-scooter-related injuries may be due to problems with pavement quality and roadside debris or hazards**. Another theme within these items is related to program funding and investment. Incentives for safety performance or helmet use, funding of dedicated staff positions, funding of helmet distributions, and using e-scooter permitting/licensing fees to pay for safety infrastructure were all cited largely as practices (currently) not in use.*
- *Studies showed a large proportion of injuries resulted from single vehicle crashes and, in particular, falls, which took place in a variety of settings including roadways, sidewalks, and bike lanes. **The conditions of the roadway or sidewalk surface were commonly attributed as crash factors, and e-scooters have been noted as being more vulnerable to road irregularities** (e.g., stormwater grates, rail crossings, cracks) than bicycles.*
- *E-scooter users and industry members have **consistently requested bicycle infrastructure or low-speed and low-volume streets for safety in riding e-scooters in the street**. E-scooter*

users' ***preference to ride in bicycle lanes aligns with pedestrians' desire that e-scooter users not ride on sidewalks****. Many studies found that e-scooter riders prefer streets with bike lanes and low speed limits, and several cities prohibit e-scooter use in areas heavily traveled by pedestrians, for safety reasons. Because bans on sidewalk riding push e-scooter riders into roadways, the roadway design and condition are important to consider.*

- ***Lack of structural supports (such as staffing and funding) to address environmental and behavioral needs to improve safety for e-scooter riders is likely perpetuating e-scooter risks, crashes, and injuries in many communities.***

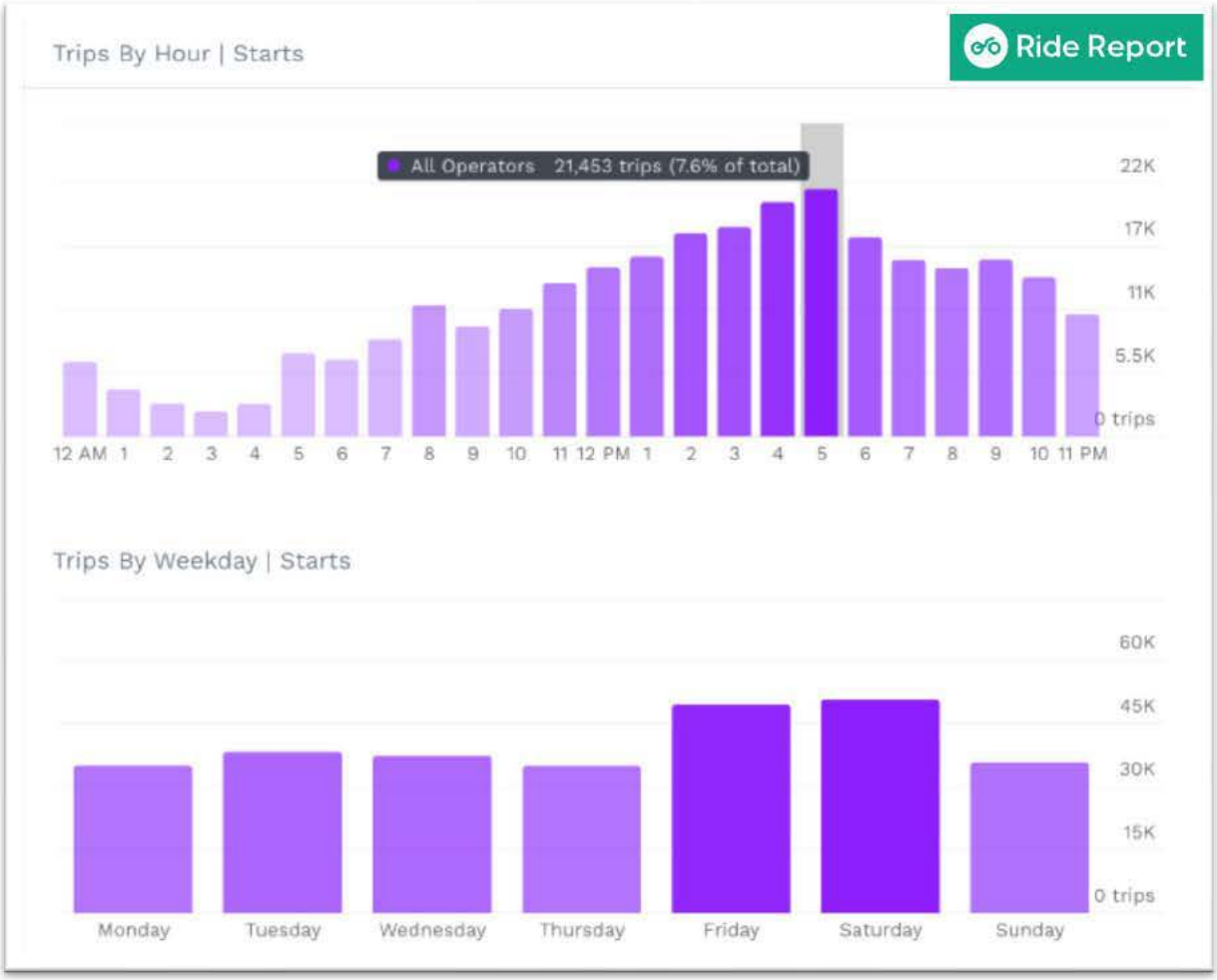
8. Broad stakeholder perspectives, including from community members, road user groups, disability advocates, health and trauma experts, academia, the e-mobility industry, and all levels of government.

Lack of data - availability

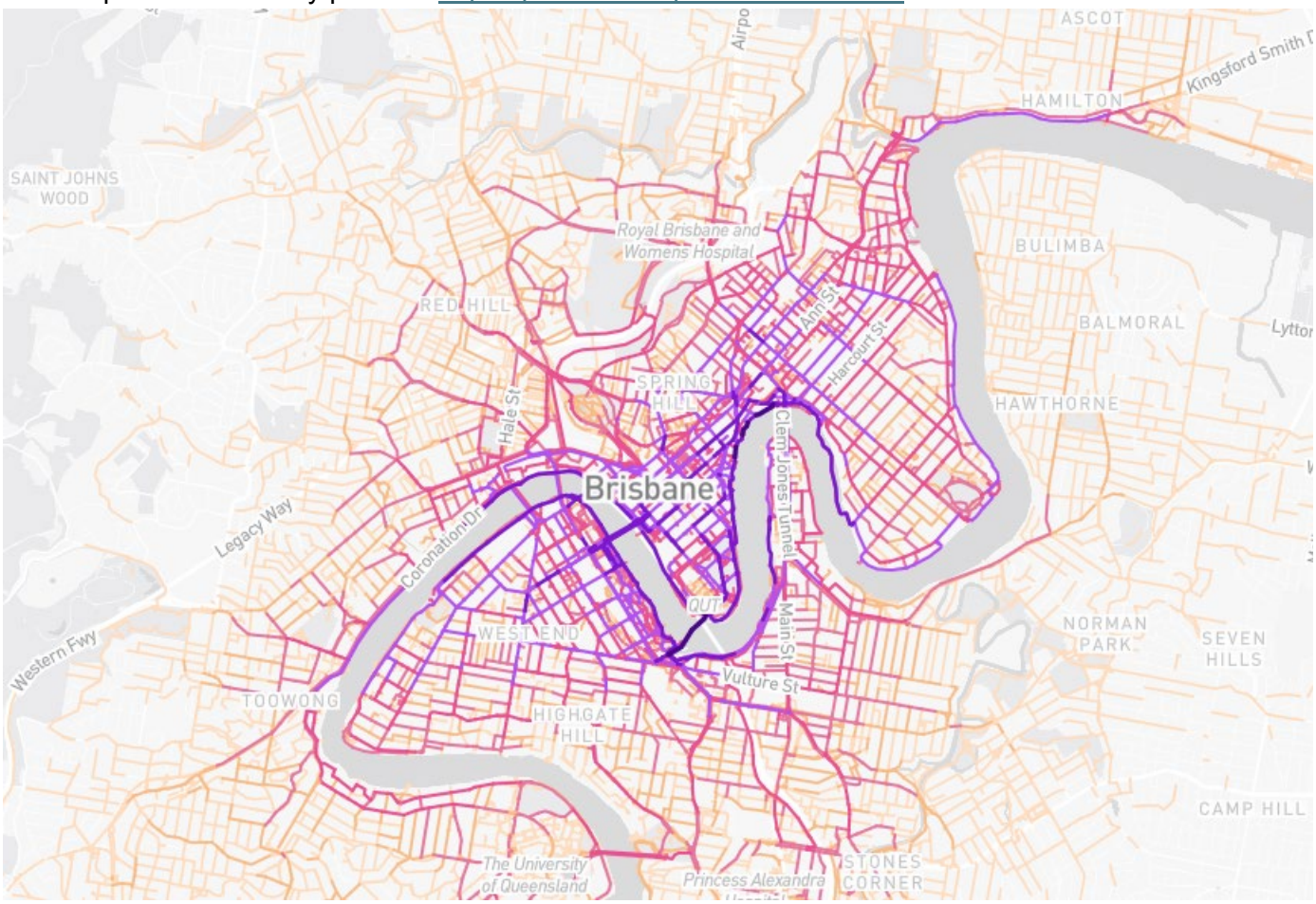
The operators of the public/shared e-scooter schemes, and the Local Government authorities who manage them, will have a significant amount of data available. The INRIX (https://inrix.com/press-releases/inrix-acquires-ride-report/) Ride Report Micromobility platform provides a publicly available data 'heatmap' for public/shared e-bikes and e-scooters. Brisbane data is available at this link: https://public.ridereport.com/brisbane?x=152.9896871&y=-27.4703015&z=13.38 , however, there is very limited data available on private PMDs beyond sales data.

- Question to the public/shared e-scooter operators: *What is the size of the public/shared e-scooter fleet in Queensland and what is the average distance travelled and duration of travel?*

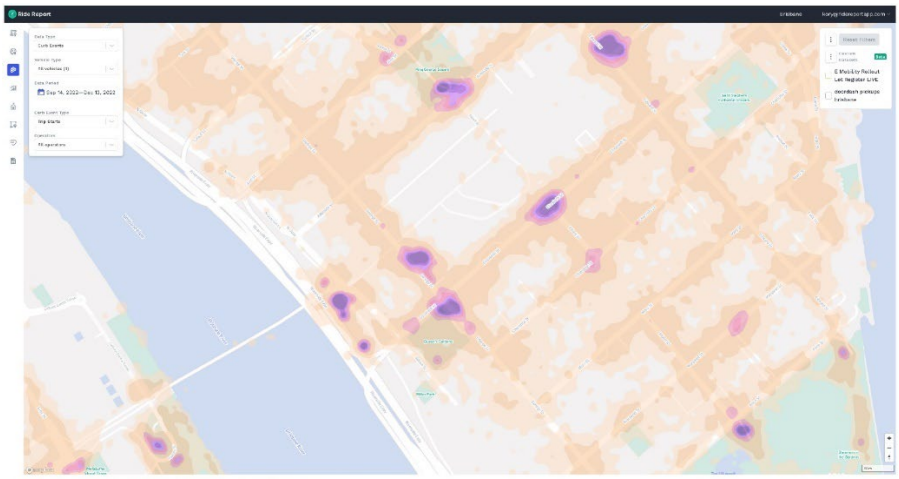
Charts and figures below are data extracted (June 2019 to September 2022) from the INRIX Ride Report Micromobility platform:



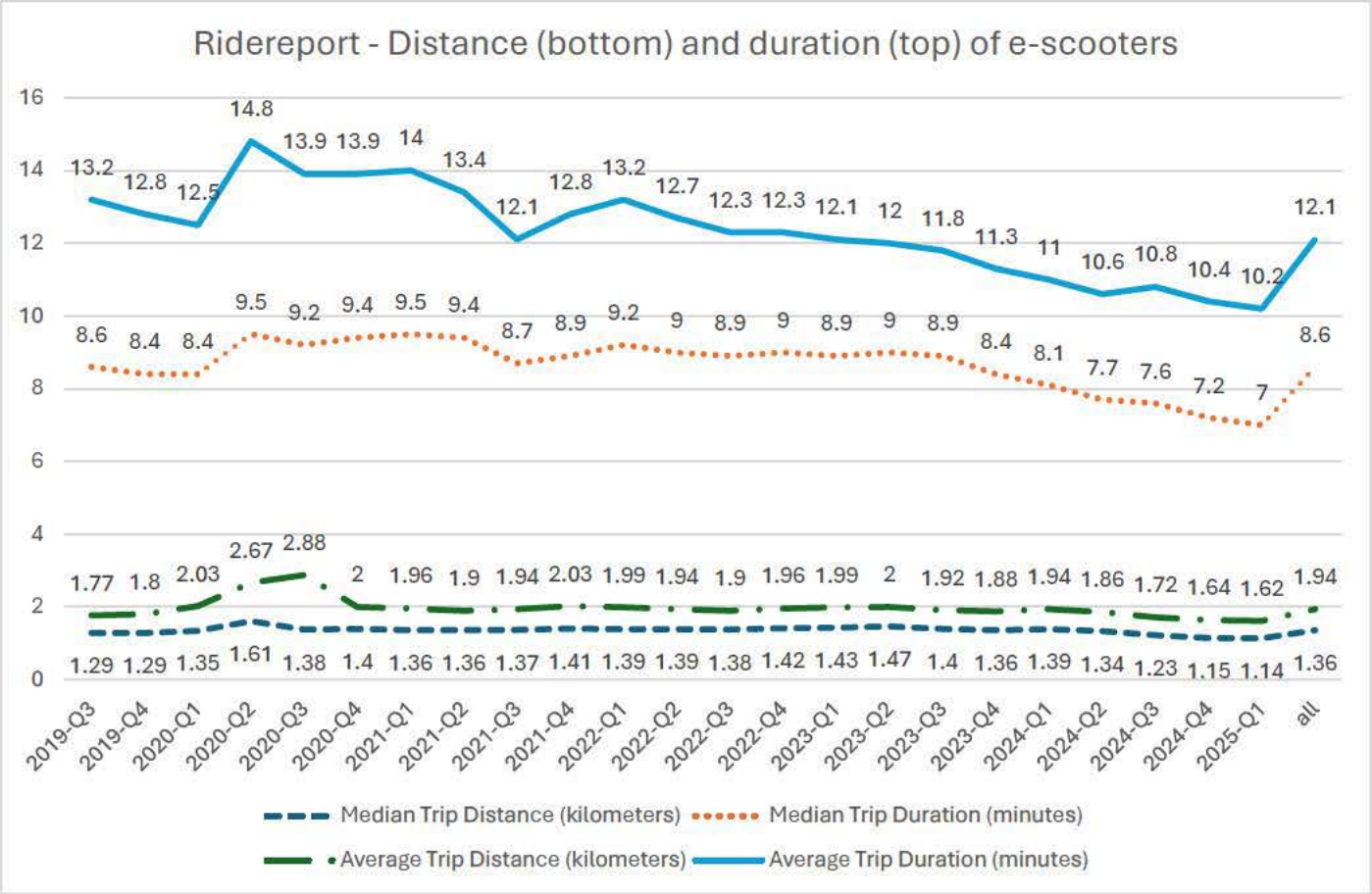
Brisbane City public/shared e-scooter heatmap extracted (June 2019 to September 2022) from the INRIX Ride Report Micromobility platform https://public.ridereport.com/brisbane:



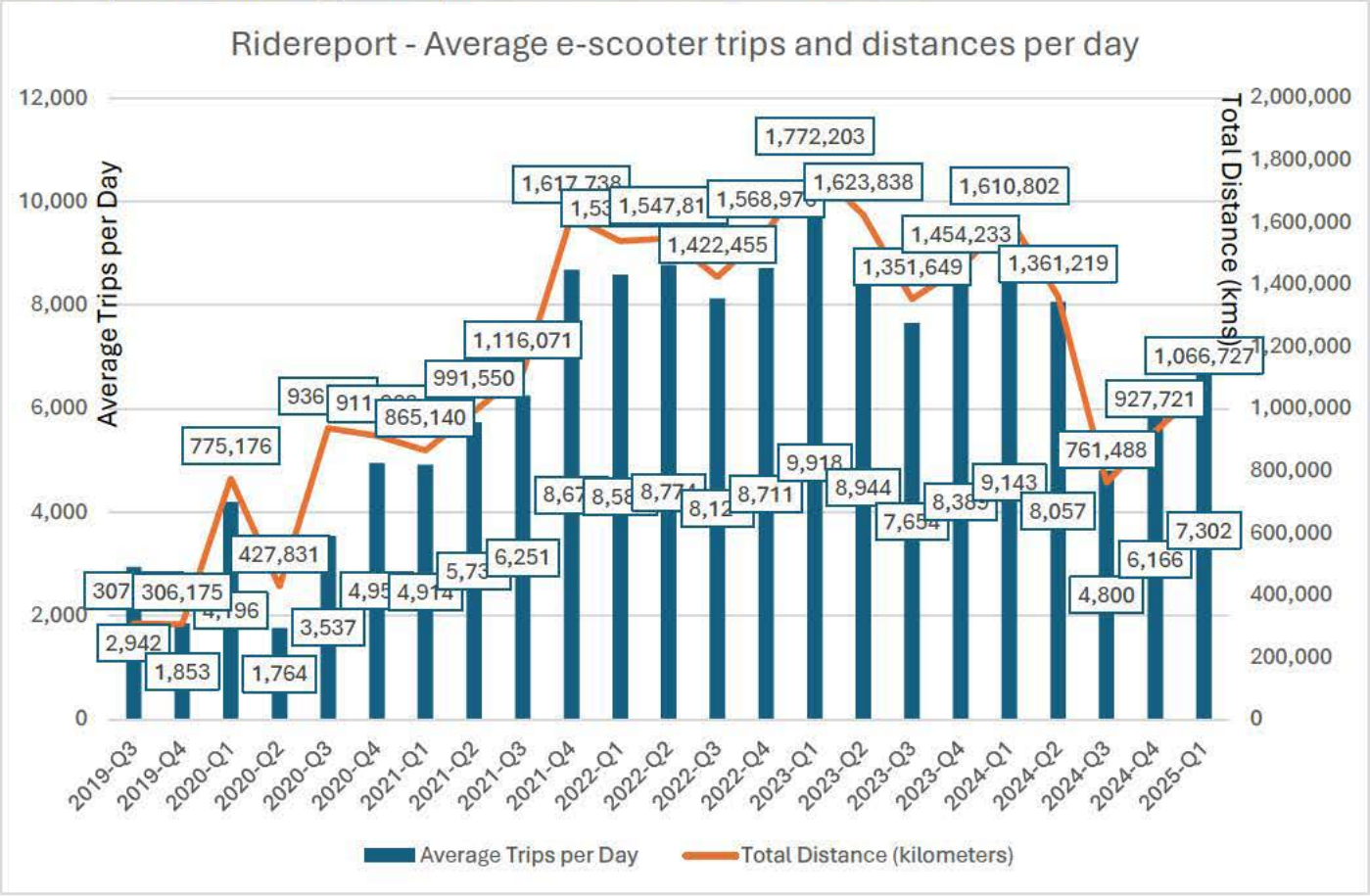
Brisbane City public/shared e-scooter parking heatmap extracted (September 2022 to December 2022) from the INRIX Ride Report Micromobility platform:



