MONASH University

CITY OF SYDNEY

SUSTAINABLE
MOBILITY AND
SAFETY RESEARCH

Behavioural change & road space reallocation: doing more with what we have

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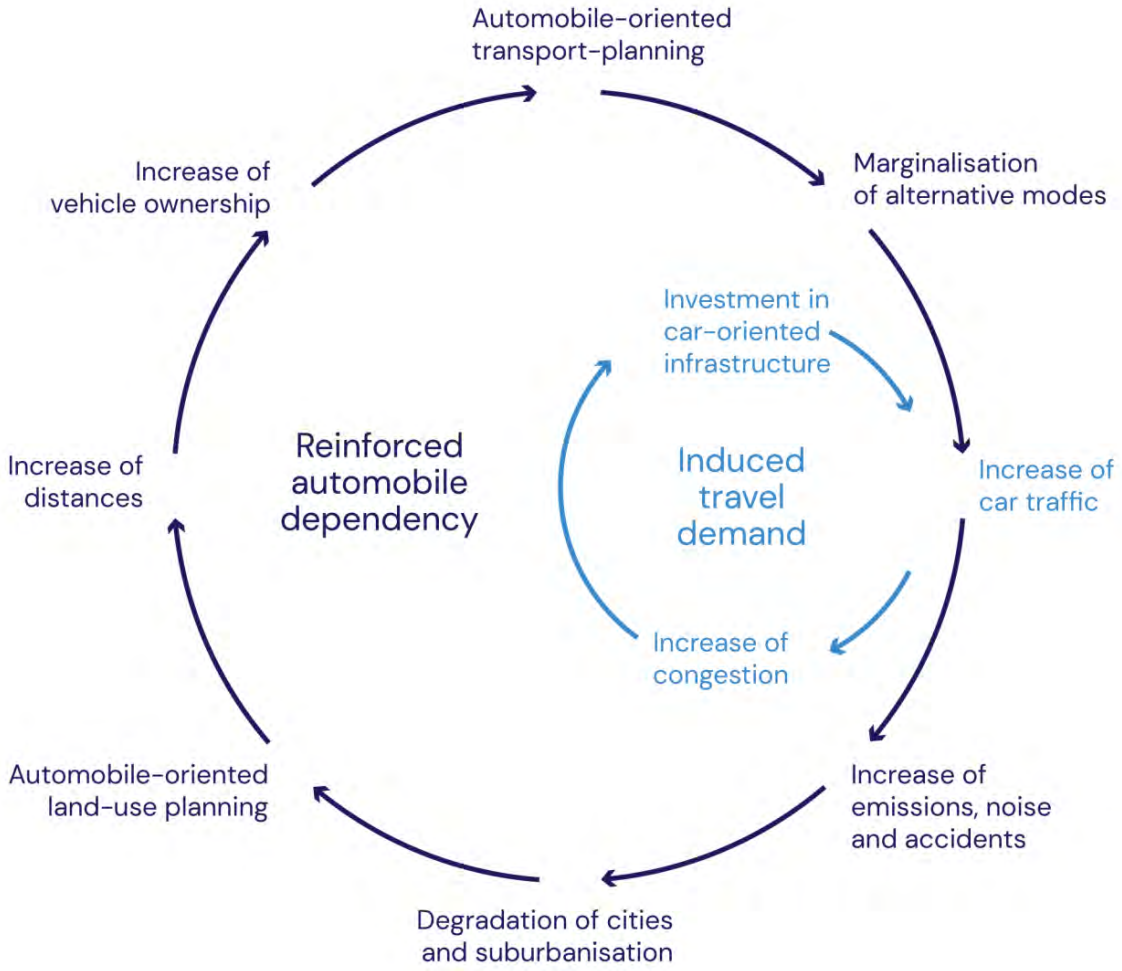
The journey

- The benefits of active travel and the opportunity to transform mobility at the local level
- Bust some myths
- Success stories and how to deliver more with less
- Connecting the dots and measuring what matters

The negative impacts of car-centric cities and towns

Artist: Karl Jilg



TUMI (Transformative Urban Mobility Initiative): 'The vicious cycle of automobile dependency'. Available at: https://transformative-mobility.org/multimedia/vicious-cycle-of-automobile-dependency/

The negative impacts of car-centric cities and towns

Mental health and wellbeing impacts

Reduced social connection and child independence

Climate change

Cardiometabolic disease and obesity

Air quality degredation

Road deaths and serious injuries

Air pollution

Water and soil pollution

Premature mortality

Physical inactivity

Noise pollution

Ecosystem degradation & biodiversity loss

Increased traffic danger

Urban heat island effects

Increased VKT and emissions

Increased car dependency

Social severance and fragmentation

Limited access to public transport

Inadequate active transport infrastructure

Increased urban sprawl

Limited tree canopy and green space

Unequal impacts on people and places

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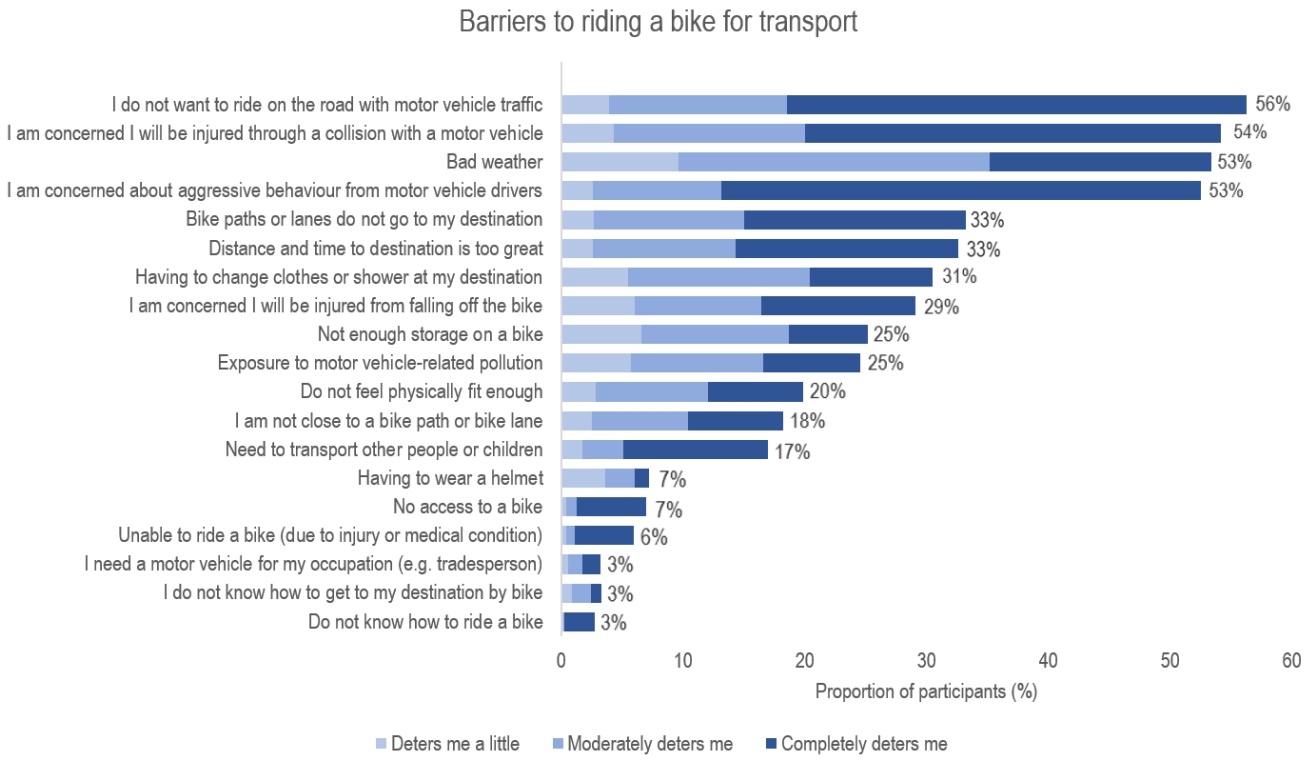
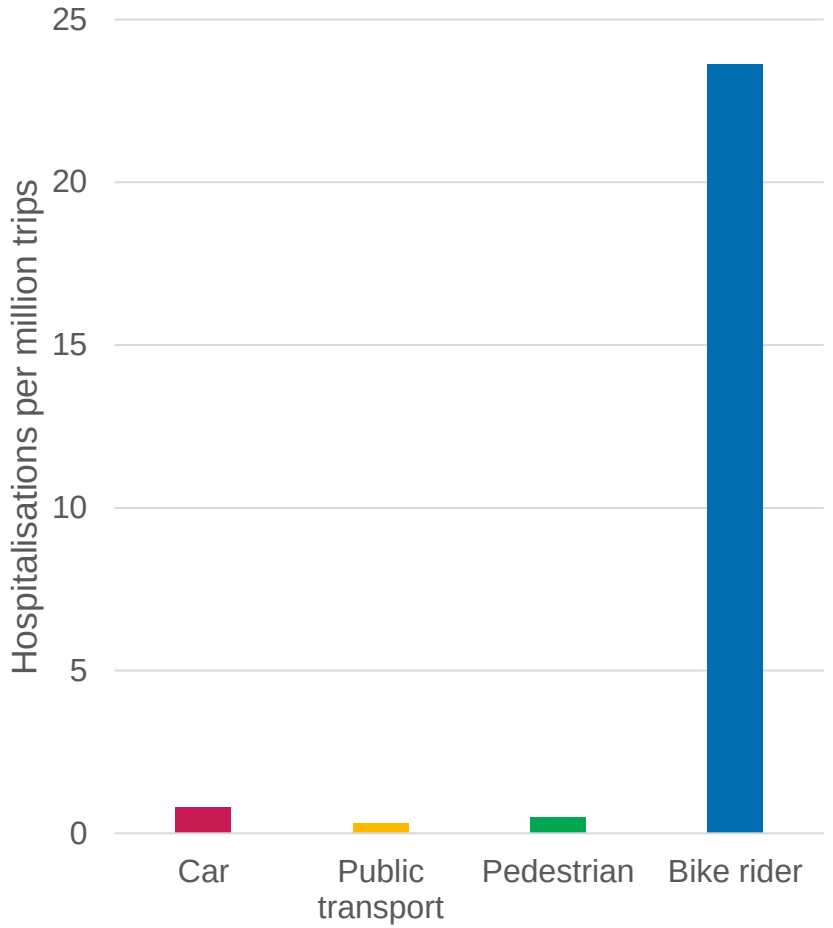
- Negative features
- Exposures / mechanisms
- Population health impacts
- Environmental impacts

The negative impacts of car-centric cities and towns: safety

- Problem: ~14,000 Australians are hospitalised following a bike crash every year (20% of all transport injuries) despite making up only ~2% of trips
- The opportunity:
  - Enhancing road safety not only has the potential to reduce injury and death, but also to address key barriers to uptake





1. Pearson, L., Gabbe, B., Reeder, S., & Beck, B. (2023). Barriers and enablers of bike riding for transport and recreational purposes in Australia. *Journal of Transport & Health*, 28, 101538.

The benefits of active travel: health and wellbeing

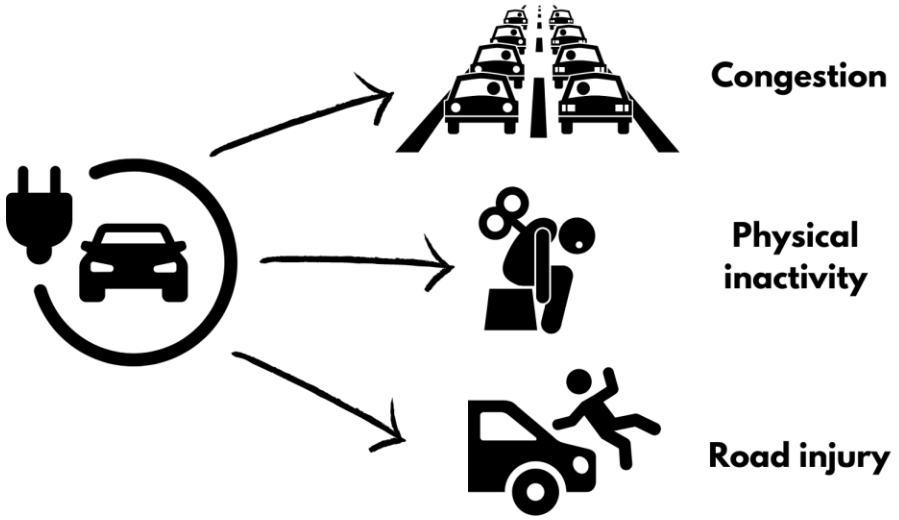
- Problem: 41% of Australian adults don't meet physical activity guidelines and Australian children are ranked among the least physical active in the world
- Solution:
  - At an individual level, shifting short trips from cars to active travel results in 3-14 months of additional life[1]
  - At a population level, if we could shift just 3.6% of trips from cars to active travel we would eliminate[2]:
    - ~40,000 cases of type II diabetes
    - ~28,000 cases of ischemic heart disease
    - ~23,000 cases of stroke
  - Benefits to mental health and absenteeism
    - People who walk or ride to work are ~20-25% less likely to develop depression or anxiety[3]
    - Employers in the Netherlands estimated **€27 million/year** saved from reduced sick days among regular cycle commuters[4]

1. De Hartog, J. J., Boogaard, H., Nijland, H., & Hoek, G. (2010). Do the health benefits of cycling outweigh the risks?. *Environmental Health Perspectives*, 118(8), 1109-1116.
2. Celis-Morales, C. A., Lyall, D. M., Welsh, P., Anderson, J., Steell, L., Guo, Y., ... & Gill, J. M. (2017). Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study. *BMJ*, 357.
3. Fan, J., Zhang, X., Jia, X., Fan, Z., Yang, C., Wang, Y., ... & Yang, Y. (2025). Association of active commuting with incidence of depression and anxiety: prospective cohort study. *Translational Psychiatry*, 15(1), 39.
4. TNO (2009). Reduced sickness absence in regular commuter cyclists can save employers 27 million euros. Online report: https://www.vcl.li/bilder/518.pdf

The benefits of active travel: climate

- Problem: Transport already accounts for ~21% of Australia's emissions, and is on track to become the largest source by 2030
- Solution:
- Climateworks have highlighted that EV uptake alone is not enough to achieve emissions reductions targets[1]
  - Rather, we need an approach that also includes 35% of car passenger kilometres to shift to active and public transport
- Air pollution benefits can be realised at small scales
  - When modal filters, 20mph / 30km/h limits and new bike lanes were implemented in London[2]:
    - NO_2 dropped by 15-25% and $PM_{2.5}$ dropped by 6-13%

Siloed solutions to complex problems



1. Rau, L., Rowe, H., & Powell, R. (2024). Decarbonising Australia's transport sector: diverse solutions for a credible emissions reduction plan. Climateworks Report: https://www.climateworkscentre.org/resource/decarbonising-australias-transport-sector-diverse-solutions-for-a-credible-emissions-reduction-plan/
2. Dajnak, D., Walton, H., Gregor, S., Smith, J. D., & Beevers, S. (2018). Air Quality: concentrations, exposure and attitudes in Waltham Forest. Environmental Research Rroup, School of Analytical, Environmental and Forensic Sciences (London: King's College London).

The benefits of active travel: local liveability

- Problem: Commute times are ballooning, congestion costs are expected to reach $40B by 2031 and community connectivity is declining[1]
  - Cars are idle 95% of the time and are very space inefficient
- Solution:
  - Increased walkability leads to:
    - Social engagement, political participation and trust in others[2]
  - 50% of car trips in Greater Melbourne are <5km[3]
    - Huge potential for modal shift to reduce car usage
  - Short trip substitution means fewer cars driving and parking, freeing kerb-space and reducing congestion
    - In UK neighbourhoods with traffic reduction measures, car ownership fell by 6% in two years[4]
  - Freeing up space taken by cars, gives us space for vibrant local life and reduces demands on existing assets

1. Infrastructure Australia (2019). Urban Transport Crowding and Congestion. Report available at: https://www.infrastructureaustralia.gov.au/publications/urban-transport-crowding-and-congestion
2. Leyden, K. M. (2003). Social capital and the built environment: the importance of walkable neighborhoods. *American Journal of Public Health*, 93(9), 1546-1551.
3. Beck, B., Winters, M., Thompson, J., Stevenson, M., & Pettit, C. (2021). Spatial variation in bicycling: a retrospective review of travel survey data from Greater Melbourne, Australia (No. 78qgf_v1). Center for Open Science.
4. Goodman, A., Urban, S., & Aldred, R. (2020). The impact of Low Traffic Neighbourhoods and other active travel interventions on vehicle ownership: findings from the Outer London mini-Holland programme. *Findings*.

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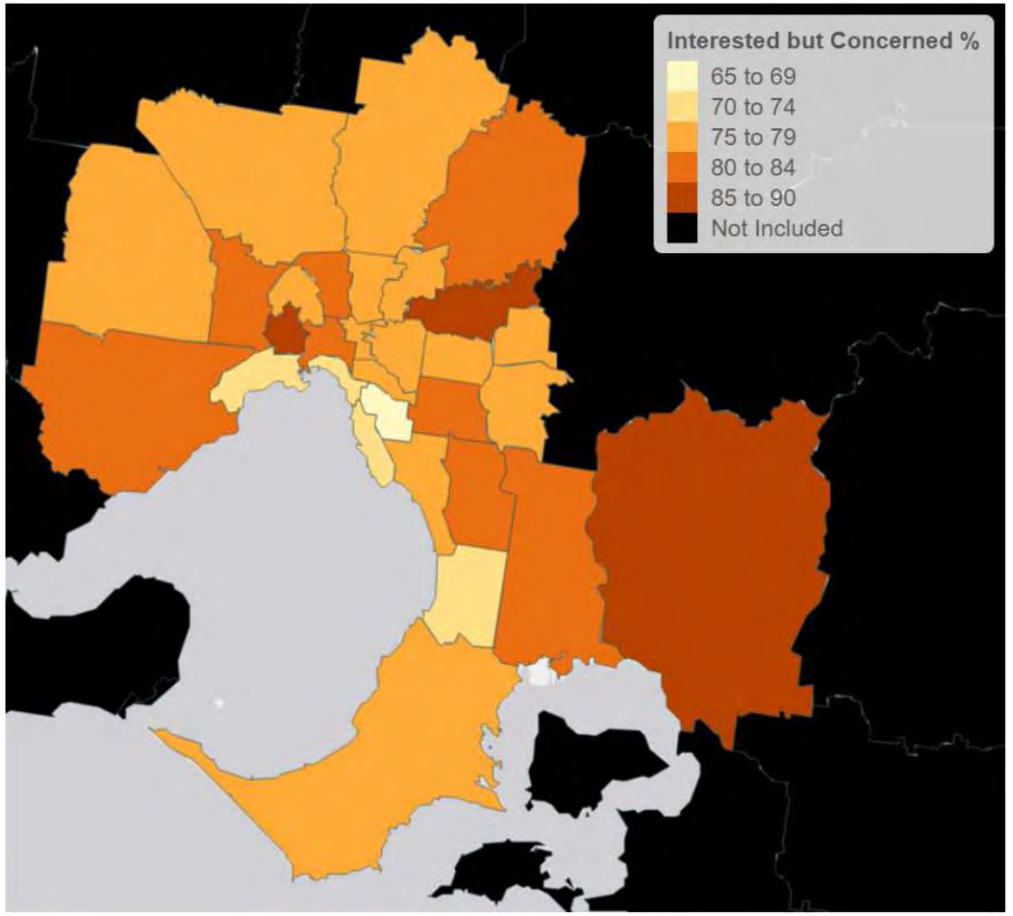
Myth busting

Myth #1: People don't want to walk and ride more

- 81% of Australians walk 10 minutes or more in an average week[1]
  - And people want to walk more (e.g. 74% of residents in Greater Bendigo want to walk more often[2])
- 15% of Australians rode a bike in an average week[1]
  - 78% of Victorians would ride more if safe infrastructure is provided[3]

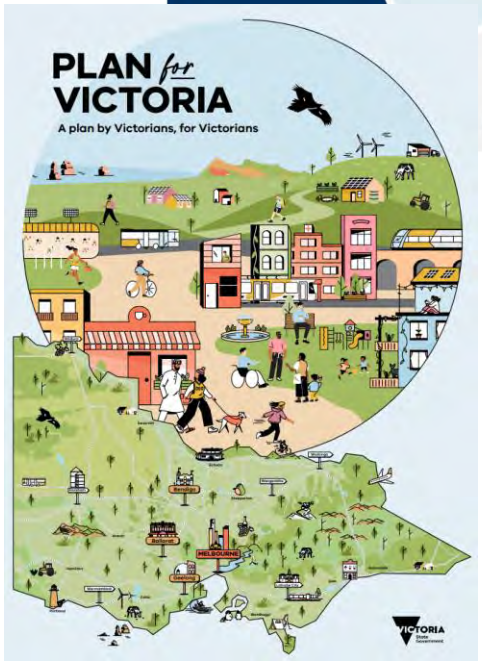
Interest in bike riding



1. CWANZ. (2025). National Walking and Cycling Participation Survey 2025. Available at: https://www.cwanz.com.au/wp-content/uploads/2025/10/251001-CWANZ-National-Walking-and-Cycling-Participation-Survey-Report-National.pdf
2. City of Greater Bendigo (2019). Walk, Cycle Greater Bendigo: Walking and Cycling Strategy 2019. Available at: https://www.bendigo.vic.gov.au/sites/default/files/2023-08/City-Greater-Bendigo-Walk-Cycle-Greater-Bendigo-Strategy-2019.pdf
3. Pearson, L., Dipnall, J., Gabbe, B., Braaf, S., White, S., Backhouse, M., & Beck, B. (2022). The potential for bike riding across entire cities: quantifying spatial variation in interest in bike riding. *Journal of Transport & Health*, 24, 101290.

Myth #2: Communities oppose active travel infrastructure

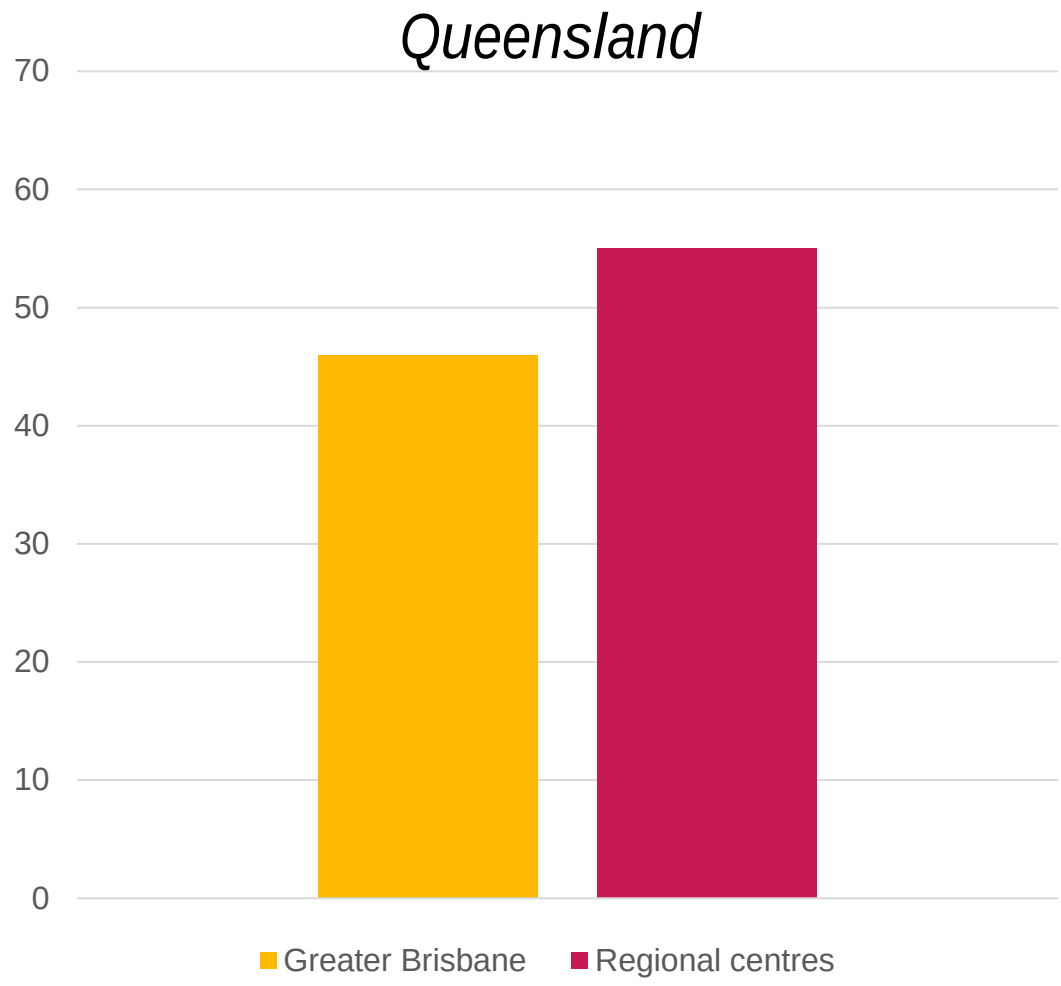
- Communities want more walking and bike riding infrastructure
  - 67% of Australians want more investment in active transport infrastructure[1]
  - Consistently articulated in state/local government strategies (e.g. Plan for Victoria)