Brisbane City public/shared e-scooter trip duration and distance (average and median) chart extracted from the INRIX Ride Report Micromobility platform https://public.ridereport.com/brisbane:



Brisbane City public/shared e-scooter trips per day chart extracted (2019-Q3 to 2022-Q3) from the INRIX Ride Report Micromobility platform https://public.ridereport.com/brisbane:



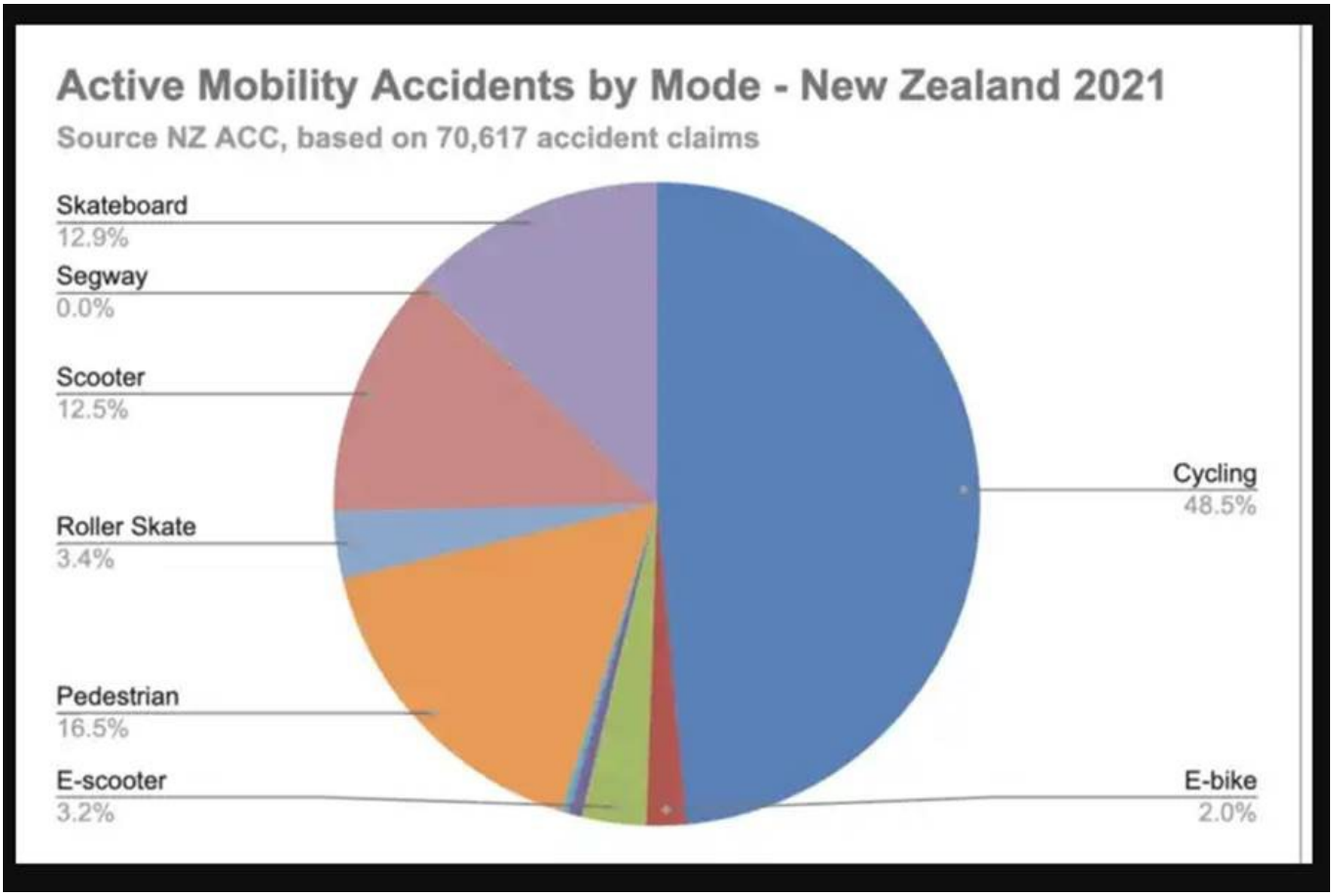
It is important to note that **hospital admission data** (non-injury, treatment or recovery data) is self-reported, and is subject to recall bias and the level of awareness of the person being admitted at the time. In addition, analysis and development of countermeasures from hospitalisation and crash data often only focuses on reducing the injury severity, not preventing crashes. Often PMD crash or hospitalisation data is shown in isolation, and not provided proportionally to the total number of transport related crashes or hospital admissions – this has the potential to be misleading. US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"Overall, the published literature relies on data originating from hospitals. This could lead to biased results since hospital and emergency department data **tend to overrepresent moderate to severe injuries** because less-serious injuries may be treated at outpatient centers or may not receive any formal medical care. Therefore, less is known about minor e-scooter injuries as well as noninjury events (i.e., "near misses")."*

With reference to the offence and infringement data provided in Appendix 1 of the TMR submission to the Inquiry, there is also a potential risk that this type of data can be skewed towards offences that are simple or easy to enforce and prove in a court of law.

- Question for Queensland Health: *Of the e-scooter crashes and hospitalisations, how was the type of PMD determined and the speed – was it self-reported or crash investigated? If self-reported, is it consistently self-reported and are you aware of any inherent biases in self-reported data?*
- Question for Queensland Health & TMR: *What number and proportion of total crashes and hospital admissions are PMD crashes and hospital admissions? What are the numbers and proportions for the other types of crashes and transport related hospital admissions?*
- Question for Queensland Health: *Of the e-scooter crashes and hospitalisations, how many are attributed to or were contributed to by rider behaviours vs infrastructure deficiencies? How was this determined – was it self-reported or crash investigated? If self-reported, are you aware of any inherent biases in self-reported data?*
- Question to QPS: *Are all PMD crashes reported and investigated? If not, how is it decided which to report and investigate?*

Relative crash risk data

Data from New Zealand in the chart below (https://www.linkedin.com/feed/update/urn:li:activity:6969844587318177792/ & https://medium.com/zipidi-intel/active-transport-accident-levels-is-emobility-significant-e0a7b88f9cbb) provides an indication of the relative volumes of path/road users. A more up-to-date version of this chart with Queensland-specific data would likely be of more use to the Committee, and this may be able to be sourced from one of the state government agencies.



Stephen Coulter, Head of eMobility Australia (https://www.linkedin.com/in/stephenbcoulter/) is an expert in this field and should be given consideration for an invitation to appear before the Committee.

Private PMD ownership 'snapshot'

Research undertaken in 2022 by Griffith University on the private ownership and use of personal mobility devices (PMDs) in Southeast Queensland provided the first in-depth examination of the private PMD fleet. It found that almost three quarters of all private PMDs were e-scooters

The table below is a direct extract from the research report: *Understanding private ownership and use of personal mobility devices (PMDs) in South East Queensland* by Abraham Chik-Keung Leung, and Matthew Burke, published in 2022 at the 26th International Conference of Hong Kong Society for Transportation Studies (https://research-repository.griffith.edu.au/server/api/core/bitstreams/f39c8b97-7f3f-4009-a6b5-e303508d2d5b/content)

The research authors, Dr Abraham Leung and Professor Matt Burke of Griffith University (https://www.griffith.edu.au/cities-research-institute/research/transport-group) are both experts in this field and should be given consideration for an invitation to appear before the Committee.

Figure 1. Breakdown of electric PMD owned by the respondents (n=130)

Number(s) Owned	E-scooter	E-Skateboard	E-Unicycle
None	21 (13.46%)	142 (91.03%)	140 (89.74%)
1	88 (56.41%)	10 (6.41%)	9 (5.77%)
2	36 (23.08%)	2 (1.28%)	4 (2.56%)
3	8 (5.13%)	0 (0%)	1 (0.64%)
4	2 (1.28%)	1 (0.64%)	1 (0.64%)
5 or more	1 (0.64%)	1 (0.64%)	1 (0.64%)
Estimated vehicle numbers reported by respondents	197 (~1.26 per person)	23 (~0.15 per person)	29 (~0.19 per person)

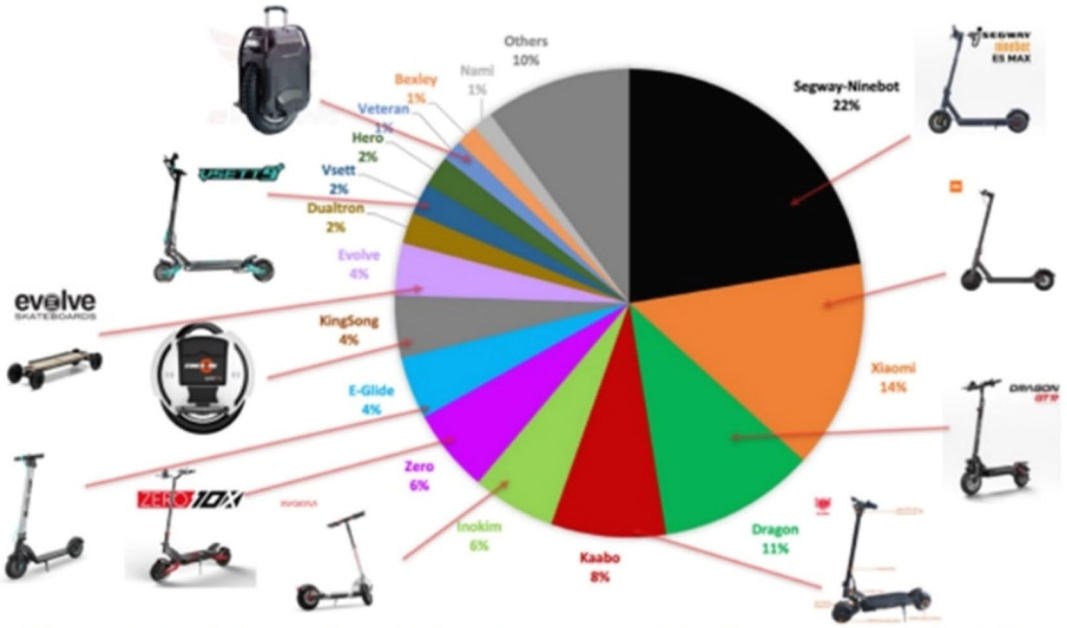


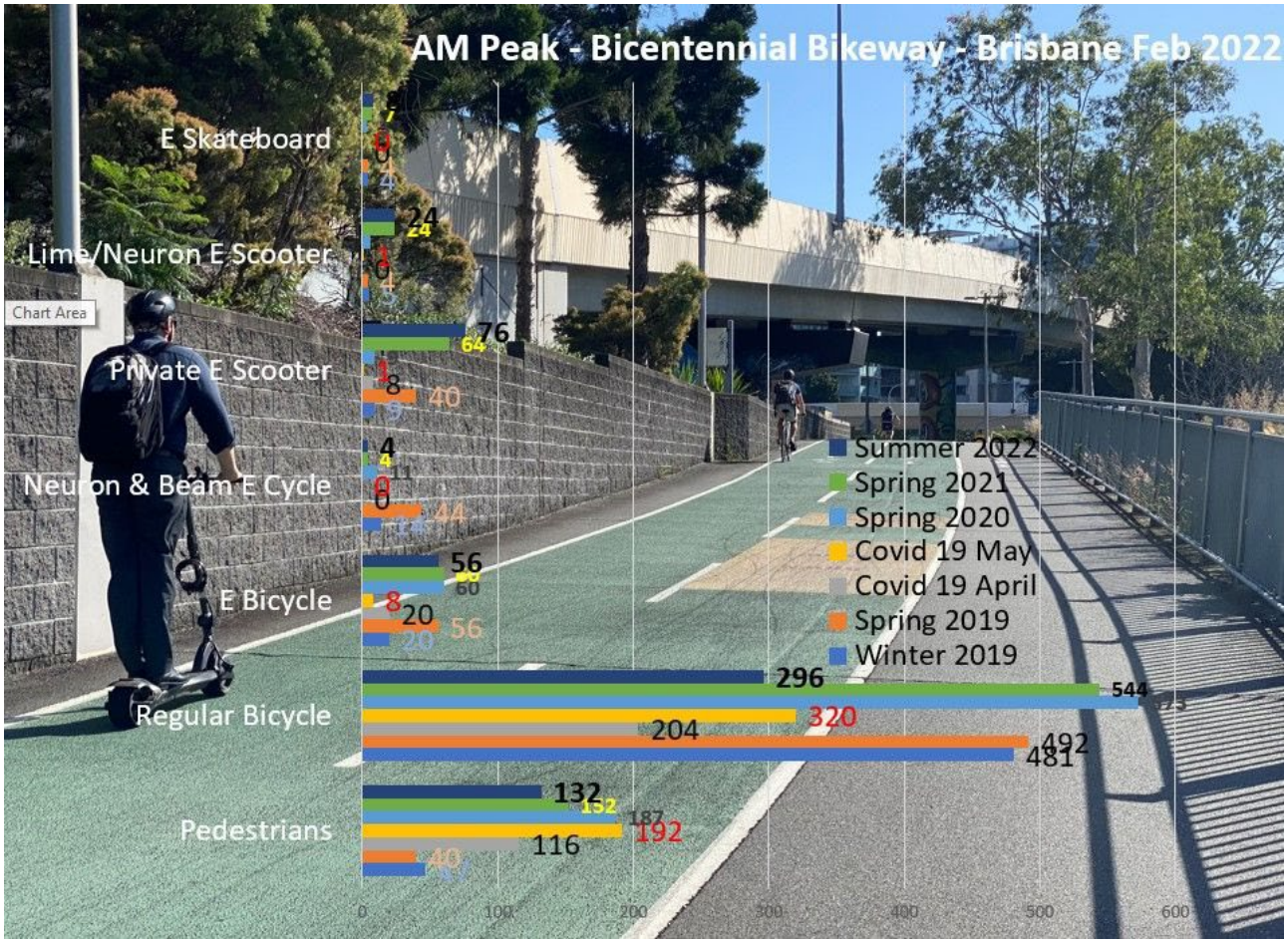
Figure 2. Breakdown of model brands as reported by the respondents (n=130)

This report also made other interesting findings that may be of relevance to this inquiry:

- Most users (53.5%) have used a public for hire e-scooter before getting their own. *This suggests that the public/shared scooters may be used as a 'test drive' prior to the decision to purchase a private PMD. It may also suggest* ***the purchase of a private PMD was intended to overcome*** *the speed and range limitations of a 'public for hire' e-scooter.*
- High-end 'prosumer' e-scooter (non-speed limited) users were mostly from the outer suburbs, and devices were newer (less than six months). *This suggests that private PMDs are likely to be more recent purchases and are* ***used for longer-distance journeys*** *than the 'public for hire' PMDs.*
- Trip distance also corresponded with device type, and high-end 'prosumer' ones were being the farthest ridden. High-end 'prosumer' e-scooters were more likely to be male, middle or older aged, and also with higher reported income. *This finding does* ***correspond with the hospital admission*** *data on age and gender.*