1. Climate Council (2022). People and Transport National Poll 2022: Results. Report – available at: https://www.climatecouncil.org.au/wp-content/uploads/2022/08/Climate-Council-National-Transport_Final-1.pdf

Myth #3: Active travel is just for city slickers

Proportion of car trips that are <5km



Victorian data is sourced from the Victorian Integrated Survey of Travel and Activity (VISTA). Regional centres includes data from Shepparton, Ballarat, Bendigo, Latrobe and Geelong.
Queensland data is sourced from the Queensland Household Travel Survey Series. Regional centres includes data from Toowoomba.

Myth #4: Traders will lose business

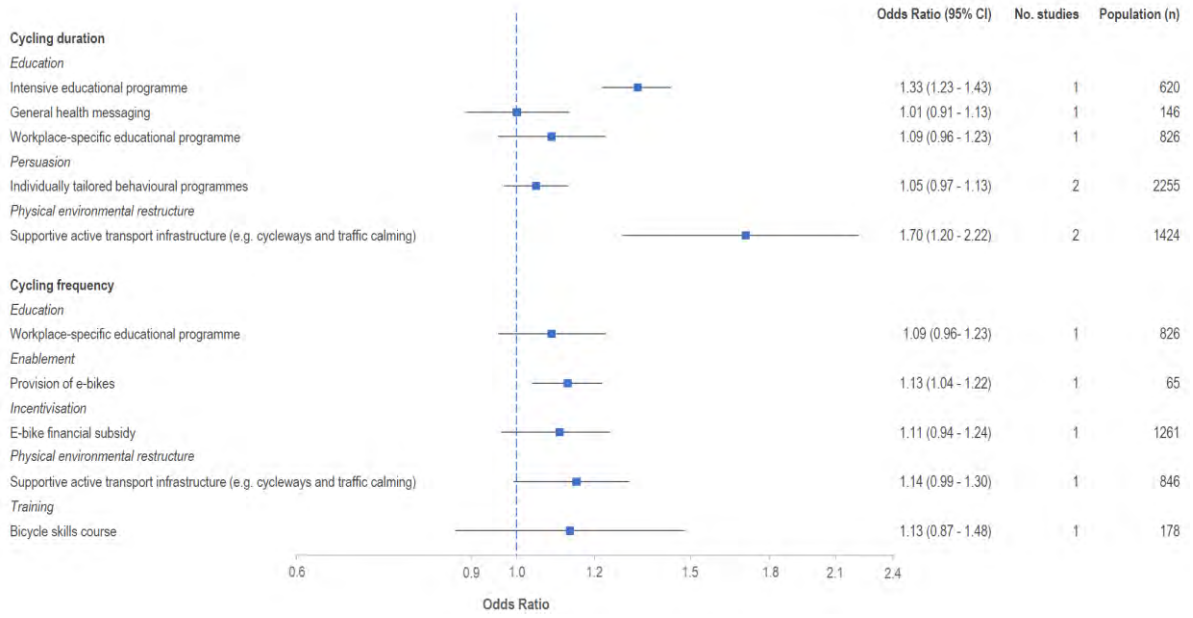
- Businesses often underestimate the proportion of people who arrive on active modes
  - In Northcote (VIC), retailers estimated that 56% of people arrived by car, when it was only 33%[1]
  - Data from 21 high streets across Greater Sydney showed that >60% of people accessed high streets by foot, bike or public transport[2]
  - In Brisbane, restauranteurs thought diners arriving by car contributed 58% of their revenue, when it was less than 20%[3]
- There are direct economic benefits to businesses
  - New York's redesign of 9th Avenue saw local retail sales jump ~49% after adding protected bike lanes and pedestrian plaza[4]
- There are also benefits to property prices
  - In US commercial real estate, being in a more walkable location increased property values by up to ~9% for each 10-point increase in walkability[5]

1. Victoria Walks. (2018). Northcote Travel Survey. Available at: https://www.victoriawalks.org.au/Darebin_shopping/
2. Committee for Sydney (2024). Walkable and bikeable streets are good for business. Available at: https://sydney.org.au/wp-content/uploads/2024/11/The-business-case-for-walking-and-cycling.pdf
3. Yen, B. T., Burke, M., Tseng, W. C., Ghafoor, M., Mulley, C., & Moutou, C. (2015). Do restaurant precincts need more parking? Differences in business perceptions and customer travel behaviour in Brisbane, Queensland, Australia. In ATRF 2015. Australasian Transport Research Forum (ATRF).
4. New York City Department of Transport. (2012). Measuring the street: New metrics for 21st century streets. Available at: https://www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf
5. Pivo, G., & Fisher, J. D. (2011). The walkability premium in commercial real estate investments. *Real Estate Economics*, 39(2), 185-219.

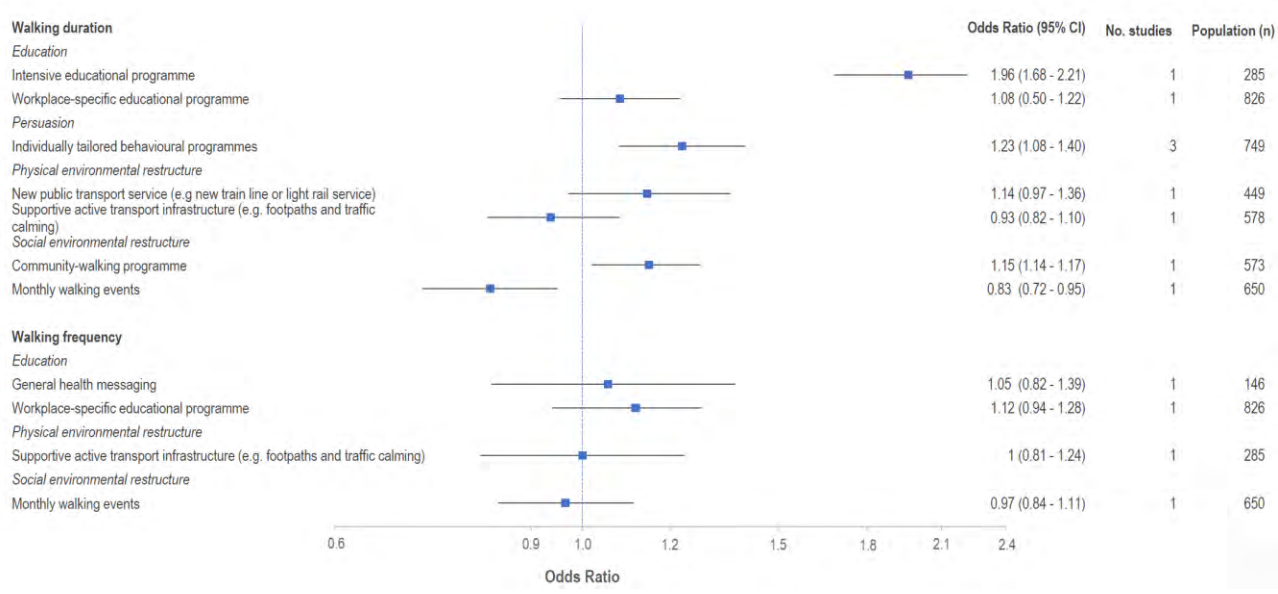
Myth #5: Behaviour change programs don't work

- Infrastructure is the foundation to enabling active travel, but behavioural programs have a critical role to play

Bike riding



Walking



1. Pearson, L., Page, M. J., Gerhard, R., Clarke, N., Winters, M., Bauman, A., ... & Beck, B. (2025). Effectiveness of interventions for modal shift to walking and bike riding: a systematic review with meta-analysis. *Transport Reviews*, 1-32.

Myth #5: Behaviour change programs don't work

- Interventions need to be well-designed and meet the needs of the people that we want to influence
- Top-down approaches may be misaligned to the needs of specific population sub-groups
- And this is where co-design comes in

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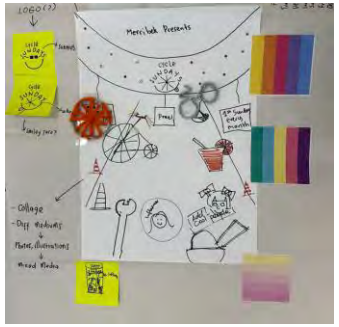
PETAL Project:
Unlocking young women's access to bike-riding

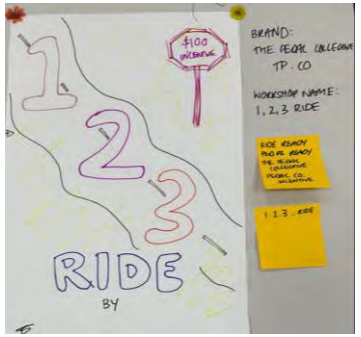
"Cycle Social": a casual social cycling group

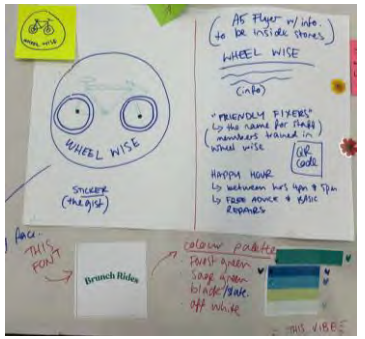
Cycle Social



"Cycle Sundays": regular local street closures with supportive services

"1, 2, 3, RIDE": a combined workshop and financial incentive program





"Wheel Wise": a gender-sensitive accreditation program for bike shops

Pearson, L., Beck, B., Kalms, N. & Skouteris, H. 2024. PETAL Project: Unlocking young women's access to bike-riding, Summary Report. Monash University.