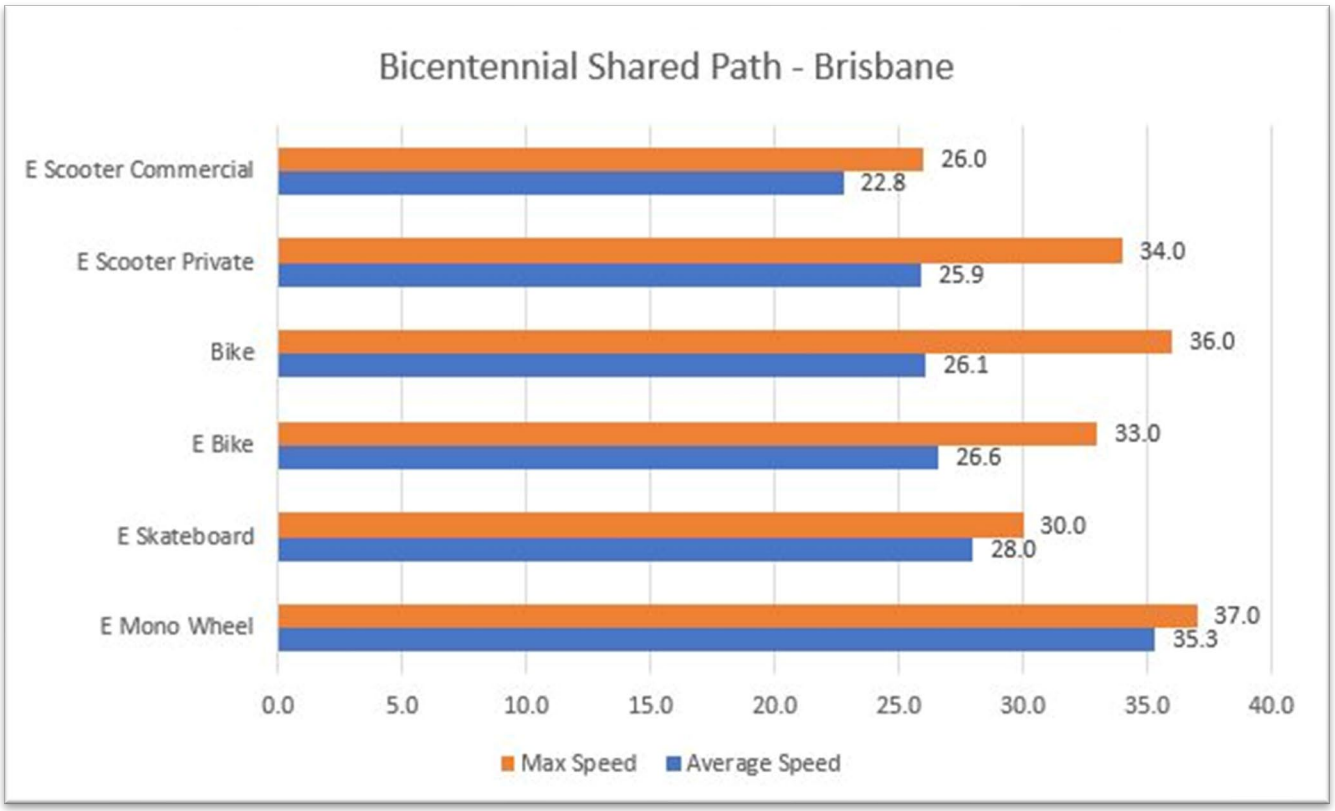
- E-skateboard or e-unicycle users tended not to make long distance recreational trips, perhaps limited by device design. *This emphasises the need for the Inquiry* ***to focus on e-scooters****, as not only are all the other PMD devices* ***a smaller proportion of the fleet****, but they are also* ***used for shorter distance journeys*** *and are less exposed to road danger.*

This 2019-2022 Brisbane bikeway traffic count data (below) from Matrix Traffic and Transport Data (https://www.linkedin.com/feed/update/urn:li:activity:6899866123479711744) gives an indication of the proportions of e-bicycles to regular bicycles, as well as private PMDs to public/shared PMDs. This chart shows that **non-electric bikes significantly outnumber ebikes** and that at this location private PMDs are only slightly higher in volumes than public/shared PMDs.

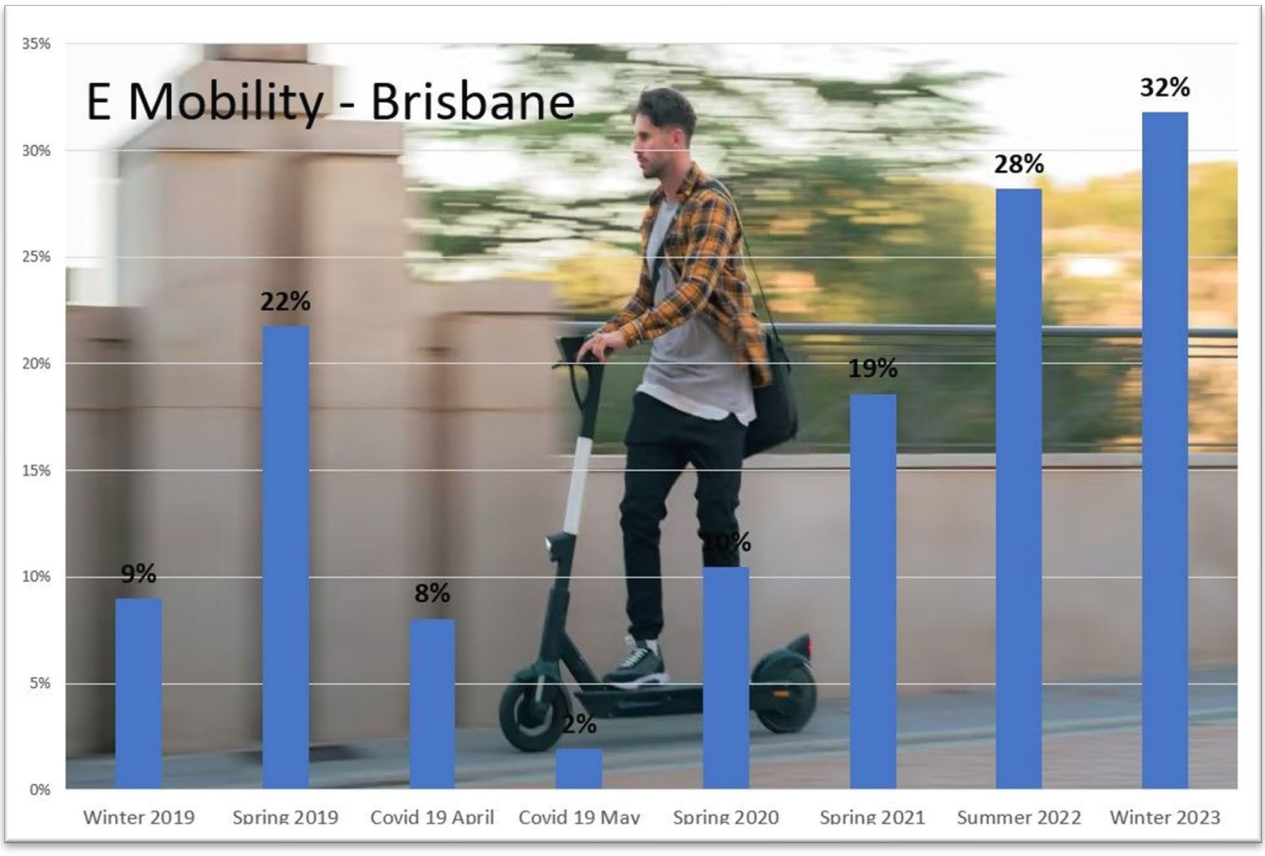


Question for Bicycle Industry representatives: *What proportion of the total bicycle fleet in Queensland is electric vs non-electric?*

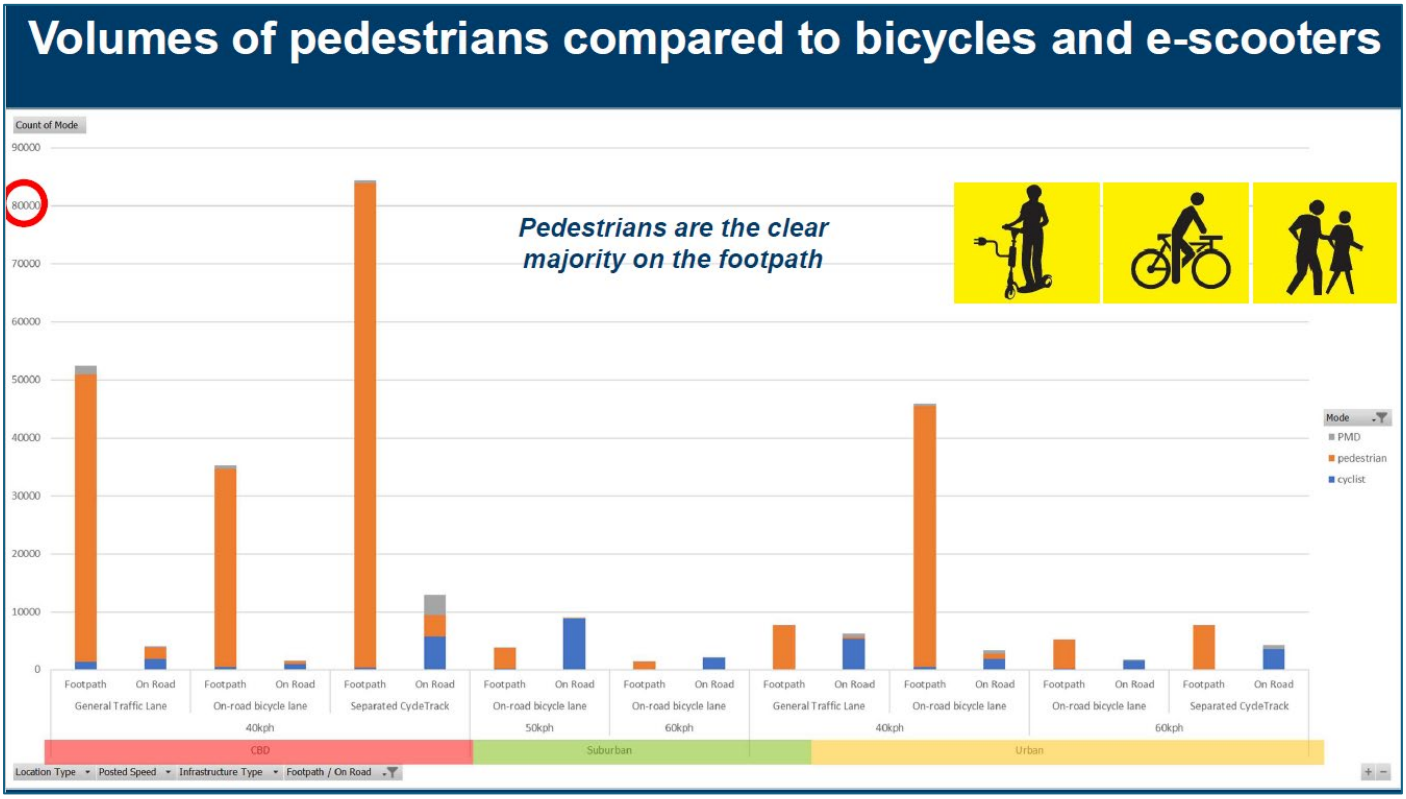
This 2024 Brisbane bikeway traffic count data (below) from Matrix Traffic and Transport Data (https://www.linkedin.com/feed/update/urn:li:activity:7089107351223341056/) shows the speed differences of various PMDs compared to non-electric bicycle speeds.



This 2024 Brisbane bikeway traffic count data from Matrix Traffic and Transport Data (https://www.linkedin.com/feed/update/urn:li:activity:7090102006425489408/) shows the AM peak hour inbound to the CBD. In terms of numbers E Mobility increase from 168/Hr to 192/hr. 88% Private E Scooter and 12% Beam/Neuron. Pedestrians were down by the same amount (a decrease of 30 peds per hour)

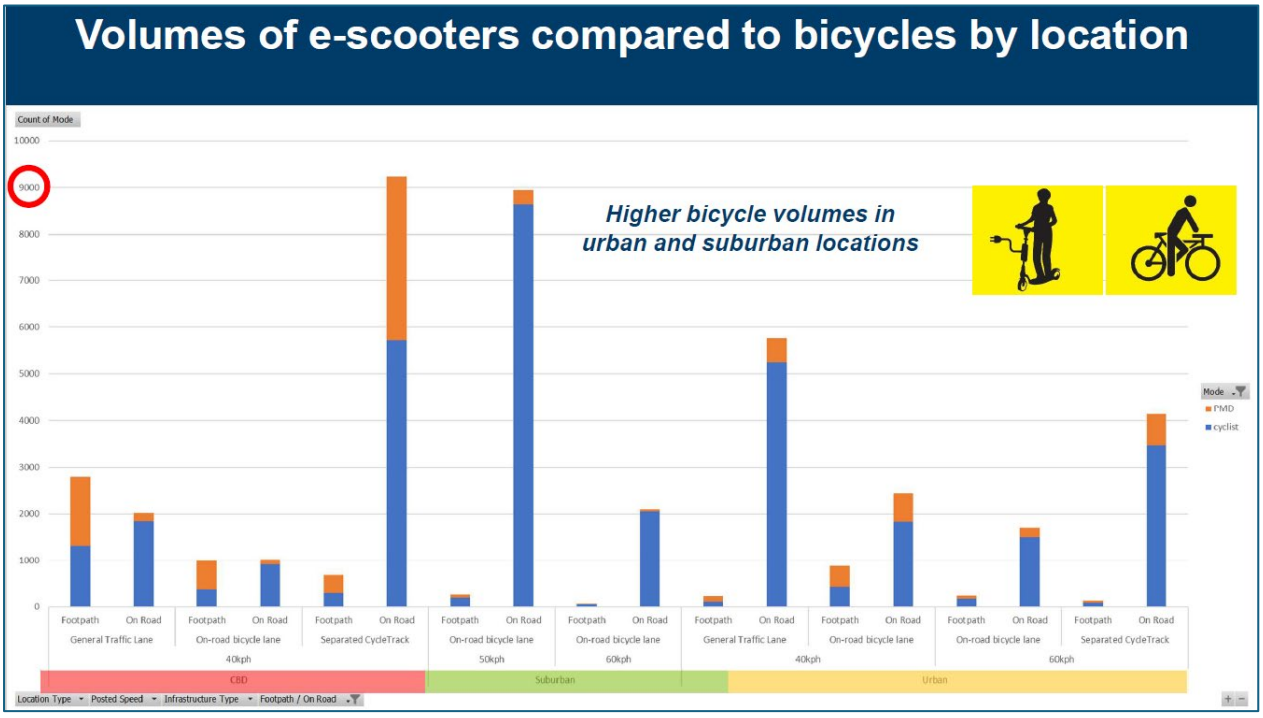


The chart below shows relative volumes of PMDs (**grey**), bicycles (**blue**) and pedestrians (**orange**) in Brisbane City at various locations over several days in 2022. This chart shows that the clear majority of footpath users in the CBD are pedestrians, with bicycles and PMDs in higher volumes on-road and in urban/suburban areas.



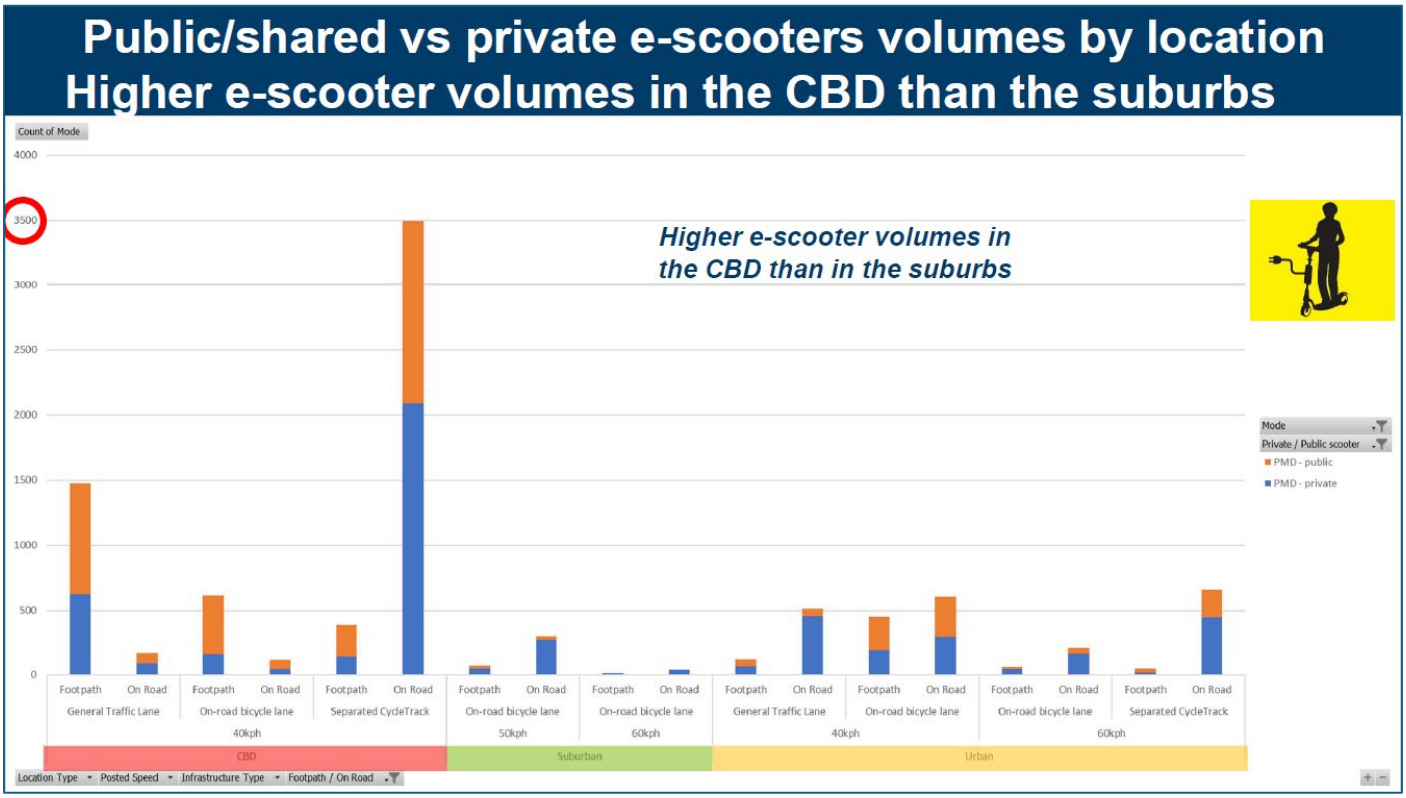
Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

The chart below shows relative volumes of PMDs (**orange**) and bicycles (**blue**) in Brisbane City at various locations over several days in 2022. This chart shows that **bicycles significantly outnumber PMDs**, with higher volumes of bicycles and PMDs in on-road and in urban/suburban areas.