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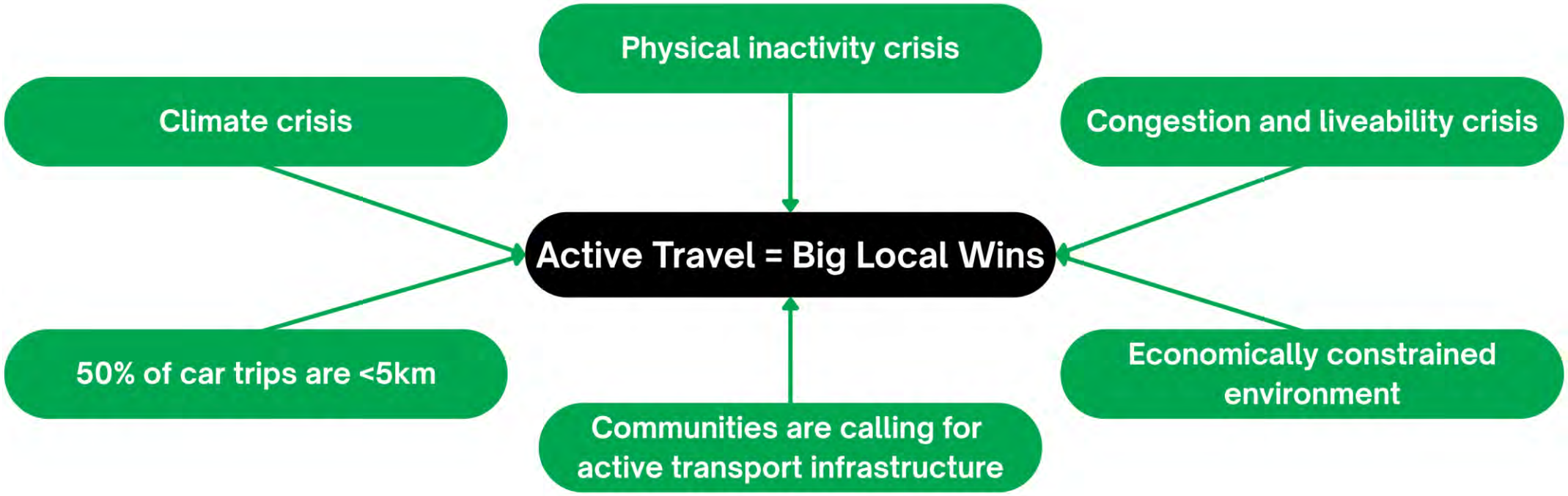
The opportunity

The opportunity: why this is our moment



The opportunity: why this is our moment

Councils are the key to unlocking the door

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How to untap this potential: What works

What works

Paris' bike network

- Plan for 100% bikeable city
- €2 billion investment to increase their network to 100,000km of bike lanes by 2030
- New infrastructure has increased bike riding by 240% and cut air pollution by 50%

Wales' 30km/h default

- Default speed limit reduced to 20 mph (~30 km/h)
- Road trauma dropped by 26%
- Minimal impact on travel time (<2 mins per journey)
- Active travel to school increased to 53%

UK LTNs

- 50% reduction in deaths and serious injuries within LTNs
- On average, 62 minutes more walking and 43 minutes more cycling per week
- 10% reduction in crime
- 6% reduction in car ownership

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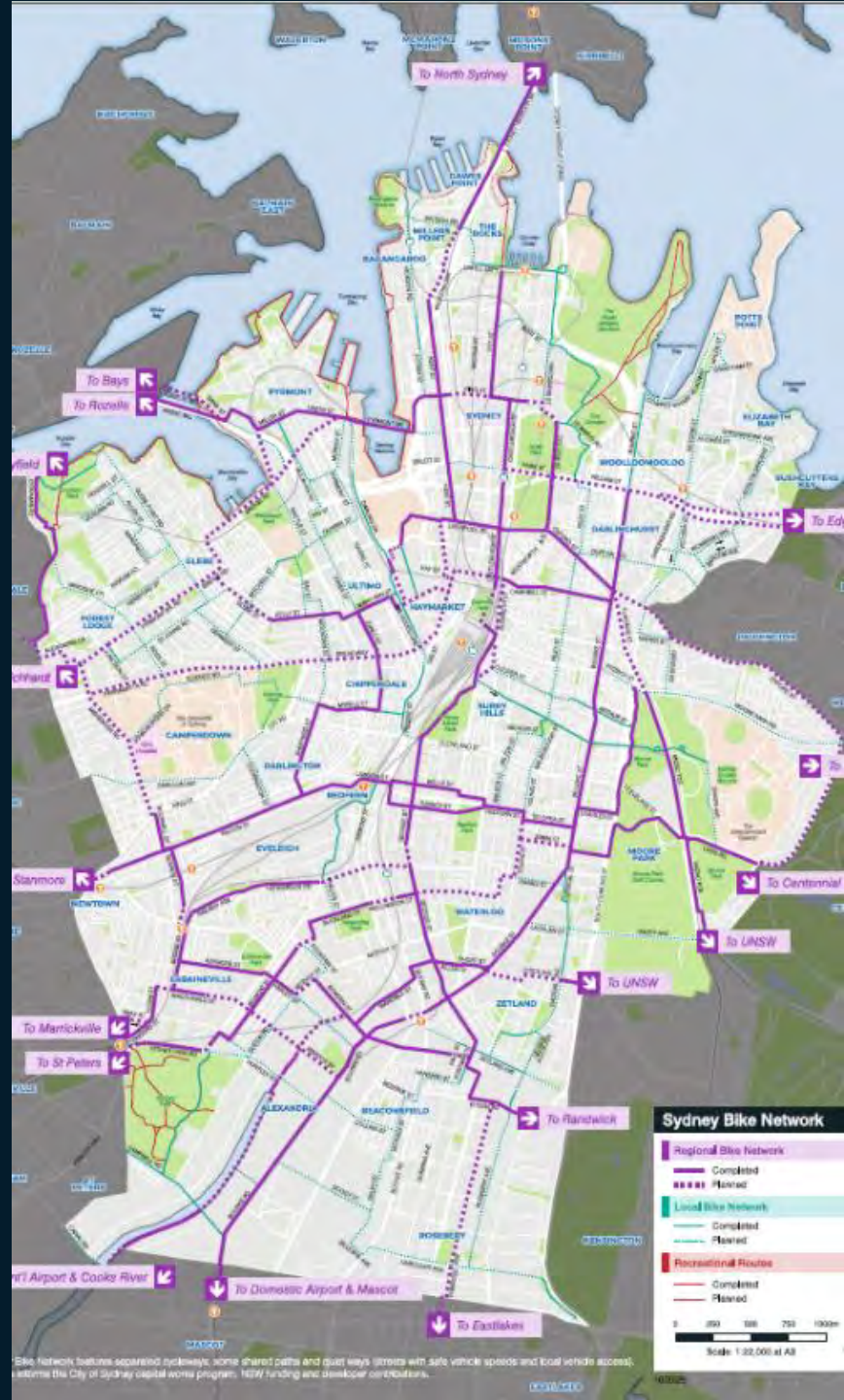
Case Study: City of Sydney's approach to street space reallocation to accelerate delivery of the bike network

ALGA National Conference, Bendigo, November 2025

Tegan Mitchell



City of Sydney's approach to street space reallocation to accelerate delivery of the bike network

Purpose: A case study describing the City's experiences implementing a connected bike network by reallocating street space. The case study draws from the City's strategic framework, lessons learned, qualitative and quantitative monitoring.

Agenda:

1. City of Sydney context
2. Reallocating street space to accelerate the delivery of the bike network.
   - Lessons learnt since 2017
   - Example design options for 12.8 m streets
3. Measuring success

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City of Sydney – context

City of Sydney image: College Street cycleway (image used with permission)

Why are we reallocating street space for the bike network?

The city is growing. Bike networks can move more people in less space than vehicles. Our community want a safe, comfortable, connected network. When we build cycleways, people use them. Streets are calmer, quieter.

Implementing a connected bike network is a strategic response to:

1. Increasing travel demand caused by population, visitor & job growth
2. Land use densification
3. Community expectations
4. Reducing road trauma
5. Space is limited and most of it is set. Addressing current mis-match between road space allocation and use

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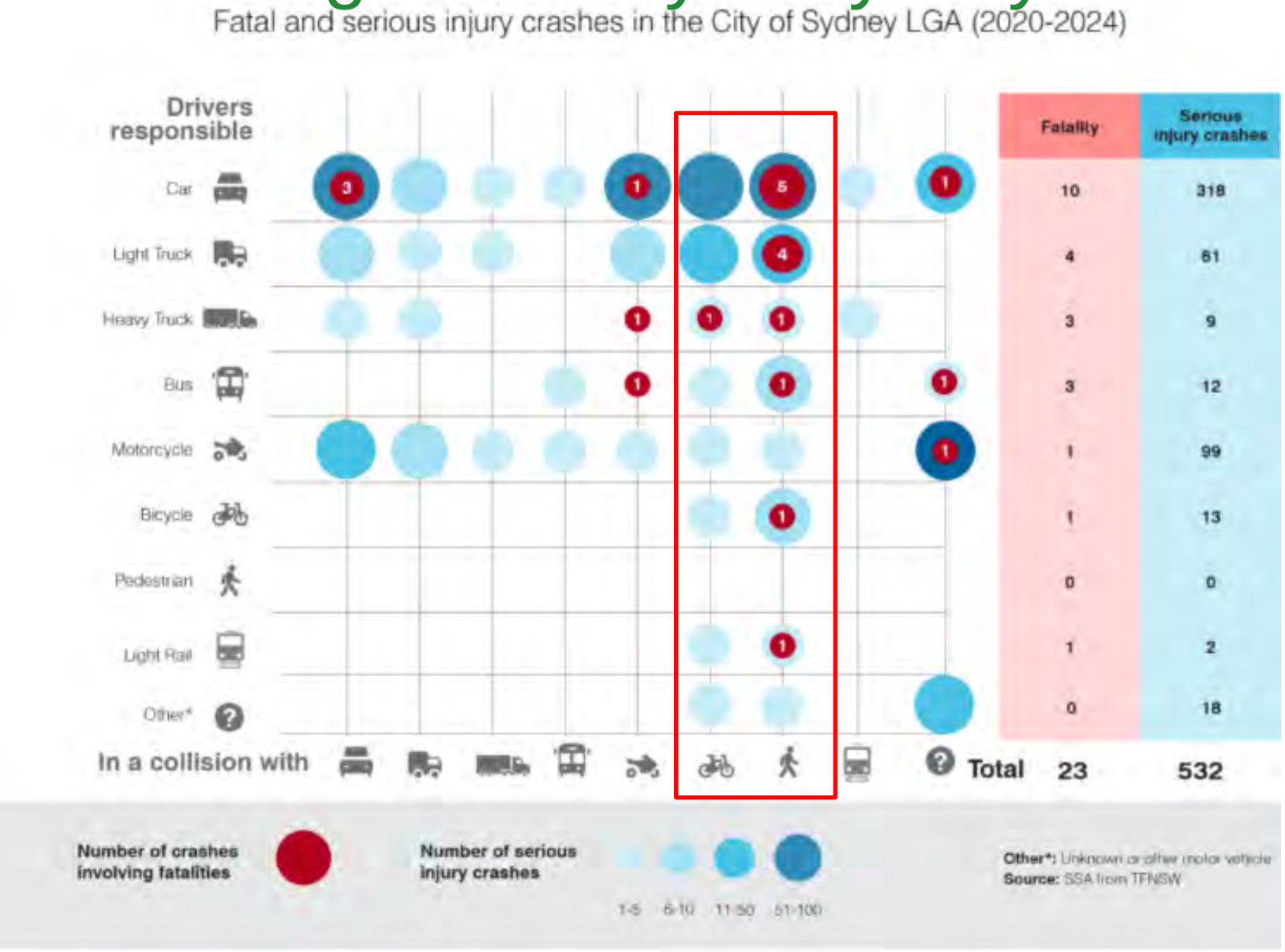
Road trauma kills and injures too many people walking and riding in the City of Sydney



- People walking and riding are being killed by **cars, trucks and buses**
- Road trauma is the biggest killer of children in Australia
- People are injured when riding in mixed traffic 40km/h (and above) speed zones, no riders have been injured riding in cycleways

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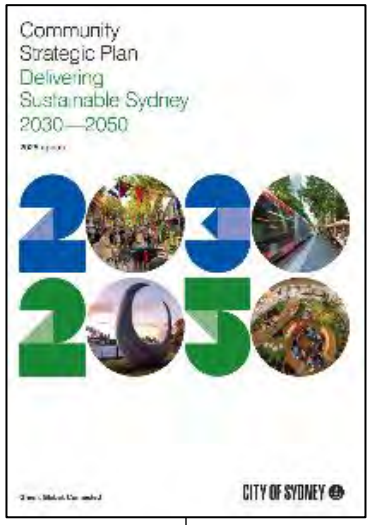
Strategic context

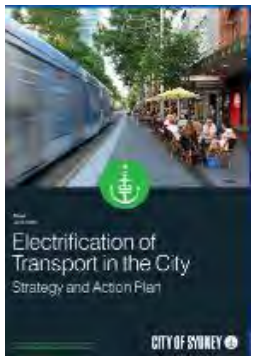
Community Strategic Plan

"a city for walking, cycling and public transport"

Access Strategy Principle B1

"We will reallocate street space for the most economically important space efficient users, especially people walking, cycling and on public transport."