Source: "*The rise of Personal Mobility Devices (PMDs) both public/shared and private in Queensland and the Infrastructure Management & Delivery implications for path user management*" from the AITPM 2023 Annual Cycling and Walking Technical Webinar (Industry Update), on 2 March 2023 (https://www.aitpm.com.au/events/upcoming-events/qld-the-rise-of-personal-mobility-technical-seminar-in-person-2-mar-2023).

The chart below shows relative volumes of **public/shared** PMDs (**orange**) and **private** PMDs (**blue**) in Brisbane City at various locations over several days in 2022. This chart shows that PMD volumes are much lower in the urban/suburban areas.



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Technology and innovation

As the GPS equipment used in smartphones and on PMDs is typically not sub-meter accurate, this does limit the usability of this technology for safety and enforcement purposes. It has been demonstrated to work very well in large 'restricted areas', such as the Queen St Mall, Roma St Parkland or SouthBank. However, for road-based applications where footpath operation is legal but road operation is illegal, the accuracy of the GPS is not reliable enough at this stage to be useful for this purpose.

US research *(National Academies of Sciences, Engineering, and Medicine 2022. E-Scooter Safety: Issues and Solutions. Washington, DC: The National Academies Press. https://doi.org/10.17226/26756)* has found that: *"Issues with **GPS accuracy** and urban canyons may pose problems to wide employment of such technology. Overall, **sidewalk riding restrictions have proven difficult to enforce** (Santacreu et al. 2020). Other technologies with the potential to identify sidewalk riding (e.g., sensor- or camera-based systems) are emerging and being deployed."*

*"To date, no city is known to try to regulate e-scooter parking more granularly using geofencing on a block face (Moran, 2021). GPS is shown to have an average margin of error of 16.9ft, making it useful for large areas such as limiting operation in parks (**GPS.gov**, 2021).* ***Geofencing alone does not appear to be a solution to sidewalk congestion****. GPS devices' margin of error of 16.9 feet far exceeds the space constraints on a sidewalk whose total width may be half that length. "*

To overcome GPS limitations, there are some image-recognition systems **currently under development and in limited use**:

- https://insidelocalgovernment.com.au/australian-first-ai-e-scooters-roll-in-to-melton/
- https://www.smartcitiesworld.net/micromobility/micromobility/beam-trials-ai-driven-footpath-detection-for-e-scooters-in-victoria-10689
- https://techcrunch.com/2022/07/27/drover-ai-is-using-computer-vision-to-keep-scooter-riders-off-sidewalks/

Test videos of these systems from Drover AI (https://drover.ai/) in action are available here:

- Sidewalk (red), road/bike lane (green) and parking lot (purple) identification: https://www.youtube.com/watch?v=SPZCO1siWo4
- Object identification: scooter, vehicle, bicycle, person, or bollard https://www.youtube.com/watch?v=qnfA0A3SKnE
- Parking zone/bike rack (green) vs sidewalk (red) identification: https://www.youtube.com/watch?v=h1I_L3wvkhs

At this stage, to determine the feasibility and usefulness of these technologies, research, development and testing will be required. If properly incentivised with government funding or regulations there is the possibility that innovative new technologies will be able to be developed.

This point is further highlighted in the extract below from the 2019 Neuron submission (https://www.ntc.gov.au/submission/368) in response to NTC's Consultation RIS on the *'Barriers to the safe use of innovative vehicles and motorised mobility devices'* (https://www.ntc.gov.au/transport-reform/ntc-projects/Barriers-to-the-safe-use-of-innovative-vehicles-and-motorised-mobility-devices):

> Without clarity on the usage of PMDs, businesses will be reluctant to work and partner with operators that can help to enhance the visibility of and grow their business. Businesses may also be reluctant to market to PMD users. For instance, in the United States, e-scooter share companies are partnering with real estate landlords to enhance micro-mobility transportation options for tenants of these buildings, giving these landlords an edge over the competition while also solving related issues that crop up from these e-scooter share schemes[3]. Such growth opportunities and revenues will be lost without clarity in regulation.

Key Insights and Concluding Summary

- Private PMDs are a low-cost transport option, providing cost of living relief to some people. Public/shared PMDs provide benefits to visitors to Queensland.
- Provision of PMD-permitted (physically separated) bicycle lanes and separated paths provide safety benefits not only for PMD riders, but also people who ride bicycles and pedestrians using footpaths. There is support for this, and it is completely feasible, is happening now, and there are examples all across the state.
- PMD parking on footpaths are a clutter hazard, but there are ways to improve the safety through introducing new requirements and utilizing bicycle parking and associated funding.
- There has been a significant amount of research undertaken in Queensland on PMD safety. In addition, PMDs on footpaths operate in a very similar manner to bicycles, which have always been footpath-legal in Queensland. As a result, infrastructure and methods to manage bicycles will also work for PMDs – although PMDs are more vulnerable to infrastructure deficiencies such as pavement defects.
- Throughout this submission questions have been put forward for consideration about the merits and potential unforeseen consequences of several of the 'solutions' that have been proposed in public forums.
- This Inquiry is also an opportunity to publicly re-visit and review the regulations and systems that are already in place to see if they need to be continued or expanded – especially with all the research findings available.
- In recognition of the workload burden of Police enforcement, several public policy options for self-explaining and self-enforcing systems have been put forward as a potential solution that may require minimal upkeep, once in place. Also, the use of revenue to direct safety efforts where they are most needed.
- There is a lack of data on private PMDs, and hospitalisation/crash data has its own inherent limitations. There needs to be awareness of this in decision-making, to ensure the impact can be assessed.
- There are some technology solutions on the horizon and many currently under development – but they have their own limitations and may require more development and industry incentives to become viable.

CITYLINK CYCLEWAY KEY FINDINGS REPORT

OCTOBER 2022

BRISBANE CITY

Dedicated to a better Brisbane

A message from the Civic Cabinet Chair for Transport

Like many global cities, Brisbane is on the precipice of change that will shape the next decade of how we live and move through our city.

As an older city adapting to the many different emerging transport technologies, from e-scooters to the Brisbane Metro, there are many opportunities for Brisbane to achieve our vision of a connected city, where there are many transport options that enhance liveability.

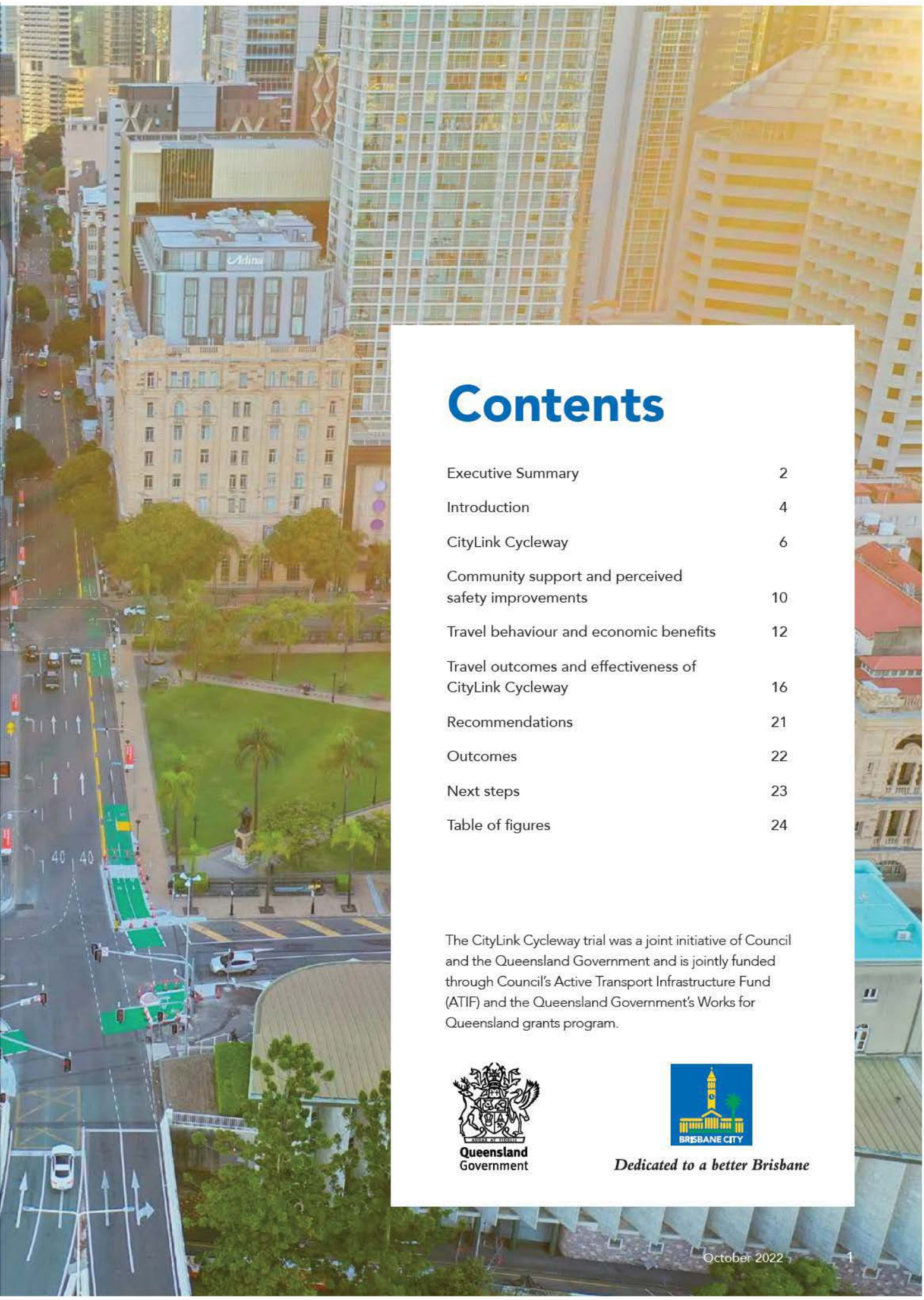
The CityLink Cycleway is one of those opportunities.

The CityLink Cycleway connects the heart of Brisbane to the extensive bikeway network surrounding our inner city, providing residents and visitors with options of how they travel to and through the city. This cycleway helps us strive closer to our vision for a connected, active city, where the many options of transport enhance liveability while supporting businesses and prioritising safety.

Brisbane City Council has a proud history of proactively creating a choice of active and sustainable travel options for people to use and this CityLink Cycleway trial and subsequent evaluation is evidence of that.

As our city grows and prepares for the Brisbane 2032 Olympic and Paralympic Games, we need to look at active transport options that provide choice and safety for all residents and visitors and the success of the CityLink Cycleway trial gives us a roadmap of a way to sustainable success.

Cr Ryan Murphy
Civic Cabinet Chair for Transport



Contents

The CityLink Cycleway trial was a joint initiative of Council and the Queensland Government and is jointly funded through Council's Active Transport Infrastructure Fund (ATIF) and the Queensland Government's Works for Queensland grants program.

Queensland Government

BRISBANE CITY

Dedicated to a better Brisbane

Executive Summary

Council undertook a 12 month trial period, between February 2021 and March 2022, to monitor the performance of CityLink Cycleway and seek feedback from a range of users, including riders, customers, businesses and community members. Following the trial period, analysis was undertaken to determine the effectiveness of the infrastructure and assess the performance of CityLink Cycleway against the benefits set out by the project, including improved safety and increased active travel opportunities in the city centre. Evaluations of the trial and recommendations for the future of CityLink Cycleway were completed by Griffith University and Jacobs Engineering Group. A summary of the community feedback and the two third-party evaluations are presented in this report.

Based on the trial evaluation findings, Council concludes CityLink Cycleway trial a success. CityLink Cycleway improves safety for road users including people walking and riding, increases opportunity for active and sustainable travel choices, and is generally supported by the community. The CityLink Cycleway trial evaluation indicates that cycleways in Brisbane's city centre can have direct, tangible economic benefits to surrounding retailers and businesses, which is consistent with global trend data[1,2].

Community support and perceived safety improvements

For the duration of the trial, Council gathered community feedback via an online survey which demonstrated a high level of support for CityLink Cycleway. Close to 80% of people are in favour of CityLink Cycleway on Elizabeth Street and William Street to Grey Street via Victoria Bridge. More than 65% of respondents were also strongly in favour of CityLink Cycleway along Edward Street.

More than 80% of survey respondents strongly or somewhat agree that CityLink Cycleway improves safety for bike riders and more than 75% of survey respondents strongly or somewhat agree that pedestrian safety was improved by CityLink Cycleway.

Travel modes and economic benefits on the CityLink Cycleway

Griffith University undertook research to analyse the perception of local businesses, customers and delivery workers on travel behaviours and economic effects.

Similar to global trends[1,2], the trial evaluation demonstrated that increased levels of active transport

1 D von Schneidemesser & J Betzien, 'Local Business Perception vs. Mobility Behaviour of Shoppers: A Survey from Berlin,' *Findings*, June, 2021

2 D Arancibia, S Farber, B Savan, Y Verlinden, N Smith Lea, J Allen, & L Vernich, 'Measuring the Local Economic Impacts of Replacing On-Street Parking with Bike Lanes,' *Journal of the American Planning Association*, vol. 85, 2019 463–481

has direct, tangible economic benefits for surrounding retailers and businesses, with people who chose to use active transport modes representing a higher proportion of expenditure than people who drove. Specifically, the results show that people who walk and ride (41%) directly represent a greater proportion of the total expenditure than people who drive (24%). The results also indicate that businesses generally underestimate the volume of customers utilising active travel modes and over-estimated the number of customers travelling by car.

In examining the perceptions of CityLink Cycleway among customers, businesses and delivery workers, the results demonstrate that most people support the infrastructure remaining in place and perceive that CityLink Cycleway generally improves street safety. It is noted, while feedback was positive overall, there were differences in support levels for the retention of CityLink Cycleway across user groups with businesses (45%), customers (83%) and delivery workers (80%) in support of CityLink Cycleway.

Travel outcomes and effectiveness of CityLink

Jacobs Engineering Group analysed available data to understand the overall effectiveness of CityLink Cycleway and any impacts to travel networks across the city centre, including to traffic travel times and kerbside allocations.

The results demonstrate an increase in riders using CityLink Cycleway and reduction in riders using nearby streets, representing the uptake of the trial infrastructure. This leads to reduced conflicts between different transport modes and safer city centre traffic environments for all road users.

The data identifies an overall growth of e-mobility which is reflected most strongly on Elizabeth Street (93%). Since the implementation of CityLink Cycleway, more than 70% of e-scooters use the trial infrastructure instead of the footpath, improving pedestrian safety.

The effect of CityLink Cycleway on travel times for buses between Elizabeth Street and Edward Street (2 seconds) and Cultural Centre to Eagle Street (30 seconds) was found to be negligible. However, there was an increase of vehicle travel time (3:27 minutes), on Edward Street, between Turbot Street and Margaret Street. The overall decrease in car parking rates in the city centre that CityLink Cycleway has not had a negative impact on parking in the city centre.

Limitations

The CityLink Cycleway trial period was impacted by several unprecedented events including coronavirus lockdowns and the February 2022 Brisbane weather event. Works and road closures to facilitate significant infrastructure projects, including the Kangaroo Point Green Bridge, Cross River Rail, and the Brisbane Metro, were also underway during the trial period. While efforts were made to capture good quality data to reflect ongoing behaviours and impacts, it is expected that some data captured during the trial period may have been impacted.

Recommendations

Several recommendations were made as part of the trial evaluation, including providing clearer signage and ongoing road safety education. This report outlines the success of CityLink Cycleway and Council's next steps to make the infrastructure permanent.

OUTCOMES

The independent evaluations concluded that there is a strong level of community support for CityLink Cycleway and demonstrated that the intended project benefits and objectives were achieved, including improving perceived safety and minimal disruption to other road users.

Following analysis of the evaluations, Council has determined that CityLink Cycleway trial was a success.

Council will examine the recommendations made during the evaluation period and is committed to undertaking the required steps to future proof the existing CityLink Cycleway. Council will now explore future CityLink Cycleway connections to expand the inner city active transport network and create safe, sustainable alternatives to driving.

Introduction

Having a safe, connected, flexible and sustainable transport network is vital to Brisbane. It helps us commute to work, access vibrant lifestyle and leisure opportunities, do business and visit family and friends. Easy and accessible transport is essential to the functioning and growth of our city.