Supporting policies and guidance:

- *Neighbourhood parking policy*
- *Car share policy*
- *Streets code*

Transport targets

Sustainable Sydney 2030–2050: Continuing the Vision

- By 2035, the local government area will achieve net-zero emissions
- By 2050, people will use public transport, walk or cycle to travel to and from work
  - 9 out of 10 people working in the city centre
  - 2 out of 3 people working in the rest of the Local Government Area
- By 2030, every resident will be around a 10-minute walk to what they need for daily life.

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Investment

Cycling Strategy and Action Plan

Funding bicycle related works:

- **$88 million of capital funding** over the next 10 years

Case Study: City of Sydney approach to street space reallocation to accelerate delivery of the bike network

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Street space reallocation to accelerate delivery of the bike network

Lessons learnt since 2017

1. **Program management:** Prioritise, build capacity and capability within the organisation and consultancies
2. **Vision and validate:** Strategy set the vision not providing more of the same
3. **Street context and design process:** Understand inputs to street context, communicate impacts of current and future context
4. **Design options:** Separation in 12.8m, build within the kerbs (where possible), reduce travel lanes before removing parking, *intersections* are complicated
5. **Construction:** Minimise disruption to people along the street, build fast in stages, leverage engagement
6. **Engagement:** Early during the design phase to avoid reworking your design, be flexible, adapt and respond

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1. Program Management

2018 program reset to accelerate delivery

Lessons learnt:

- Cycleways delivery took 3-4 years,
- Road space reallocation approvals took too long
- Costs were too high
- Few skilled professionals

Since 2018:

- Confirmed the bike network, including community engagement
- Simplified the design process, separating strategic design from project development and construction
- Built capability and capacity across within City and across engineering consultancies

OUTCOME OF PROGRAM RESET : Delivery increased to 1.5 – 2 km new separated cycleway/year

2. City's approach to road space reallocation

Vision and validate, not predict and provide

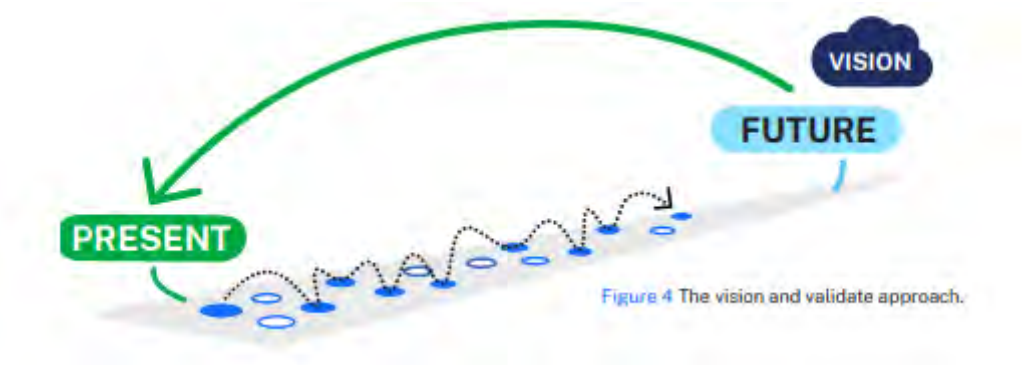


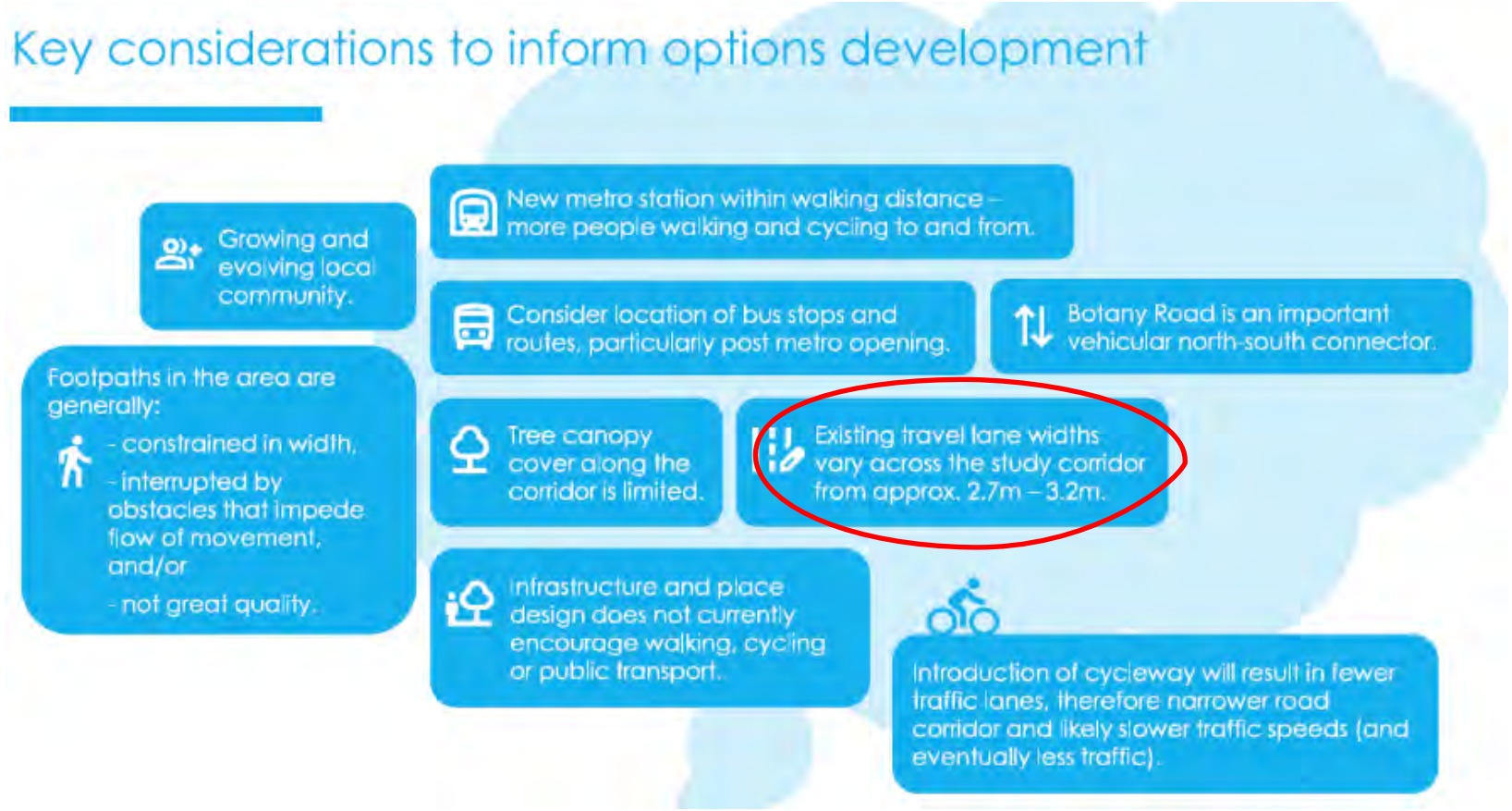
Figure 4 The vision and validate approach.

- Strategy sets the vision
- Road space is reallocated to "deliver" that vision
- Future street operation is measured to "validate" the vision

Lessons learnt

- More people *does not have to mean more car trips, or more road space*
- Car trips can decrease even through car parking remains stable
- Traffic modelling overestimates car trips on dense urban streets
- Demand for riding is supressed by a lack of safe infrastructure and safety perceptions

3. Street context and design process



Lessons learnt:

- Reallocating road space requires understanding the street in detail

- Measure performance against objectives
- Measure – people walking, footpaths, traffic lanes
- Identify early critical issues eg: loss of parking spaces, bus routes or land use changes

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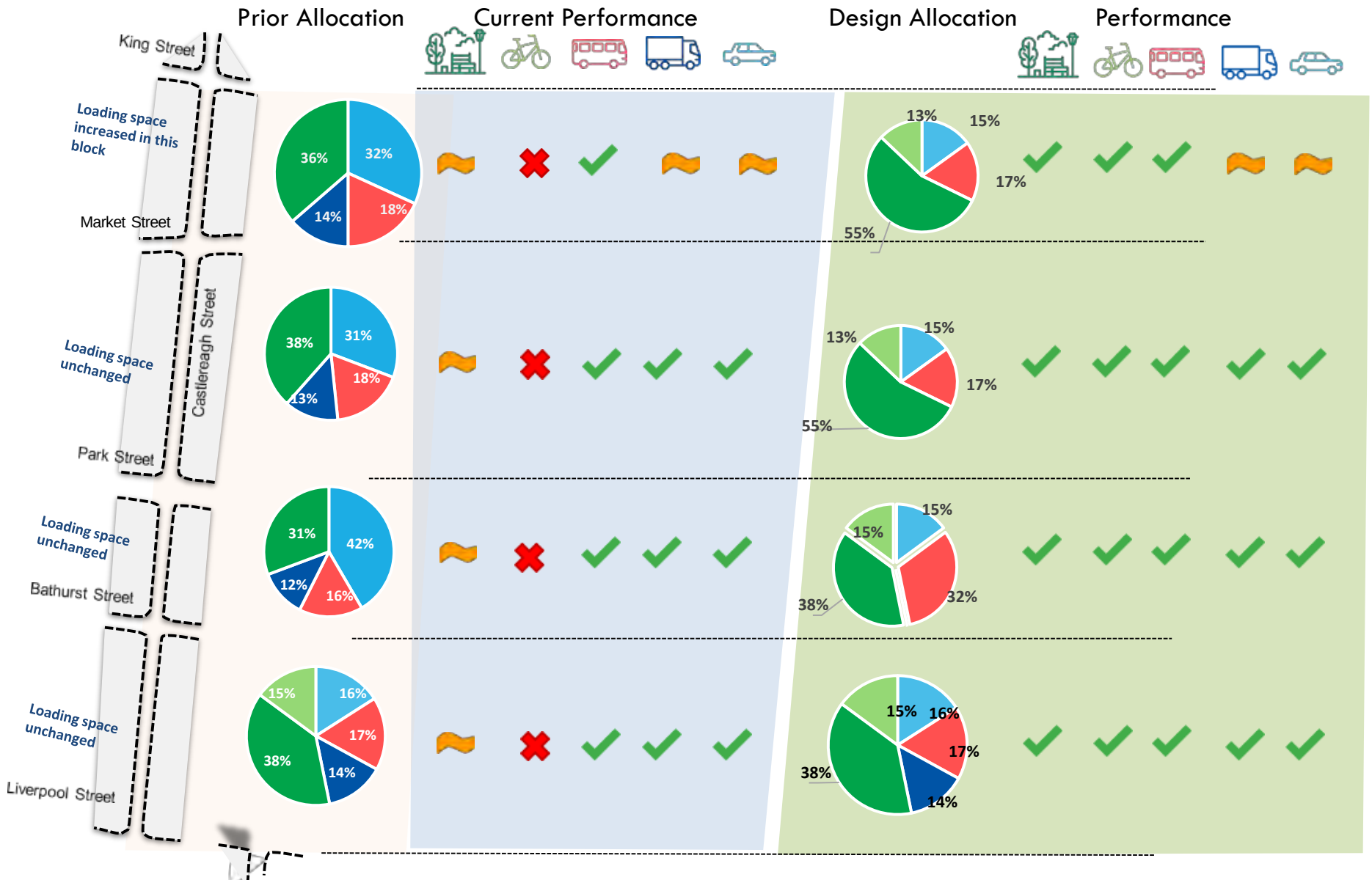
3. Street context and design process

Use visualizations to communicate current and future performance



- Improve pedestrian access and dwelling opportunities
- Provision of separated cycleway along the length of Castlereagh Street north
- Maintain emergency vehicle access
- Use of Castlereagh Street by express bus services during PM peak in the future
- Provision of parking and loading zones to support commercial activity
- Maintain local vehicle access

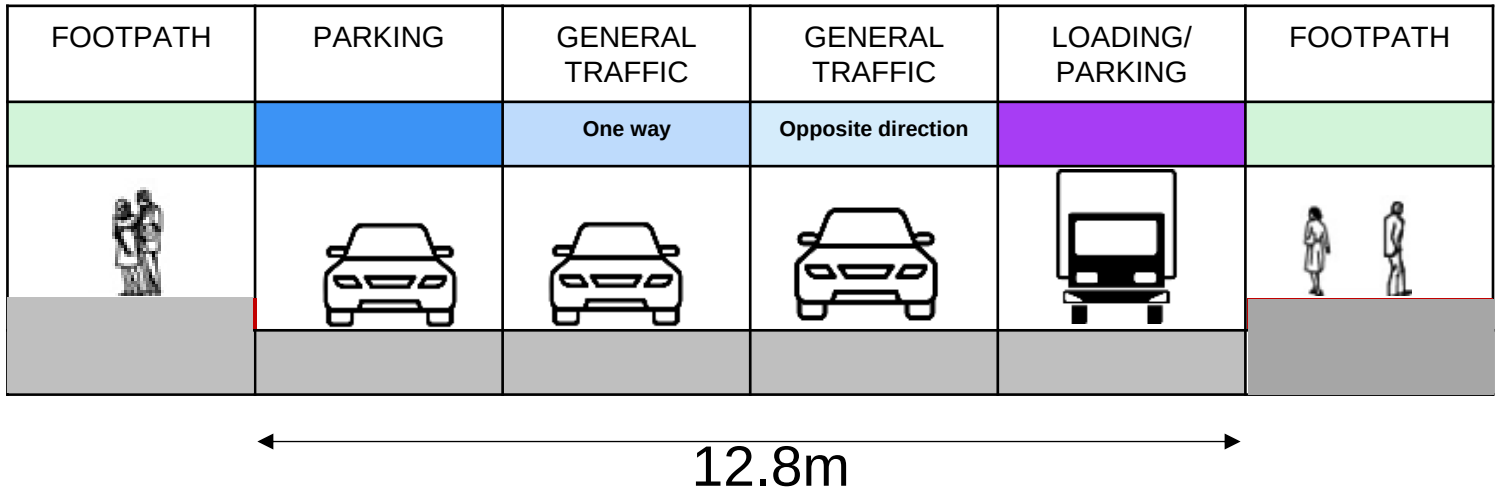
People driving
Loading
Bus passengers
People Riding
People Walking

4. Cycleway design

Using a 12.8m wide street as an example

- Prioritise:
  1. People
  2. Bikes
  3. Public transport
  4. Vehicles
- Build within the kerbs
- Design options include:
  - Type of bike lane (one-way or two-way)
  - Number of traffic lanes or parking lanes
  - Direction of traffic lanes

Typical 12.8m street cross section

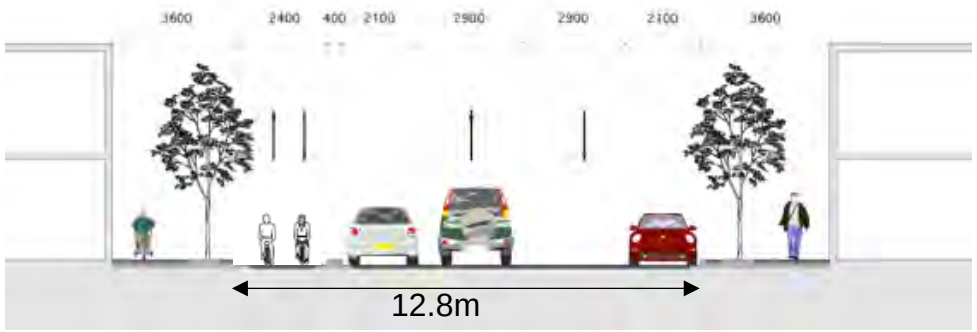


Lessons learnt:

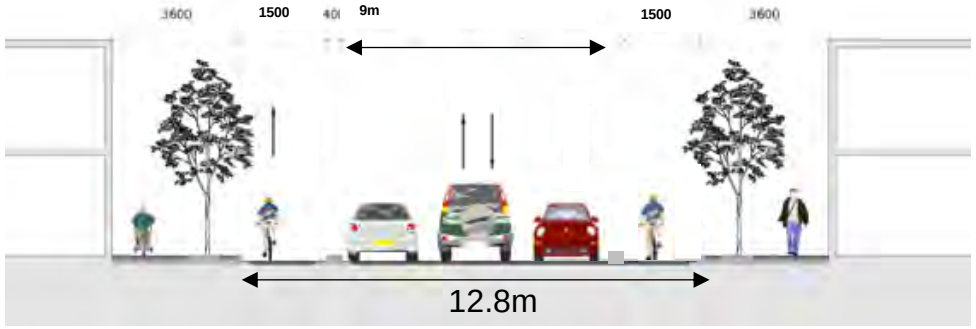
- Reallocate space between kerbs - Removing footpaths or relocating drainage is expensive and takes time.

4. Cycleway design

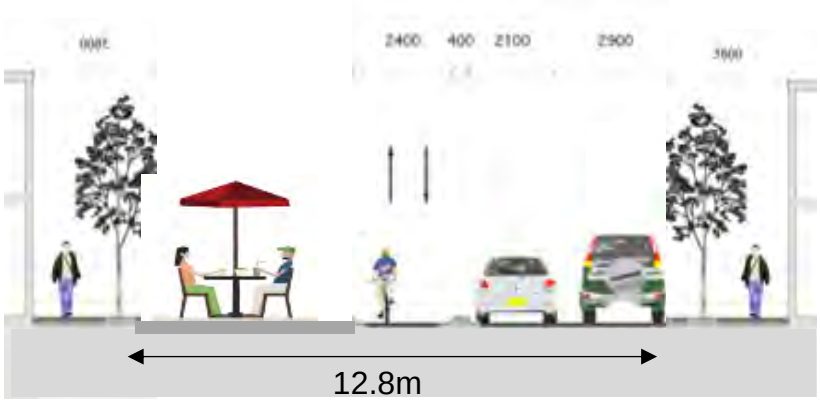
Consider multiple options, value engineer, evaluate



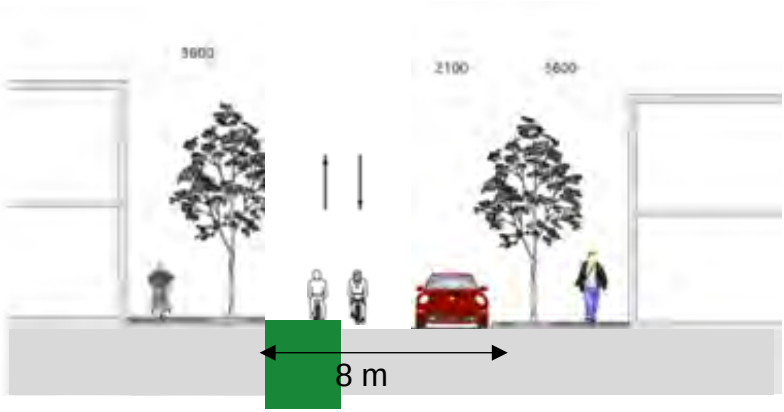
1. Yield Streets – Bidirectional cycleway



2. Yield Streets – One way cycleway



3. Reducing traffic and parking lanes



4. Contraflow lanes

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Example

Yield Streets (bi-directional)

- ✓ Maintain kerbs
- ✓ Maintains parking
- ✓ Allow riders to ride in both directions
- ✓ Reduces vehicle lanes
- ✗ Simple at intersection

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Example

Yield Street (Conventional)

- ✓ Maintain kerbs
- ✓ Maintain parking
- ✓ Allow riders to ride in both directions
- ✓ Same number vehicle lanes
- ✓ Simple at intersection

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Ivy Street

Riders can ride in both directions on one way streets

Example Contraflow lanes

- ✓ Maintain kerbs
- ✓ Maintain parking
- ✓ Provide two - way riding
- ✓ Low speed, low volume streets
- ✓ Simple at intersection

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Pitt Street (2021)

Pitt Street (now)

Removing a lane of traffic and parking made crossing Pitt Street possible along the entire corridor significantly increasing the number of people walking

Example

Reducing traffic and parking lanes

- ✓ Maintain kerbs
- ✗ Maintain parking
- ✓ Allow riders to ride in both directions
- ✓ Reduces vehicle lanes
- ✗ Simple at intersection

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Example

Modal filters reduce vehicle volumes and speeds to enable safe riding

- ✓ Maintain kerbs
- ✓ Maintain parking (some parking loss)
- ✓ Allow riders to ride in both directions
- ✗ Reduces vehicle lanes
- ✓ Simple at intersection

5. Cycleway construction

Minimise impacts on local street users

Lessons learnt:

- Leverage planning, stakeholder engagement and communicate during construction
- Build as fast as possible
- Build in stages, not the whole corridor at once
- Make sure your contract is aligned with overall project objectives
- Consider adjacent development works and negotiate outcomes – communicate!

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6.Community engagement

Early, consistent, proactive and responsive to stakeholders

Artists impression Belmont Street

Lessons learnt:

- Communicate all the benefits
- People can be resistant to change, visualisations help
- Some people are never supporters
- Conversation never stops
- Don’t confuse *engagement with Community sentiment*

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Measuring Success

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Measuring – tools and methods

Measuring performance give confidence to decision makers

- The City measures people riding with:
  - 26 permanent bike counters across LGA
  - Twice yearly LGA wide bike counts at 68 locations
  - Intercept surveys before and after new bike infrastructure
  - 3 yearly Active Travel Survey of 1500 residents living within the City of Sydney Local Government Area (LGA) and within a ten-kilometre radius of the city (since 2009)

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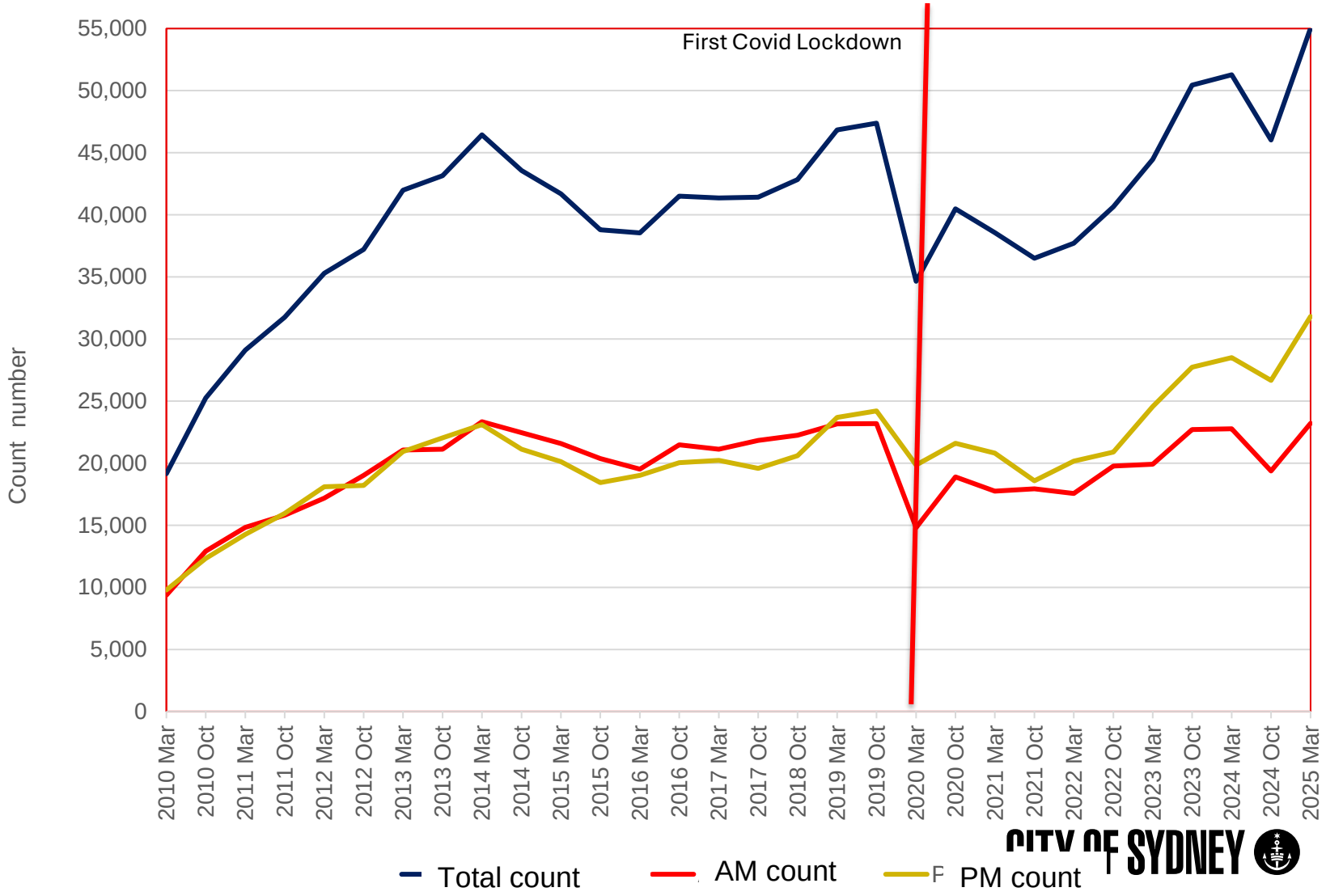
Bike counts show more people are riding

Twice yearly bike counts

- City bike counts for 68 sites (AM and PM peak period each three hours) for one day in March and October.
- Counts have nearly tripled since 2010
- Counts are indicative and are not total cycling numbers across LGA.