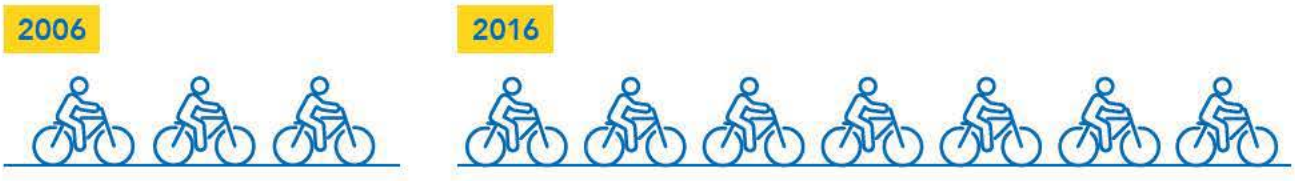
The *Transport Plan for Brisbane – Strategic Directions* (Transport Plan) is Council's plan to guide the evolution of our city's transport network as Brisbane grows and evolves. To support the release of the Transport Plan, Council developed the *Transport Plan for Brisbane – Implementation Plan 2018* (Implementation Plan).

Riding and e-mobility are key themes of the Implementation Plan which focuses on opportunities for creating an accessible, connected city that offers sustainable transport options. In Brisbane and around the world, riding is growing in popularity and becoming a preferred mode of transport as people look to sustainable and active travel options to get around their cities.

Brisbane has developed an extensive network of both on and off-road bikeways to help manage traffic congestion and keep our community active by providing safe, accessible routes to key destinations and local amenities. Complemented by the increased provision of end-of-trip facilities at many workplaces bikeways are increasingly being used for commuter purposes in addition to recreational use. Between 2006 and 2016, the number of people riding a bike to work in the city centre more than doubled.

There is a growing recognition that active travel has health, congestion reduction, environmental and cost saving benefits for individual riders and the community.

Between 2006 and 2016, the number of people riding a bike to work in the city centre more than doubled



For every $1 invested in riding infrastructure, the Queensland Government estimates $5 is returned in health benefits and traffic congestion reductions among other benefits[3].

The coronavirus pandemic changed the way we move throughout our city with a surge of growth in active travel modes, such as riding bikes and e-scooters. This increase in active travel has prompted cities around the world to further enhance active transport facilities. Paris, France is converting 52 kilometres of vehicle lane into two-way bicycle lanes and plans to add a further 130 kilometres of new dedicated bicycle lanes[4]. Melbourne, Australia is also installing 40km of protected bike lanes[5].

CityLink Cycleway trial is a priority action identified in the *Brisbane City Centre Master Plan – Stage 1*, which is a plan to revitalise the appeal and accessibility of the city centre following the impact of coronavirus and to unlock the potential of the city in the lead up to the Brisbane 2032 Olympic and Paralympic Games. CityLink Cycleway forms part of Council's plan to help shape the city centre as a place that allows the community to access businesses, shops, cafes and restaurants easily and safely and move seamlessly between inner-city precincts.

Council is committed to expanding our active transport network to encourage more people to ride more often. The Transport Plan recognises the benefits of strengthening the connectivity of bikeway networks across our city and imparts strategic direction to deliver an inner-city active travel network to create a safe, sustainable alternative to driving into our city centre.

CityLink Cycleway key facts

CityLink Cycleway expands the city centre bikeway network

For every $1 invested in riding infrastructure in Queensland, $5 is returned in benefits for the community

CityLink Cycleway improves safety and connectivity

Active transport rates are increasing in Brisbane

3 Department of Transport and Main Roads, *Cycling investment in Queensland*, Department of Transport and Main Roads, Brisbane, 2022, viewed August 15 2022, https://www.tmr.qld.gov.au/Travel-and-transport/Cycling/Cycling-investment-in-Queensland

4 City of Paris, *Le Plan Vélo 2021 - 2026*, Paris, 2021.

5 City of Melbourne, *New bike lanes*, Melbourne, 2022, viewed 15 August 2022, https://www.melbourne.vic.gov.au/building-and-development/shaping-the-city/city-projects/Pages/new-bike-lanes.aspx

CityLink Cycleway

CityLink Cycleway separates bike and e-mobility riders from general vehicle traffic and forms an important part of Council's Inner-City Transport Plan by effectively expanding the bikeway network. With one of the major barriers to riding being real or perceived safety risks, the aim of CityLink Cycleway was to provide a safe, convenient active travel options encouraging residents and visitors to use active and sustainable travel and reduce the reliance on private vehicle use in the city centre.

Benefits

The CityLink Cycleway aims to deliver a network of dedicated riding facilities to encourage even more people to use active modes of transport and help reduce the need for car-based travel in the city centre.

The overall benefits are to:

- ✓ provide a safe, connected and accessible cycleway
- ✓ provide more active travel opportunities by complementing the existing bikeway network in the city centre
- ✓ improve riders' accessibility to places of work and local amenities such as shopping precincts and recreational parks
- ✓ improve safety for people walking, riding and driving and reduce carbon emissions.

Trial stages

Planning for the initial stages of CityLink Cycleway took a balanced approach to consider long-term city centre network requirements, connectivity to existing and planned infrastructure, directness of travel and the safety of all road and path users.

The trial implemented a separated two-way bikeway along selected streets in the city centre occupying previous kerbside traffic lanes to allow separation of riders from vehicles using raised yellow kerbing.

The trial was delivered in two key stages, as shown in Figure 1, with all sections operational by March 2021.

- Stage 1
  - Elizabeth Street, between William and Creek streets
  - Edward Street, between Elizabeth and Alice streets.
- Stage 2
  - William Street to Grey Street, via Victoria Bridge.

Figure 1: Overview of CityLink Cycleway and connections

E-SCOOTERS AND E-MOBILITY DEVICES

The Transport Plan and Brisbane's e-mobility strategy outlines the importance of e-mobility as part of Council's plan to offer more sustainable and flexible travel options to meet the needs of our growing city. CityLink Cycleway was designed in consultation with the Queensland Government to ensure that, under legislation, e-mobility devices can use the separated facilities.

CityLink Cycleway separates e-scooters and other e-mobility devices from the footpath, helping improve pedestrian safety and addressing community concerns.

In January 2022 Council undertook further works to add e-scooter symbols along CityLink Cycleway to increase awareness and encourage e-mobility riders to use the bikeway.

In line with the current rules for personal mobility devices, e-wheeling devices, such as e-scooters, are not permitted to ride on other streets in the city centre.

Trial objectives

Council is committed to delivering safe and easy-to-use infrastructure that is supported by the community. The trial evaluation aimed to assess the benefits of the CityLink Cycleway against the following measures:

Provide a safe, connected, and accessible cycleway

Measures of success

- ✓ Safe infrastructure that is widely supported and enjoyed by the community
- ✓ Infrastructure that is easy to access and convenient to use

Provide more active travel opportunities by complementing the existing network for riders

Measures of success

- ✓ Increase in active travel opportunities for riders commuting into the city centre while balancing disruption to other road and footpath users

Implementation

For more than 100 years, Brisbane's city centre has adapted to the evolution of preferred transport modes and technology, from the horse and carriage of the 1800s to the e-mobility devices of today. Adapting infrastructure to align with the way we choose to move in and around our city centre, pre-existing transport networks are impacted.

To facilitate the CityLink Cycleway trial, changes to kerbside allocations were required on Elizabeth Street, Edward Street, William Street and Stanley Street. The following amenities were affected:

- vehicle parking spaces
- motorcycle parking spaces
- loading zones
- night-time taxi zones
- coach parking.

Council worked hard to balance the needs of the community and minimise changes to kerbside parking and amenities wherever possible. For example, of the 17 loading zones that were removed, 13 were relocated nearby to support business needs.

Trial period

The CityLink Cycleway trial ran for a duration of 12 months between February 2021 and March 2022.

During the trial, Council monitored the performance of the bikeway and sought feedback from a range of users, including residents, businesses, riders, and community members.

Council welcomed feedback on all aspects of the trial, including safety, bikeway usage, design improvements, parking and loading zone changes. During the trial, Council made changes to the bikeway in line with community feedback, where possible, to enhance the CityLink Cycleway.

Emergence of transport modes in Brisbane

Improve cyclist accessibility in the city centre to places of work and local amenities such as shopping precincts and recreational parks

Measures of success

✓ Improves accessibility to places of work and amenities and demonstrated benefit to local businesses

Improving safety for people walking, riding, and driving, and decreasing carbon emissions

Measures of success

✓ Improve safety for people walking, riding, and driving through sustainable transport options

Trial evaluation

In addition to welcoming and recording community feedback for the duration of the trial, Council engaged external experts to undertake analysis and evaluation of CityLink Cycleway using various sources of quantitative and qualitative data.

To facilitate a robust evaluation, Council engaged Griffith University and Jacobs Engineering Group, who undertook analyses of community sentiments on safety and overall support levels, travel behaviours and economic outcomes, transport network impacts, and recommendations for the future of CityLink Cycleway. The key findings of the evaluation are presented in this document.

During the trial, several unpredictable and severe events occurred, including the coronavirus pandemic and February 2022 weather event.

These types of events dramatically changed the way people travel, and may continue to travel, across Brisbane. While efforts have been made to capture good quality data that reflects ongoing behaviours and impacts, it is expected that some data captured during the trial period may have been impacted by these types of events.

Brisbane's city centre is undergoing significant urban transformations with the development of landmark infrastructure projects such as Kangaroo Point Green Bridge, Brisbane Metro and Cross River Rail. These projects necessitate ongoing roadworks, diversions and closures that may have influenced rider and travel behaviours during the trial period.

Timeline of the CityLink Cycleway trial

Community support and perceived safety improvements

Provide a safe, connected, and accessible cycleway

Measures of success

- ✓ Safe infrastructure that is widely supported and enjoyed by the community

Improving safety for people walking, riding, and driving, and decreasing carbon emissions

Measures of success

- ✓ Improve safety for people walking, riding, and driving through sustainable transport options

Methodology

Council hosted an online survey for the duration of the trial period, between February 2021 and March 2022, to enable the community to provide their feedback. More than 1300 responses were submitted.

The survey comprised questions relating to the safety of riders, pedestrians, and motorists, as well as overall support for CityLink Cycleway. Five-point Likert scales and open-ended questions were typically used to measure the community's feedback.

The survey was accessible online and was actively circulated to the community immediately surrounding the trial area, including businesses and residents, along with key active transport user groups. The survey was further promoted on project signage along the trial alignment. Residents or visitors who contacted Council during the trial period were encouraged to have their say.

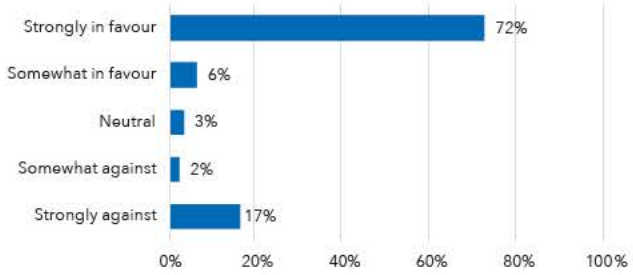
Community sentiment and support

The overall community support for CityLink Cycleway is high, as seen in Figure 2, which shows the support rates for each street of the trial. More than 70% of respondents confirmed they were strongly in favour of CityLink Cycleway both on Elizabeth Street and along William Street to Grey Street via the Victoria Bridge. This high level of support was echoed for CityLink Cycleway on Edward Street, with 66% of those surveyed confirming they were strongly in favour.

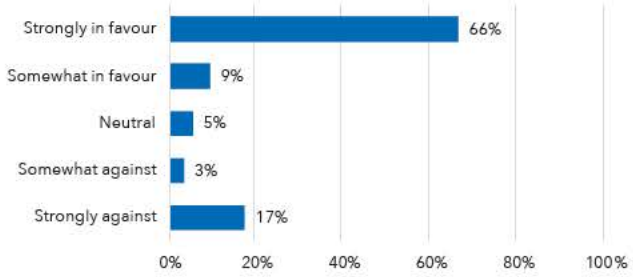
The results also show that people strongly agree that CityLink Cycleway improves safety for bike riders, pedestrians, and motorists (Figure 3). More than 80% of respondents strongly or somewhat agree that CityLink Cycleway provides a safer environment for bike riders. Additionally, 76% and 57% of people strongly or somewhat agree that CityLink Cycleway provides a safer environment for pedestrians and motorists respectively.

Furthermore, 78% of people surveyed believe that pedestrian safety is increased due to e-mobility devices using CityLink Cycleway.

What is your level of support for CityLink Cycleway on Elizabeth Street?



What is your level of support for CityLink Cycleway on Edward Street?



What is your level of support for CityLink Cycleway on William Street to Grey Street?

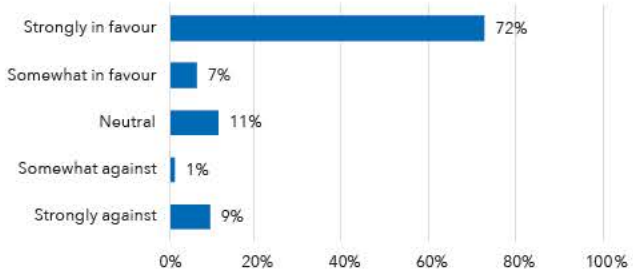
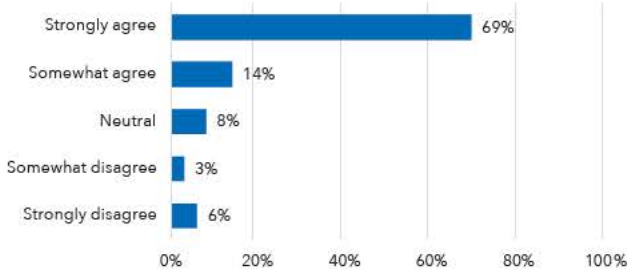
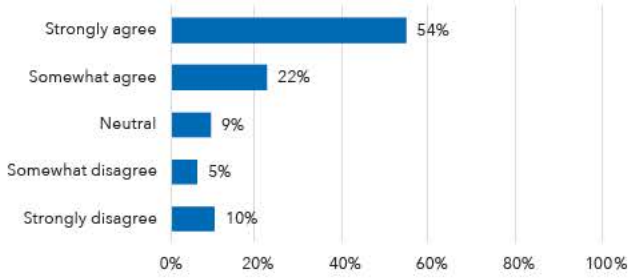


Figure 2. Levels of support for CityLink Cycleway per street

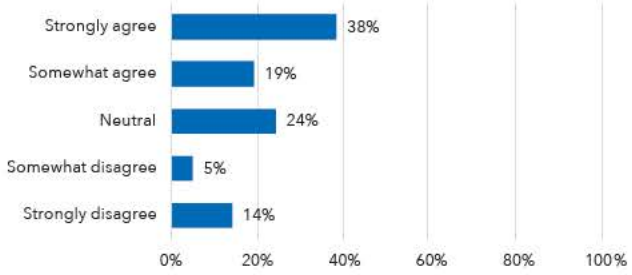
CityLink Cycleway makes a safer environment for bike riders



CityLink Cycleway makes a safer environment for pedestrians



CityLink Cycleway makes a safer environment for motorists



Do you think e-mobility devices using CityLink Cycleway improves safety for pedestrians?

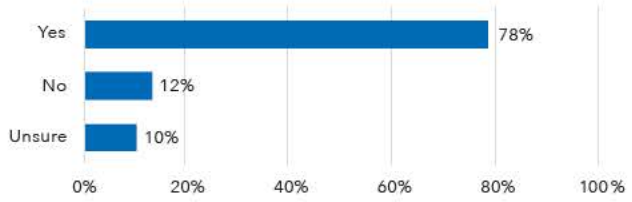


Figure 3. Perceived safety improvements per transport modes

Travel behaviour and economic benefits

Improve cyclist accessibility to places of work and local amenities such as shopping precincts and recreational parks in the city centre

Measures of success

- ✓ Improves accessibility to places of work and amenities and demonstrated benefit to local businesses

Provide a safe, connected, and accessible cycleway

Measures of success

- ✓ Safe infrastructure that is widely supported and enjoyed by the community
- ✓ Infrastructure that is easy to access and convenient to use

Improving safety for people walking, riding, and driving, and decreasing carbon emissions

Measures of success

- ✓ Improve safety for people walking, riding, and driving through sustainable transport options

Methodology

Griffith University undertook research to analyse the perception of local businesses, customers, and delivery workers to assess travel behaviours and economic impacts of CityLink Cycleway.

During April 2022 and May 2022, Griffith University's Transport Innovation and Research Hub conducted three separate surveys to understand perceived and true behaviours of businesses, customers, and delivery operators.

Forty-four of the 50 businesses contacted took part in the research (88% completion rate), which comprised of 15 questions targeting perceived customer travel and spending behaviours, as well as overall sentiment about the trial.

Customers were included via an on-street intercept survey that consisted of 20 questions targeting actual travel and spending behaviours, as well as overall sentiment about the trial. Of the 270 customer surveys undertaken, 247 were collected in full (91.5% completion rate).

Delivery workers were provided postcards comprising an online link via on-street distribution. Surveys were required to be completed autonomously by individuals. Of the 100 flyers distributed, 38 responses were received (38% response rate), with only 10 considered valid, resulting in a 26.3% completion rate.

Preferred transport modes

The mode of transport chosen by customers was recorded based on their reason for travelling into the city centre (Figure 4). Modes of public and active transport collectively outweighed the use of private car trips for all seven trip purposes, with people who travelled for education relying entirely on public transport, walking and riding.

Customer travel modes

Consistent with global trends[6,7] and previous research in Brisbane[8], businesses overestimated the number of customers travelling to their business by car by more than double the actual rate. On average, businesses estimated 43% of customers accessed their business via car while only 19% of customers reported using a car as their primary mode of transport (Figure 5).