Healthy Streets project overview

Oxford Street and Castlereagh Street

A. Community

Research question: What are people's current perceptions and experiences of cycleways and the street environment. How do they change or not change over time?

Strategies:

Healthy Streets intercept surveys:

- Pre-construction
- 1-year post construction
- 5-years post construction

B. Business community

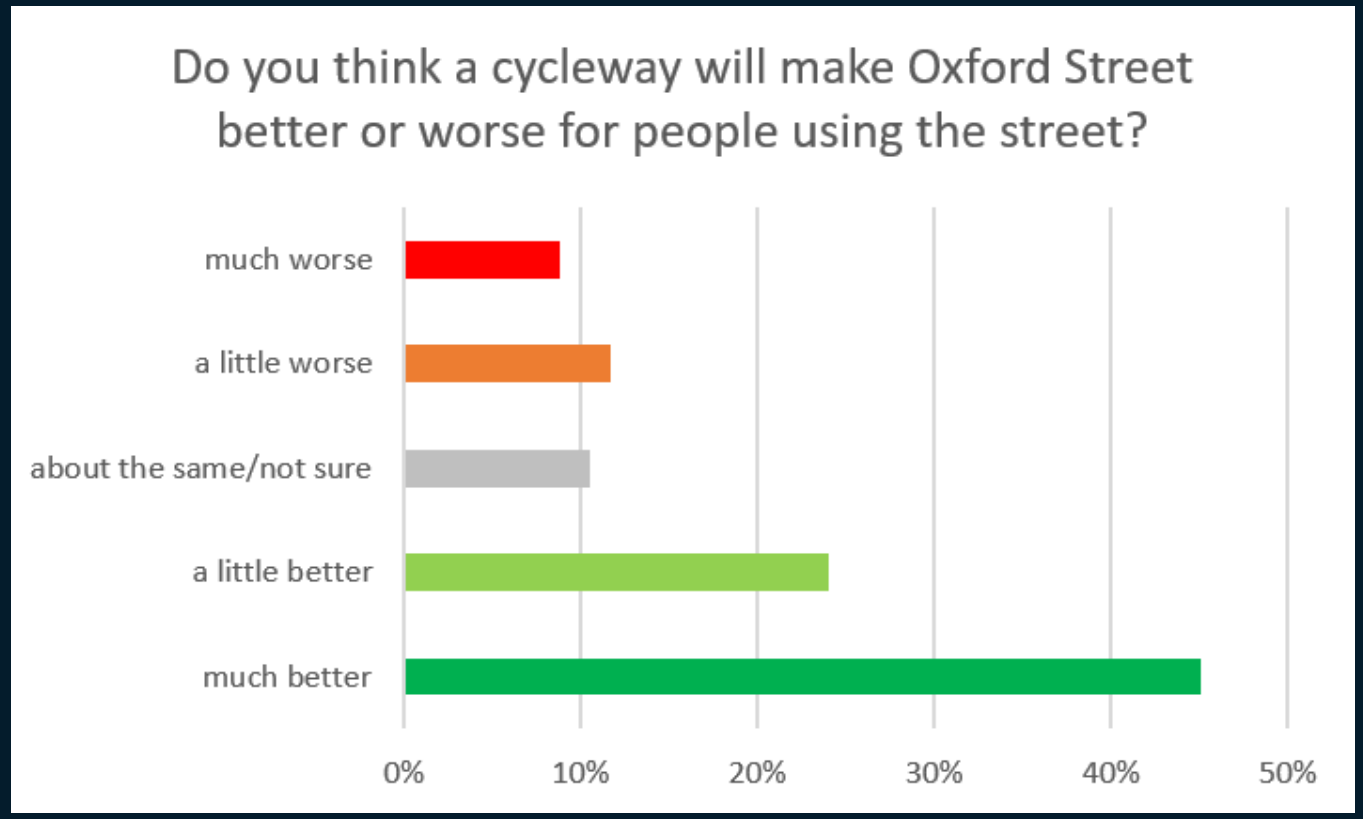
Research question: What is it like to have a cycleway out the front of your business?

Strategies:

- Review pre-construction consultation with the business community, pre-construction
- Focus groups with the business community, 1-year post construction
- Focus groups with the business community, 5-years post construction

Case Study : Oxford Street Cycleway

City intercept survey of people using Oxford Street



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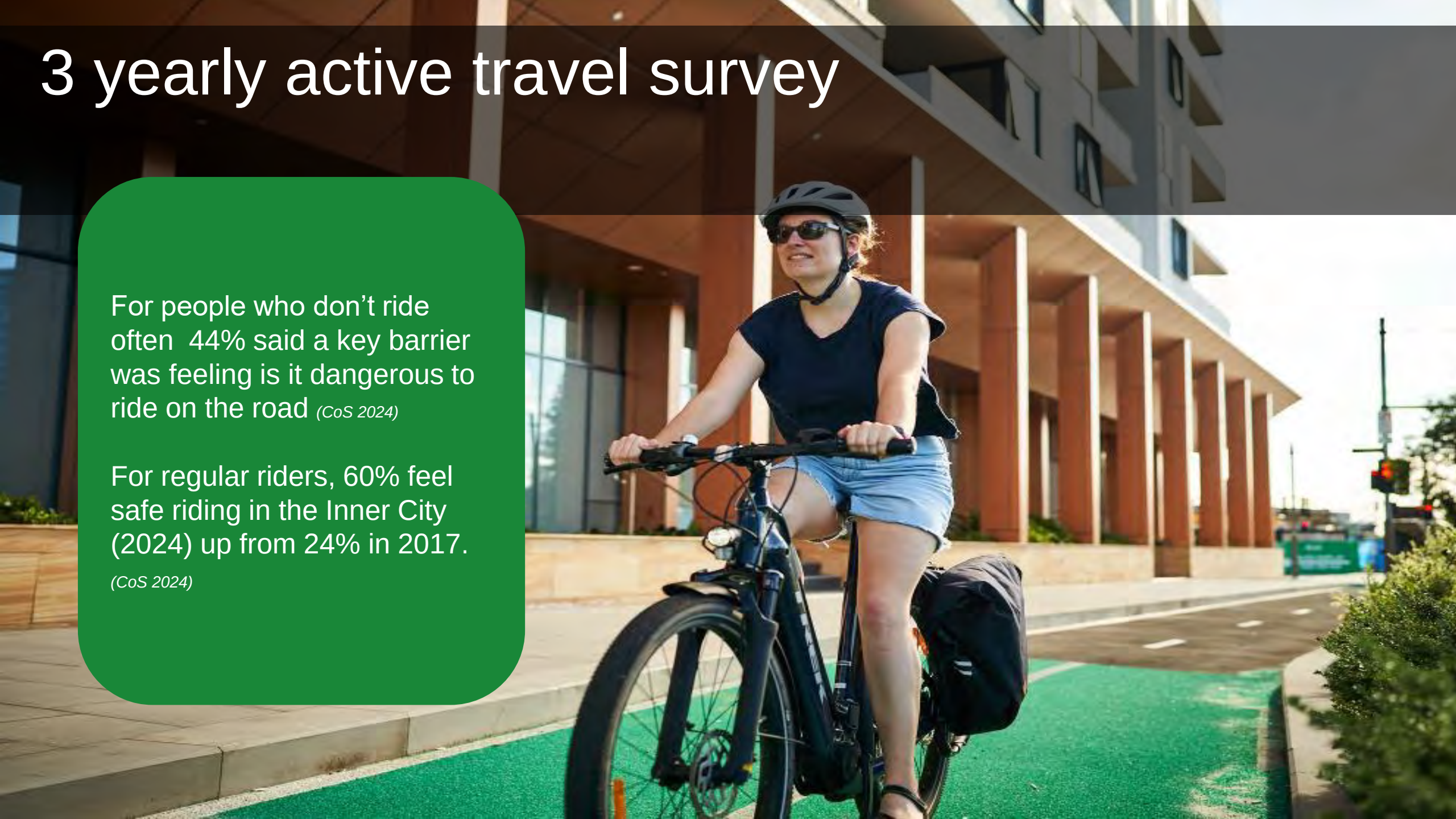
3 yearly active travel survey



For people who don’t ride often 44% said a key barrier was feeling is it dangerous to ride on the road *(CoS 2024)*

For regular riders, 60% feel safe riding in the Inner City (2024) up from 24% in 2017.

(CoS 2024)

SUSTAINABLE
MOBILITY AND
SAFETY RESEARCH

The small things that create opportunity

The small things that create opportunity

- Small, unglamorous and strategic actions taken now create readiness so that councils can pounce on windows of opportunity and are ready to handle common inhibitors
- Inter and intragovernmental relationship building and maintenance (council – state, council – council, officer – councillor)
- Multidisciplinary teams
  - E.g. transport – health – climate – communications
- Strategic micro-decisions
  - Inclusion (and approval) of network plans within longer term strategies
  - Timelines for response and approvals
  - Specific, measurable targets
- Evaluation as default
  - Consider broad outcomes (climate, economic, equity-focused, health, wellbeing)
  - Readiness for funding opportunities with proof of effectiveness