More than 80% of customers accessed local businesses by active and public transport modes, with 41% choosing to walk or ride. Of the customers surveyed, 11% reported riding as their primary mode of transport to access businesses within the city centre.

Customer spending behaviour

Similarly, the data shows that businesses significantly overestimated the expenditure of customers travelling by car. Businesses estimated more than 44% of total spend in their business could be attributed to those customers who travelled by car compared to the actual proportion of just 24% (Figure 5).

Three-quarters (75%) of the total expenditure within local businesses was attributed to customers walking, riding, or choosing public transport. Customers who used public transport were the largest contributors (40%), while customers who rode bikes or e-mobility devices represented a 13% share of total customer expenditure.

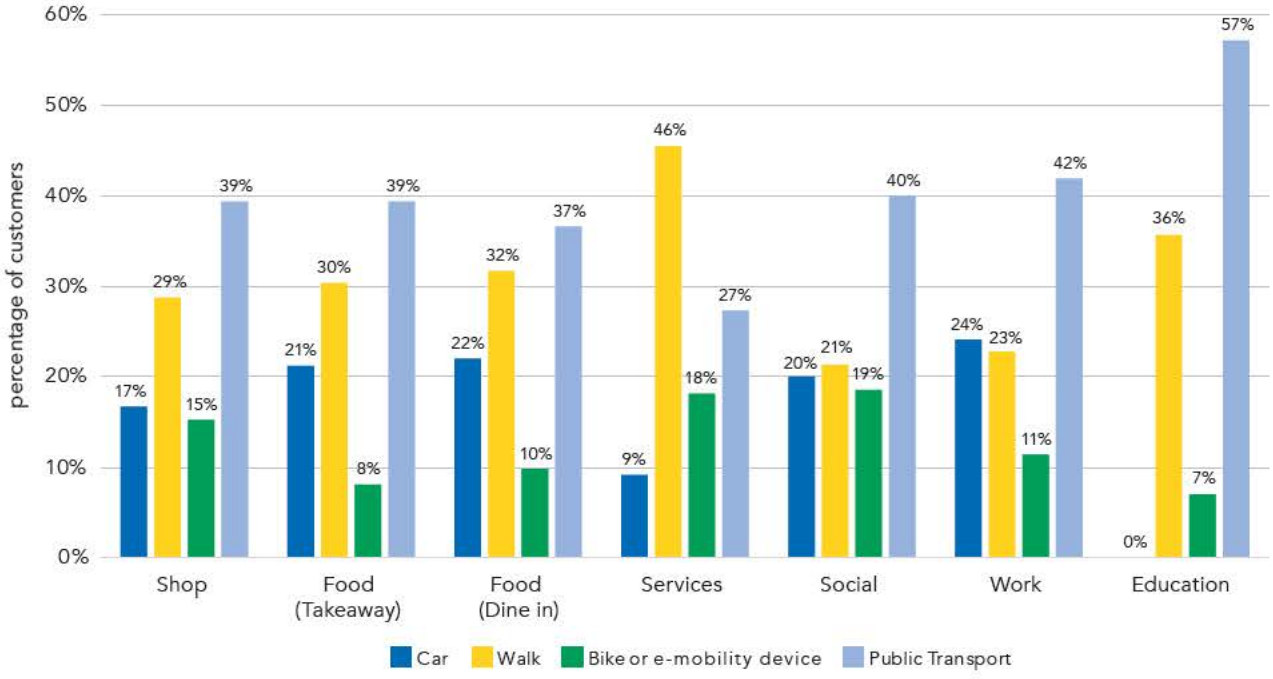


Figure 4: Customer travel mode share by trip purpose

6 D von Schneidemesser & J Betzien, 'Local Business Perception vs. Mobility Behaviour of Shoppers: A Survey from Berlin,' *Findings*, June, 2021

7 D Arancibia, S Farber, B Savan, Y Verlinden, N Smith Lea, J Allen, & L Vernich, 'Measuring the Local Economic Impacts of Replacing On-Street Parking with Bike Lanes,' *Journal of the American Planning Association*, vol. 85, 2019 463–481

8 BTH Yen, C Mulley, M Burke, W-C Tseng, 'Parking and restaurant business: Differences in business perceptions and customer travel behaviour in Brisbane,' 2020, Queensland, Australia. *Land Use Policy*, vol. 92, 103818.

Businesses overestimate that 44% of their customers use cars – **only 19% do**

More than 80% of customers use active and public transport modes – **41% walk or ride**

11% of customers ride as their primary transport mode in the city centre

¾ of total business expenditure is from people who ride, walk or use public transport

40% is from public transport users

13% is from bike or e-mobility device users

Figure 5: Customer spending behaviour

Perceived ease of travel

Riding and e-mobility are generally seen as safe and comfortable, with 66% of customers and 100% of delivery workers generally agree that cycling and e-mobility are safe and comfortable modes of transport in the CityLink Cycleway trial area (Figure 6). Customers (79%), businesses (93%) and delivery workers (50%) agree that public transport is convenient. Additionally, customers (92%), business (75%) and delivery workers (90%) perceive that walking is safe and comfortable. Respondents generally disagreed that parking is easy and convenient within the trial area.

From June 2022 Council commenced a trial of e-scooter parking racks in the city centre, including adjacent to CityLink Cycleway on Elizabeth Street with the aim to increase ease and convenience of e-scooter parking.

Effectiveness and community support

The overall perception is that CityLink Cycleway improves safety (Figure 7). Similar to previous results, perceptions varied by user group with 84% of delivery workers, 74% of customers and just 43% of businesses in favour that CityLink Cycleway makes the traffic in the street safe. 18% of businesses were neither favourable or unfavourable in response to this statement.

Similar sentiments are demonstrated in the overall support rating of CityLink Cycleway with high proportions of both customers (76%) and delivery workers (80%) providing favourable ratings of CityLink. Businesses provided a mixed response with the same proportion of business respondents in favour as those not in favour (36%) of CityLink Cycleway.

Support for the future of CityLink Cycleway

When asked if there was support for CityLink Cycleway to remain after the trial period, customers and delivery workers were in strong support with 80% and 83% of each user group respectively in support or strong support (Figure 8).

Despite more mixed responses from businesses throughout the survey, a relatively high proportion (45%) confirmed they were in support or strong support of CityLink Cycleway remaining after the trial period.

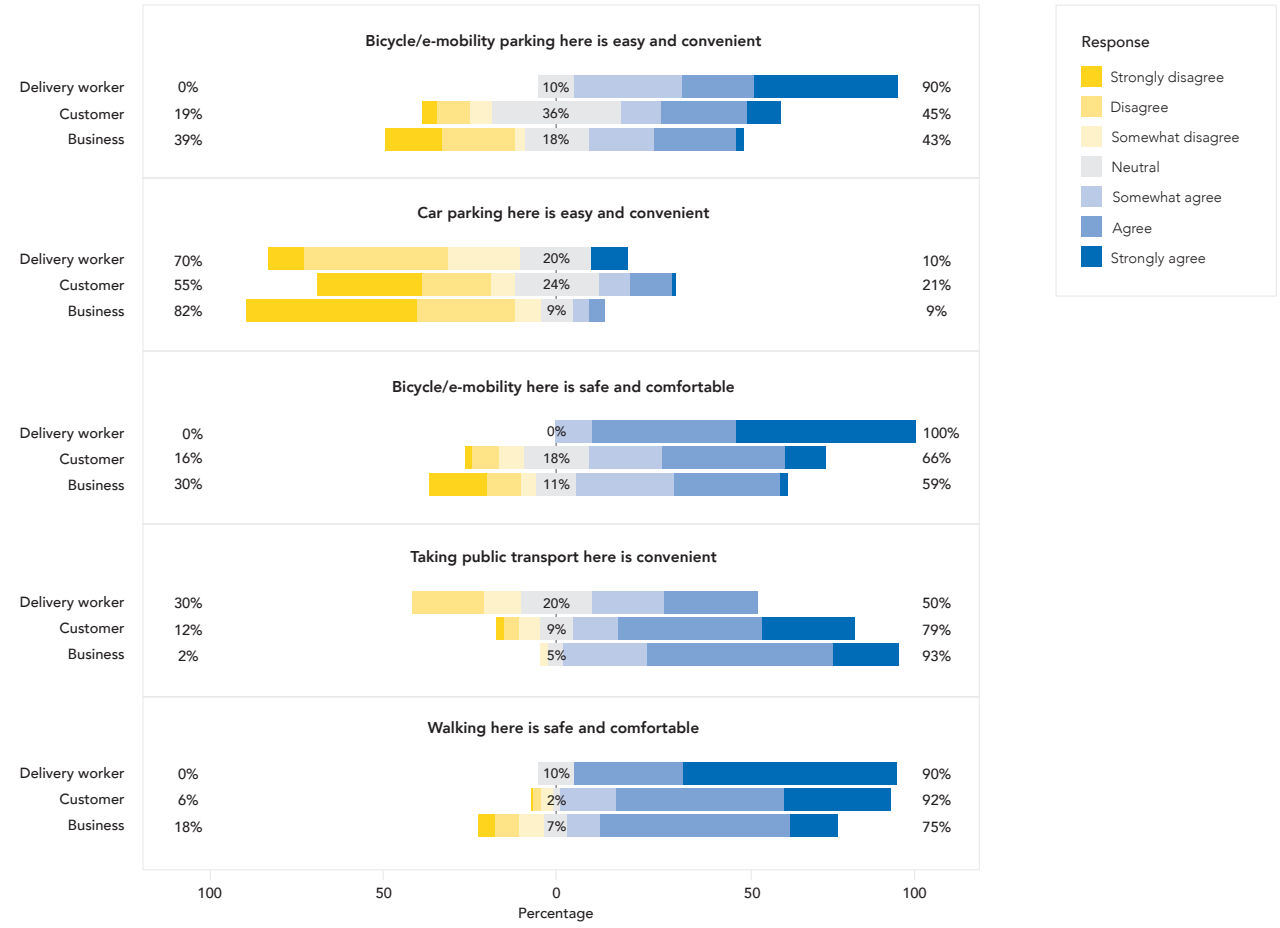


Figure 6: Perception of ease of travel by different modes on CityLink Cycleway

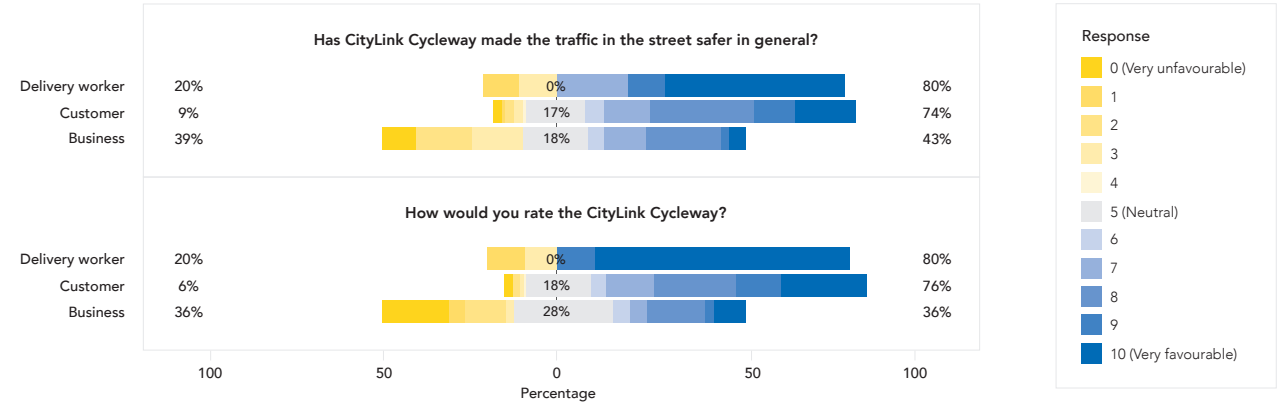


Figure 7: Safety and favourability ratings of CityLink Cycleway

Data rounded for ease of interpretation

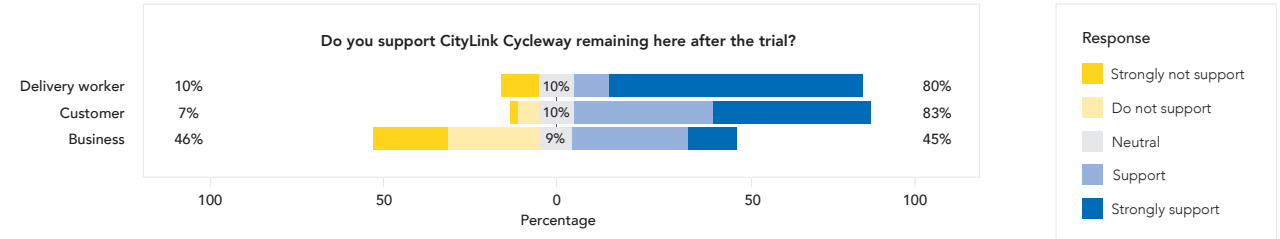


Figure 8: Retention support ratings for CityLink Cycleway

Data rounded for ease of interpretation

Travel outcomes and effectiveness of CityLink Cycleway

Provide more active travel opportunities by complementing the existing network

Measures of success

✓ Increase in active travel opportunities for riders commuting into the city centre whilst balancing disruption to other road and footpath users

Improving safety for people walking, riding, and driving, and decreasing carbon emissions

Measures of success

✓ Improve safety for people walking, riding, and driving through sustainable transport options

Methodology

Jacobs Engineering Group analysed empirical data collected before, during and after the trial period to broadly consider the perceived safety, user demand and transport network impacts of CityLink Cycleway.

A range of data sets and community feedback sources were used including travel count data, traffic monitoring data, footage from Council's CCTV network, Strava mobile app cycling tracking and Google Maps data. All data was collected from, or immediately adjacent to, the trial corridor and were captured at varying frequencies and durations between January 2019 and April 2022.

Bicycle and e-mobility growth

The number of hire-scheme e-scooter trips more than doubled between 2020 and 2021. Data from January to March recorded 400,000 hire-scheme e-scooter trips across Brisbane in 2020 and 850,000 in 2021. This growth has continued into 2022, with the number of hire-scheme e-scooter trips taken each month increasing (Figure 9). The growth rate of e-scooter trips recorded increased by 93% along Elizabeth Street (Figure 10).

Prior to the CityLink Cycleway trial, 100% of e-mobility devices were legally required to be ridden on footpaths, sharing the available space with pedestrians. Camera survey data taken during the trial period shows more than 70% of all e-scooter trips on Elizabeth Street made use of CityLink Cycleway, reducing contact points with pedestrian movements on the footpath (Figure 11).

Bike trip count data from 2019 to 2022 via the mobile app Strava, recorded over a one-week period, shows the number of Strava riders travelling along key city centre streets and the Victoria Bridge (Figure 12).

The trip data reveals an increase of total trips along Edward Street. In the same time period, bicycle usage decreased along five streets surrounding CityLink Cycleway.

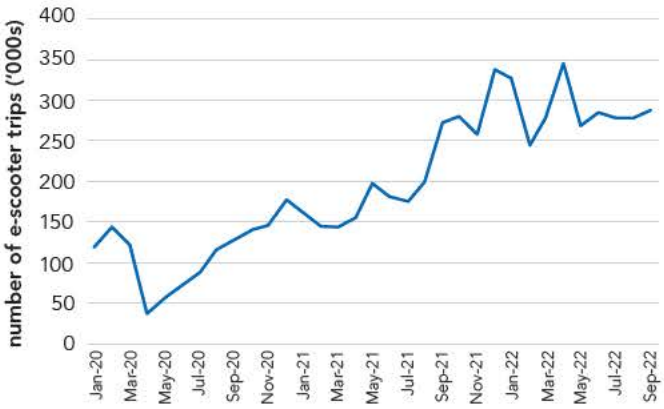


Figure 9: Number of hire-scheme e-scooter trips per month 2020-2022

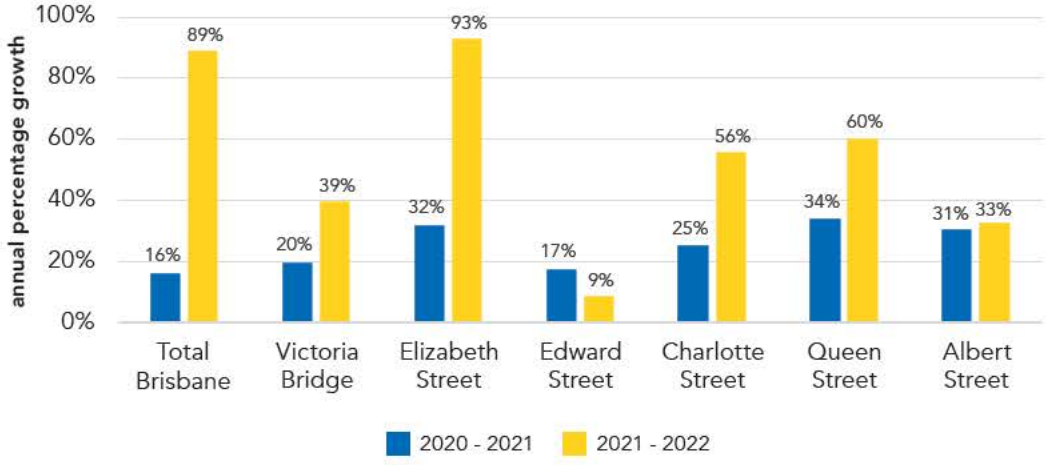


Figure 10: Growth rate of e-scooter trips per street in city centre

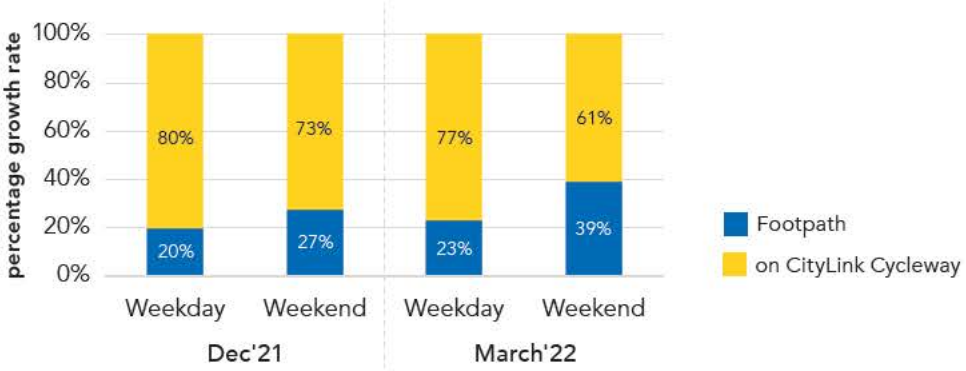


Figure 11: E-scooter usage on Elizabeth Street

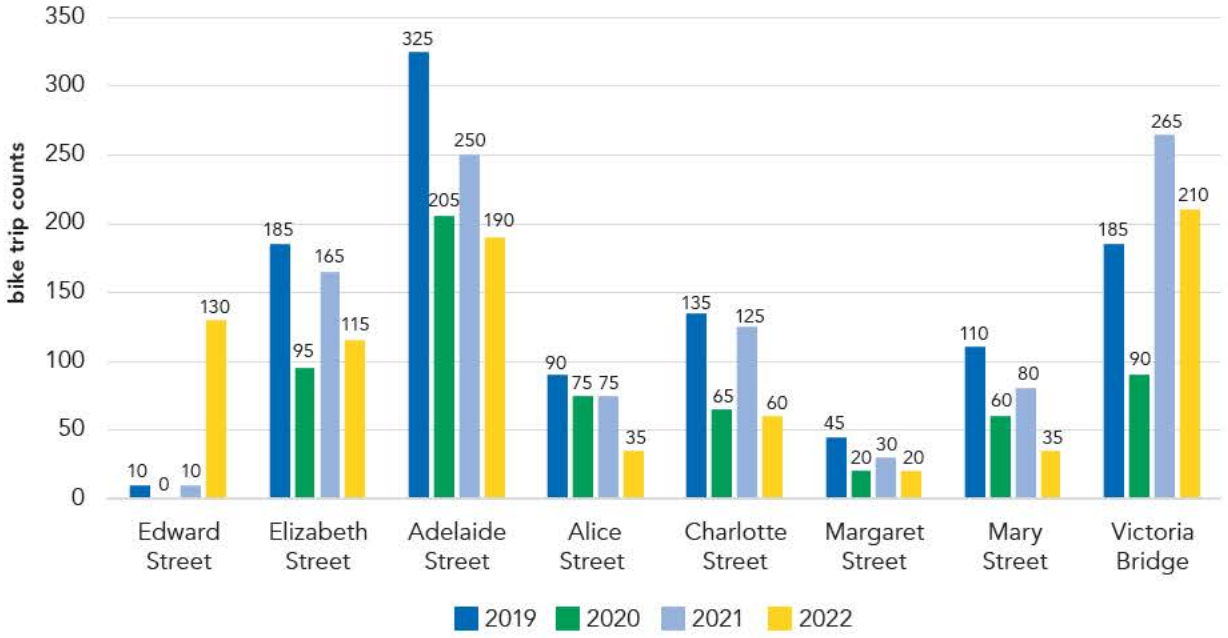


Figure 12: Strava count breakdown of city centre streets in February 2019-2022

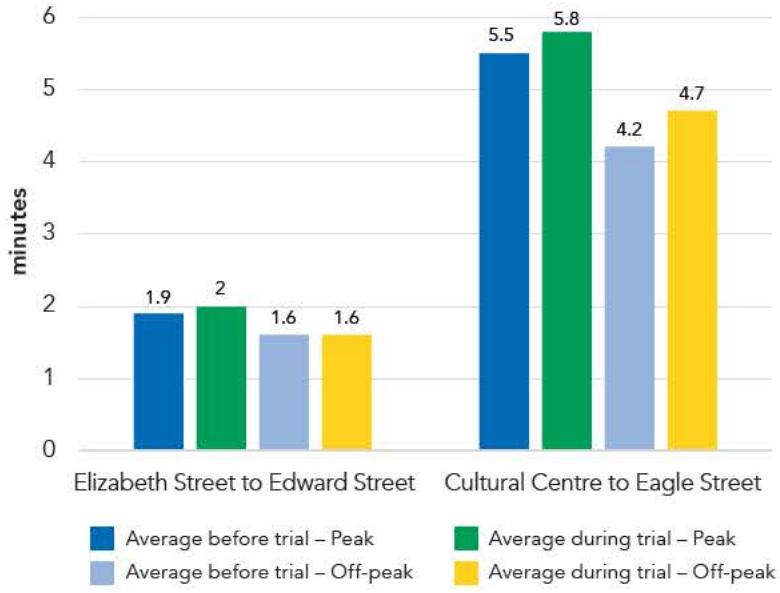


Figure 13: Average bus travel times before and during the CityLink Cycleway trial by peak and off-peak periods

Road use impacts

Motorists

The motorist data used in this analysis, averaged over a one-month period in 2020 and 2021, along Edward Street and Elizabeth Street compares motorist travel times before and during the trial (Table 1). The average increase in peak period travel times along Elizabeth Street after the implementation of CityLink Cycleway was 10 seconds (8%) and was negligible. On Edward Street the peak period travel time increased by 3 minutes, 25 seconds (71%).

The increase in travel time along Edward Street may have been impacted by road closures on Albert Street for the Cross River Rail project.

Public Transport

Average bus travel times along a 220 metre route from Elizabeth Street to Edward Street and from the Cultural Centre to Eagle Street, before and during the trial period are shown in Figure 13. Changes in average travel time for buses travelling from Elizabeth Street to Edward Street were negligible. After the implementation of CityLink Cycleway, the average travel time for buses travelling from the Cultural Centre to Eagle Street increased by 16 seconds during peak periods (5%) and 30 seconds during off-peak periods (12%), implying some increases in travel times for wider bus route travel (Table 2).

	Travel time (seconds)			
Journey	Before CityLink Cycleway	After CityLink Cycleway	Motorist travel time effect	
Elizabeth Street (between William Street to Creek Street)	219	238	18	8%
Edward Street (between Turbot Street and Margaret Street)	290	497	207	71%

Table 1: Motorist travel time effects of Citylink Cycleway

	Travel time (minutes)			
Journey	Peak average before trial	Peak average after trial	Off-Peak average before trial	Off-Peak average after trial
Elizabeth Street stop 82 to Edward Street stop 145 (Jan 2019 to Feb 2022)	1:56	1:58 (+2 seconds)	1:38	1:37 (-1 second)
Cultural Centre to Eagle Street (Jan 2019 to Mar 2022)	5:30	5:46 (+16 seconds)	4:13	4:43 (+30 seconds)

Table 2: Bus travel time effects of Citylink Cycleway

Kerbside allocation impacts

To facilitate the CityLink Cycleway trial, the following kerbside features were required to be relocated or removed:

- 58 car parking spaces (including six disability parking spaces)
- 10 dedicated and approximately 40 night-time motorcycle parking spaces
- 17 loading zones
- three nighttime taxi zones.

Council identified opportunities to re-allocate some of these removals to new locations nearby, including several taxi zones and loading zones, and all six disability parking spaces.

Loading zones

Following the removal of 17 loading zones from Elizabeth Street and Edward Street, 13 loading zone bays were relocated nearby to minimise disruption for local businesses and delivery operators. To facilitate these relocations, an additional 21 car parking spaces were removed from nearby streets, and some all-day bus stops were converted to daytime or peak-hour-only bus stops.

Feedback from businesses during the trial period suggest they view the removal and net loss of loading zones negatively, with some noting it has had a negative impact on their businesses.

Car parking

Before the CityLink Cycleway trial, Elizabeth Street had 26 car parking bays and Edward Street had 42 car parking bays. Figures 14 and 15 illustrate pre and during trial parking trends along the trial corridor and key nearby streets, showing an overall decrease in the number of parked cars in the city centre since the implementation of CityLink Cycleway. This data suggests that car parking amenities on nearby streets in the city centre are not in any higher demand since the implementation of the trial.

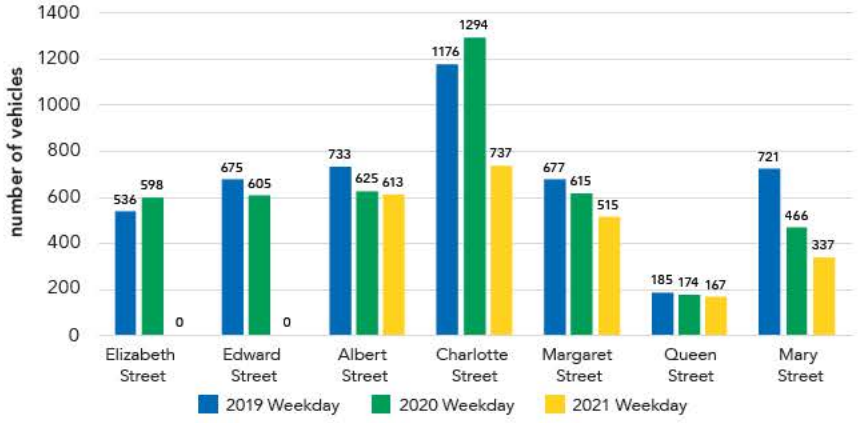


Figure 14: Number of vehicles parking on weekdays before and during the CityLink Cycleway trial

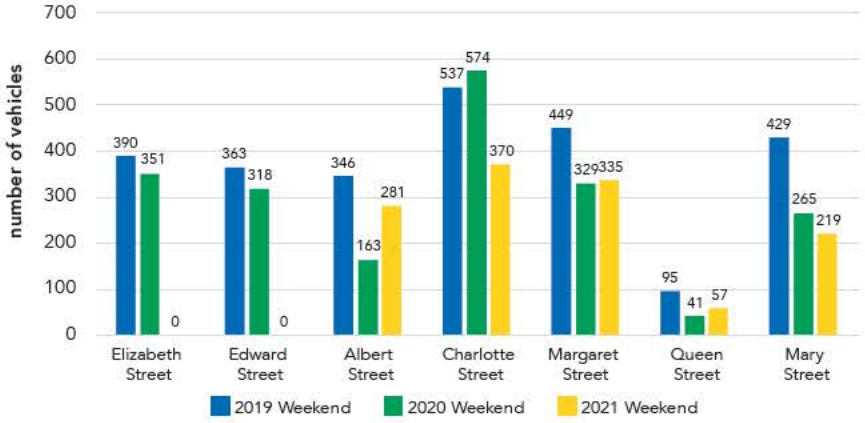


Figure 15: Number of vehicles parking on weekends before and during the CityLink Cycleway trial

Recommendations

As part of the CityLink Cycleway trial evaluation, recommendations were made by Council and external consultants to address risks identified during the trial period. Table 3 lists some of the key recommendations and associated actions that have been implemented, and planned actions that are subject to finalisation of ongoing assessments.

Recommendation	Actions taken	Planned actions
Clearer indicators or signage was suggested to show where it is recommended to ride on CityLink Cycleway	• Bike and e-scooter symbols were installed along CityLink Cycleway at increased intervals to highlight use of e-mobility and encourage all riders to use • Cycling Brisbane, Council's active travel behaviour change program, ran multiple programs, such as guided rides, that featured CityLink Cycleway	• Cycling Brisbane will continue to run guided rides and other riding promotion initiatives specific to CityLink Cycleway
Better education and enforcement was suggested to promote the safe interaction of various road users Signage to indicate recommended crossing locations was suggested	• Additional signage was installed along CityLink Cycleway at known crossing locations to improve pedestrian awareness and crossing behaviours • Cycling Brisbane ran riding workshops that include safe road crossing skills throughout the trial • Cycling Brisbane commenced a trial of e-scooter skills workshops in April 2021 incorporating road safety education • Council installed a dedicated left-turn lane from Edward Street to Margaret Street in August 2021, to improve traffic flow at this location • To improve pedestrian flow and safety, Council installed a temporary signalised crossing at the intersection of Alice Street and Edward Street in December 2021	• Council will investigate additional signage opportunities , focusing on popular and predicted pedestrian crossing locations • Council will investigate installing additional guideposts to increase awareness of the kerb separators for pedestrians • Cycling Brisbane will continue to offer road safety education workshops for bikes, e-bikes and e-scooters
A delicate balance between retaining loading zones for business use and relocating zones for community safety was suggested	• Council acknowledges the need for a delicate balance of impacts to business needs and community safety and engaged with businesses through every step of the trial • As part of the trial, 13 loading zones were relocated in nearby streets	• Council will consider the impact of changes to loading bays and other kerbside allocation amenities in any future CityLink Cycleway planning
Increased connectivity with the wider Brisbane bikeway network was suggested	• In March 2021, CityLink connected to Victoria Bridge which provides access to the southside bikeway network	• CityLink Cycleway's planned connectivity with the Kangaroo Point Green Bridge will provide access to the eastern bikeway network from 2024 • CityLink Cycleway's planned connection with Brisbane Metro via Victoria Bridge will provide riders with access to the entire public transport network

Table 3: Recommendations and associated actions

Outcomes

The results of the CityLink Cycleway trial evaluation confirm strong support to retain the infrastructure along Elizabeth Street, Edward Street and William Street to Grey Street via the Victoria Bridge. Collated data across a variety of sources demonstrates high levels of community support for CityLink Cycleway, including from inner-city customers.

Feedback from the community and user groups generally agreed that CityLink Cycleway improves safety outcomes for all road users including those riding bikes, using e-mobility devices and walking. CityLink proved effective in separating movements between e-mobility devices and pedestrians, with more than 70% of e-mobility devices using CityLink Cycleway rather than adjacent footpaths. Overall, people agree CityLink Cycleway is easy and convenient to use and further data demonstrated that bike riders favoured CityLink over surrounding inner-city streets.

Data trends indicate the number of bicycle and e-mobility trips through the city centre is increasing, with highest e-mobility growth rates seen on Elizabeth Street and Victoria Bridge.

Analysis of traffic monitoring data, including car and bus travel times before and after the trial period, generally indicates minimal disruption to the wider traffic network, but an increase in travel times was identified along Edward Street.

Businesses generally underestimated the volume of customers choosing active transport modes and overestimated the number of customers choosing to travel by car. Similar to global trend data[9,10], the evaluation revealed that city centre cycleways in Brisbane can have direct, tangible economic benefits to surrounding retailers and businesses. Customers who chose to walk or ride represented a higher proportion of expenditure when compared to those who drove. Public transport was found to be the single largest contributor to businesses when considering expenditure by transport mode. Businesses demonstrated a mix of support levels for CityLink Cycleway trial with roughly as many in favour as not in favour of the trial.

During the trial period, Council undertook initiatives to increase awareness and effectiveness of CityLink and the surrounding streets. Council is committed to investigating the recommendations of the third party evaluations, with a focus on future-proofing CityLink Cycleway.

OUTCOMES

Based on the results of the evaluation, Council is pleased to conclude CityLink Cycleway trial is a success.

9 D von Schneidemesser & J Betzien, 'Local Business Perception vs. Mobility Behaviour of Shoppers: A Survey from Berlin,' *Findings*, June, 2021

10 D Arancibia, S Farber, B Savan, Y Verlinden, N Smith Lea, J Allen, & L Vernich, 'Measuring the Local Economic Impacts of Replacing On-Street Parking with Bike Lanes,' *Journal of the American Planning Association*, vol. 85, 2019 463–481

Next steps

The success of the trial provides Council with the opportunity to consider the next steps of CityLink Cycleway.

Future-proofing CityLink Cycleway

Council looks forward to future-proofing existing sections of CityLink Cycleway along Elizabeth Street, Edward Street and the Victoria Bridge. It is anticipated that some further works will be needed to make the CityLink Cycleway trial permanent. These works are expected to include:

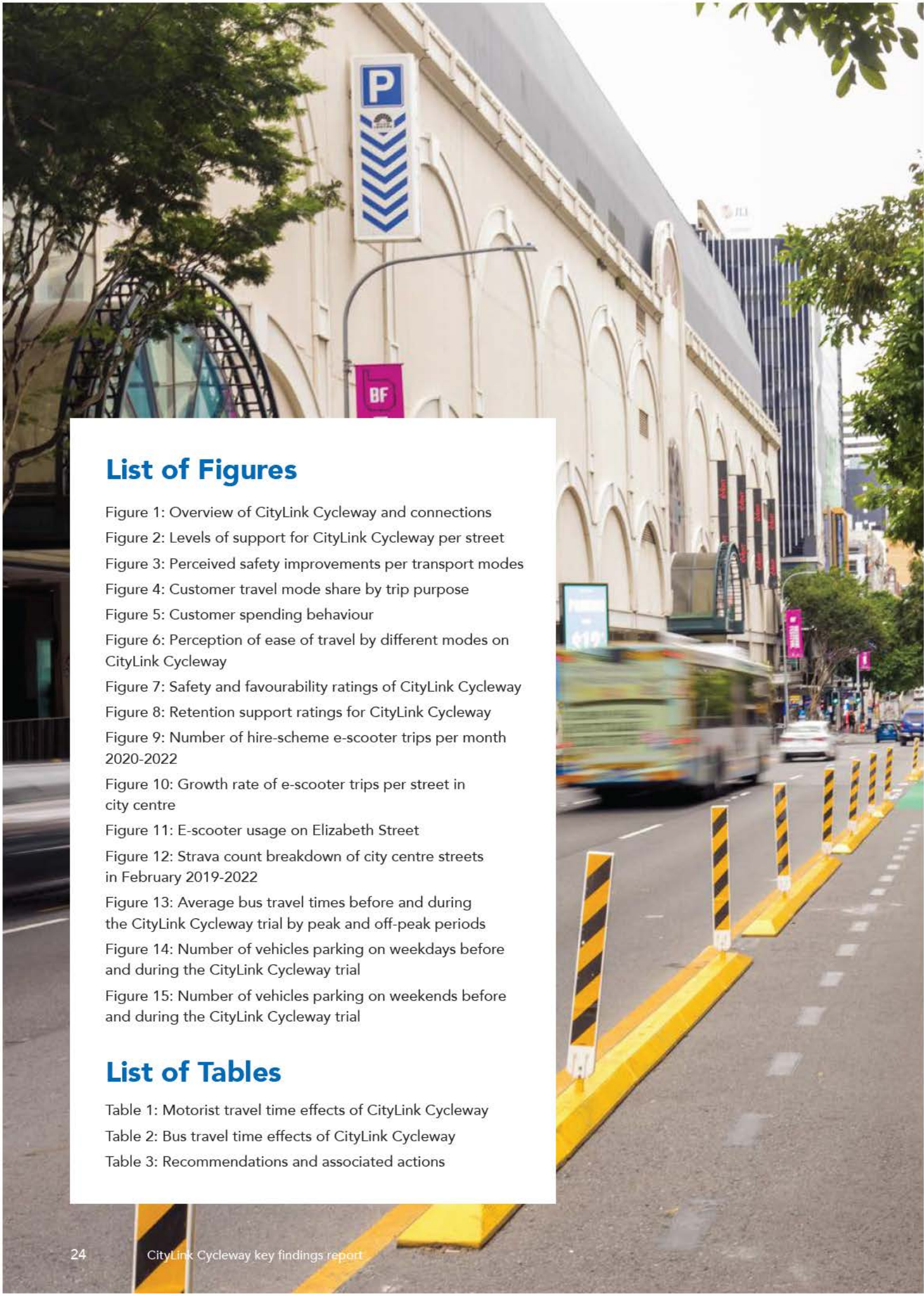
- investigating best material type for kerb separators taking into account considerations such as application and long-term maintenance requirements
- initiatives to increase e-mobility user awareness
- continuation and evaluation of Council's private e-scooter parking rack trial to improve trip amenities in the city centre, which is currently underway at two locations
- continue to investigate and install e-mobility parking hubs to provide designated areas to park and pick-up shared e-mobility devices across the city centre
- consider wider installation of guide posts along CityLink Cycleway alignment, on top of yellow kerbing, to increase awareness of the kerb for all road users, including pedestrians
- pavement resurfacing in line with ongoing maintenance activities within the adjacent road corridor.

Expanding the network

Council is committed to expanding our active transport network and carefully examining opportunities for future CityLink Cycleway connections along key inner city routes.

Future stages of CityLink Cycleway will be guided by the *Transport Plan for Brisbane and Brisbane City Centre Master Plan Stage 1* with a focus on continuing to improve connectivity between city centre precincts and Brisbane's extensive bikeway network, providing residents and visitors with travel options through the city.

- The Kangaroo Point Green Bridge will connect with CityLink Cycleway, making it easier to ride between the city centre, Kangaroo Point and the eastern suburbs.
- The Brisbane Metro project will connect with CityLink Cycleway to improve connectivity across Brisbane's public and active transport networks.



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References

1. D von Schneidemesser & J Betzien, 'Local Business Perception vs. Mobility Behaviour of Shoppers: A Survey from Berlin,' *Findings*, June, 2021

2. D Arancibia, S Farber, B Savan, Y Verlinden, N Smith Lea, J Allen, & L Vernich, 'Measuring the Local Economic Impacts of Replacing On-Street Parking with Bike Lanes,' *Journal of the American Planning Association*, vol. 85, 2019 463–481

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4. City of Paris, *Le Plan Vélo* 2021 - 2026, Paris, 2021.

5. City of Melbourne, *New bike lanes*, Melbourne, 2022, viewed 15 August 2022, www.melbourne.vic.gov.au/building-and-development/shaping-the-city/city-projects/Pages/new-bike-lanes.aspx

6. BTH Yen, C Mulley, M Burke, W-C Tseng, 'Parking and restaurant business: Differences in business perceptions and customer travel behaviour in Brisbane,' 2020, Queensland, Australia. *Land Use Policy*, vol. 92, 103818.

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The magic white line:
Do bike lanes improve safety?
Prof Narelle Haworth AM
Presentation to APCC2024
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Improve safety for whom?

Bicycle riders

Motor vehicle occupants

Pedestrians

E-scooter riders

Motorcyclists

Reduce BMV collisions by

- Increasing the separation of bicycles and motor vehicles in time and space
- Increasing the visibility and conspicuity of riders (e.g., bike boxes)
- Improving lines of sight between the modes
- Reducing the number of interactions between modes (e.g., some signal phasing)
- Reducing motor vehicle speeds

from Retting, Ferguson & McCartt, 2003

Definitions

Bicycle paths

Bicycle tracks

Bicycle lanes

Treatment types

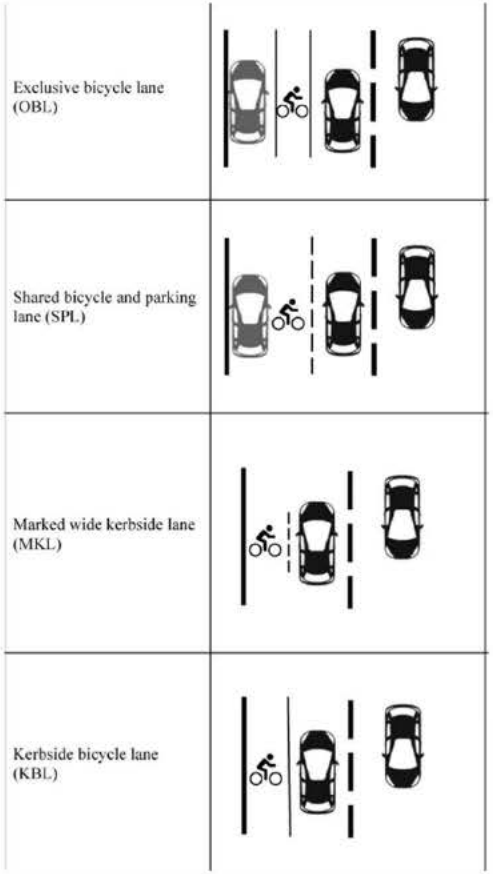
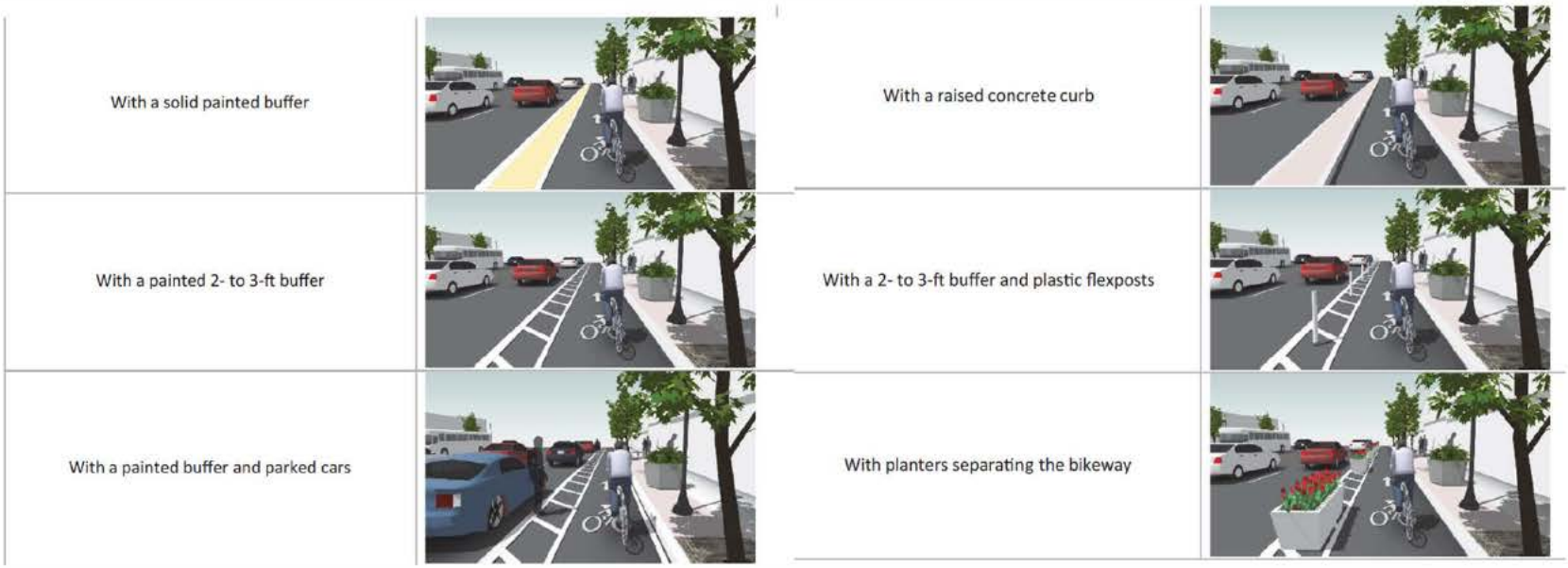


Diagram from Morrison et al. (2019)



Graphics from McNeil et al. (2020)

Some potential concerns

Will bike lanes increase perceptions of safety more than objective safety?

Will bike lanes encourage riding on unsafe roads?

Paint isn't a Safe System treatment

Debris accumulates in bike lanes

Bike lanes as a contributor to dooring

Reduced safety at intersections

Reinforce motorist perceptions that bikes shouldn't be on the road

Study methods

Police crash data (B/A?)

Hospital injury data

Mapping trajectories at locations

Naturalistic studies

Simulator

On-road experimental

Lack of strong evidence

Few studies in comparable jurisdictions that have controlled for increasing cyclist numbers after infrastructure upgrades

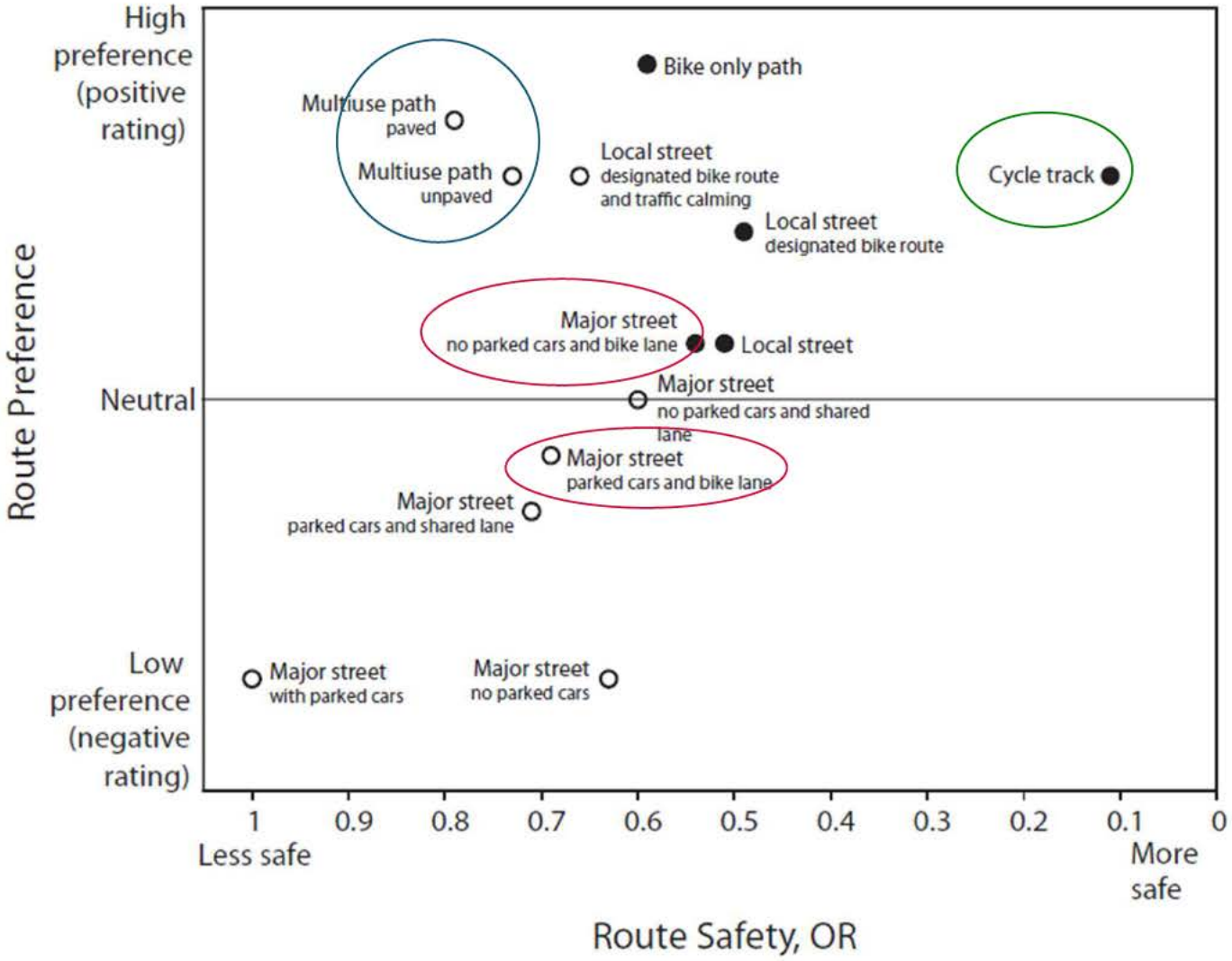
BMV crashes and some treatments are relatively rare, so small samples

Often unspecified mixture of treatments analysed

Cyclist–vehicle exposure data are generally not readily available

Most research in US or Canada

Few studies looked at what happens in actual BMV interactions



Objective vs subjective safety: Vancouver and Toronto, Canada, 2008–2009
(Teschke et al.)

Crash reductions of bike lanes

Crash-based Melbourne study with statistical control for lack of bicycle volumes (Morrison et al., 2019)

Only exclusive bicycle lanes improved safety in all situations

All types of bicycle lanes improved safety where speeds were greater, bus routes and tram stops were present, and traffic lanes were narrower

Effect on passing distances

Passing distance affects actual and perceived safety

Mixed results regarding effect of bike lanes on passing distances

Among 15 studies

- 10 found no or decrease in passing distance
- 5 found increase in passing distance
- Australian studies disagree

Available space seems to be most important determinant

Coloured bike lanes

When uncoloured bicycle lane was painted red

- Fewer cars stayed in the bicycle lane
- Distance of cars from the lane increased
- Cyclists more likely to cycle in the lane instead of outside it

Which colour? – red if you are used to it but green if not used to coloured lanes

Norwegian studies by Karlsen & Fyhri (2020) and Fyhri et al., (2021)

Physical separation

Protected bike lanes (North America cycle tracks) are associated with both decreased likelihood and severity of cyclist-involved crashes

Three Canadian studies

- 28% reduction in cycling injuries, compared to streets without any cycling infrastructure (Lusk et al. 2011)
- 89% reduction in risk of injury, compared to other cycling infrastructure (Teschke et al. 2012)
- 38% reduction in BMV crash rate at intersections after cycle tracks installed, 35% reduction on nearby streets (Ling et al., 2020)

Netherlands study (van Petegem et al., 2021)

- controlled for kilometres travelled by bicycle and by motor vehicle, 50-60% less bicycle crashes occur on distributor roads (50 km/h) with cycle tracks compared to those with cycle lanes

Light vs heavy separation

Study in 3 US emergency depts by Cicchino et al., (2020)

Bike lanes with lighter separation (e.g., parked cars, posts, low curb) were no safer than major roads without bicycle facilities

Protected bike lanes with heavy separation (tall, continuous barriers or grade and horizontal separation) were associated with 90% lower risk

Bike lanes as traffic calming

Lower MV speeds at intersection also beneficial for pedestrian safety

Bike lanes with striped buffer +/- plastic cones or plastic posts in the situation where lane width was reduced as part of implementation

21% speed reduction for MVs turning right (left in AUS) with plastic cones and delineators – created a sharper turning radius

Painted line (not coloured bike lane) had 14 % speed reduction cf. no bike lane

Younes et al., 2024

Safety of pedestrians and e-scooter riders

Bike and e-scooter riders move off the footpath onto protected bike lanes – likely improving pedestrian safety and amenity

We don't know a lot about interactions between bike and e-scooter riders in bike lanes

Do white lines have magic properties?

Many riders think they do

Mixed evidence that white lines alone improve rider safety

Exclusivity, colour, buffers, and protection are often helpful

The devil is in the detail

A shameless plug…

Federally-funded study to assess the protection and comfort of latest cycling clothing on the market

If you would like to know more or be part of the Project Advisory Group, please let me know!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