SUSTAINABLE
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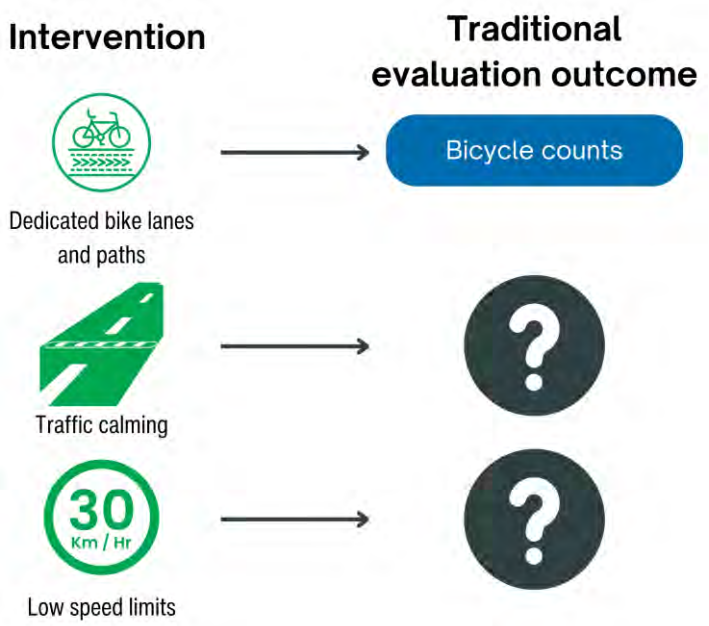
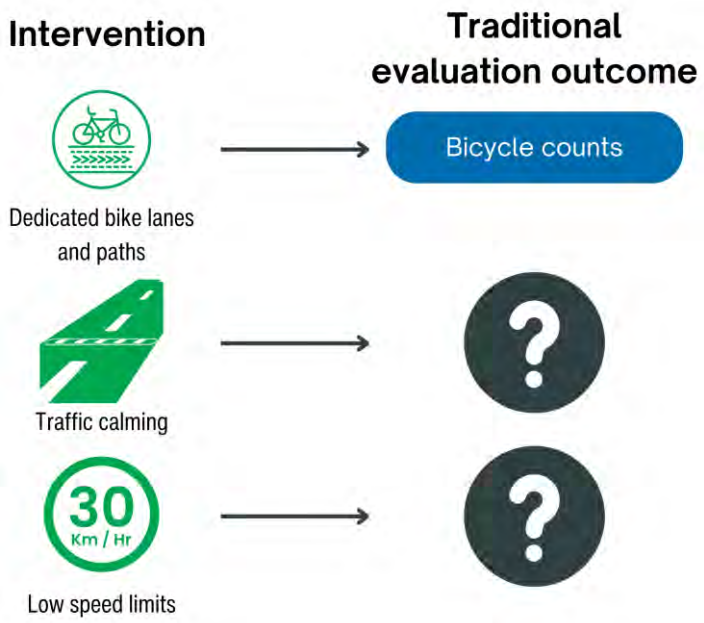
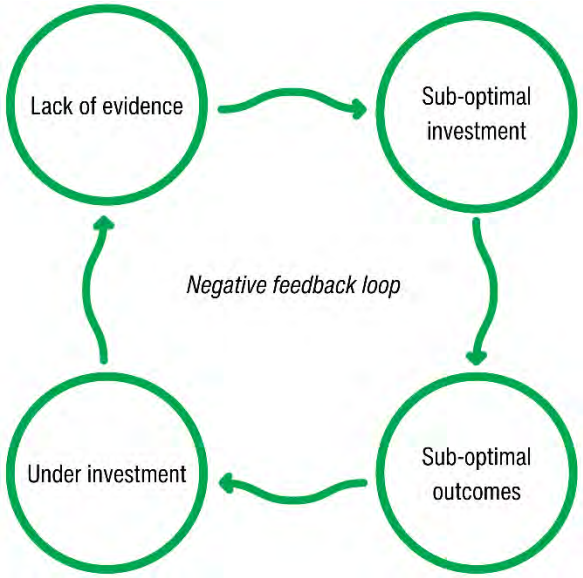
Connecting the dots

Evaluation: measuring what matters

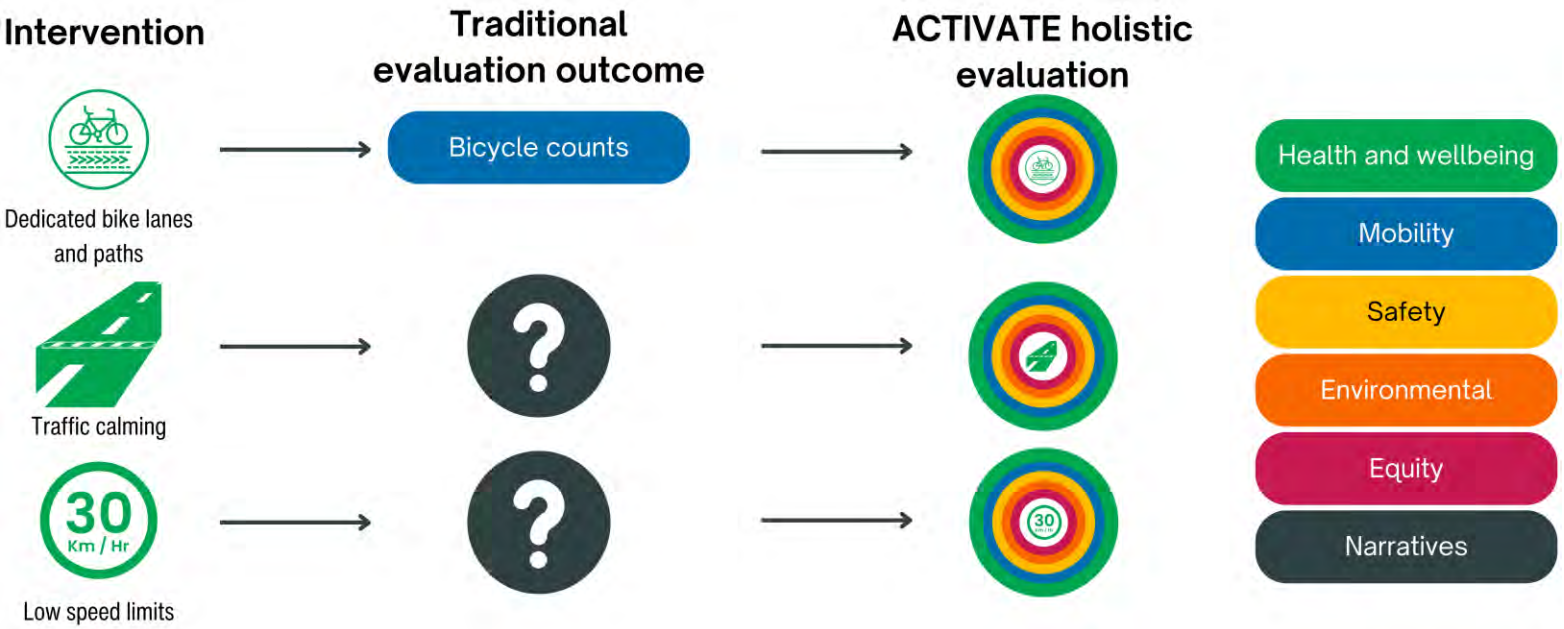


Evaluation: measuring what matters



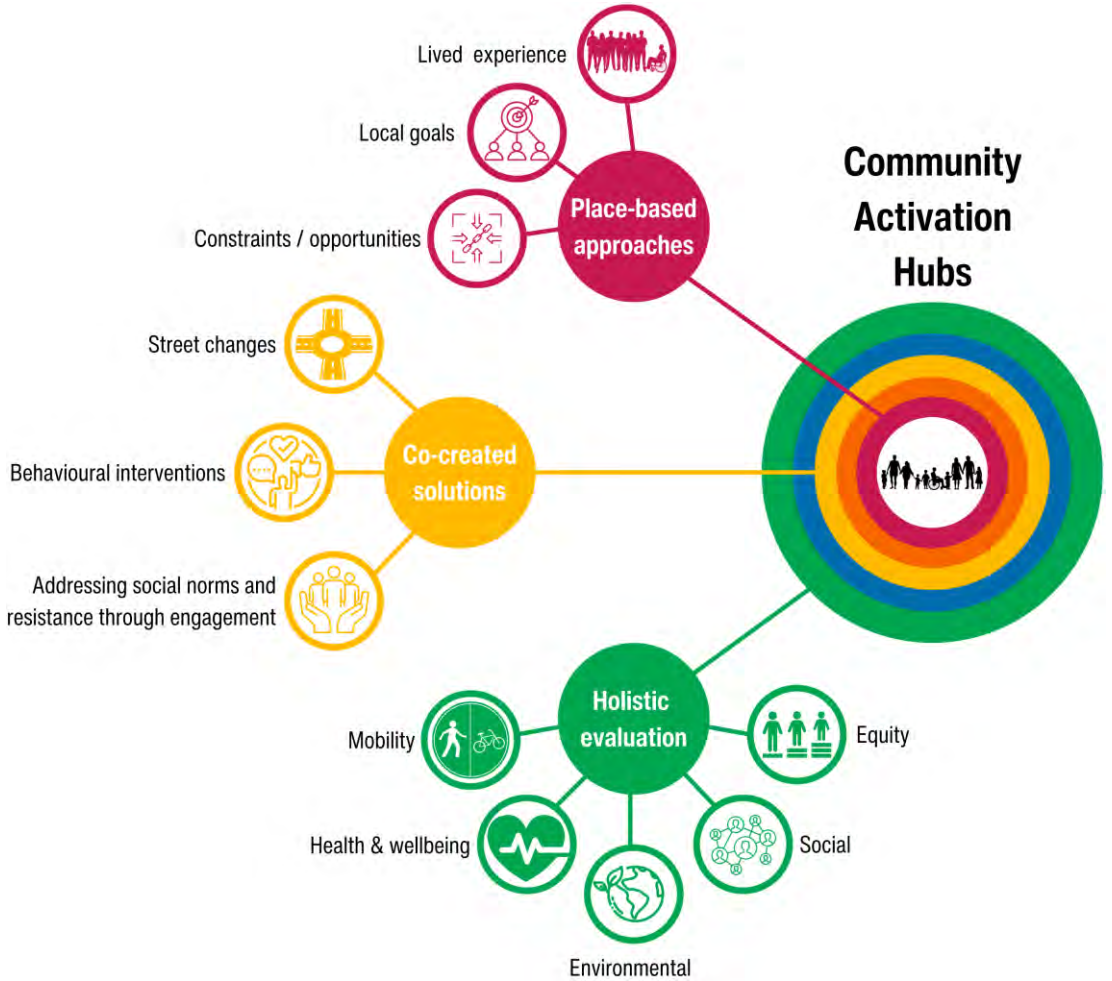


Evaluation: measuring what matters



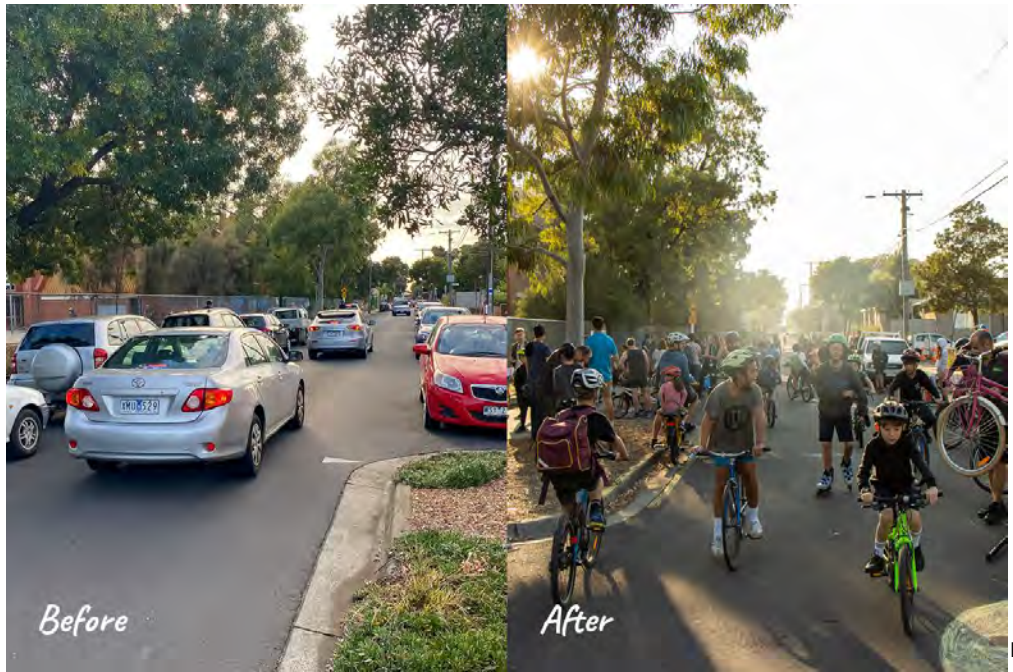
Our whole-of-system and place-based approach: ACTIVATE

- ACTIVATE: A place-based, collaborative way of working with councils and communities to co-create local solutions, rigorously evaluate them, and scale what works
  - So every street upgrade, school project, or behaviour change program becomes part of a shared learning system



Summing up

- The journey we've covered:
  - We've demonstrated the need, busted some myths and shown that communities want change
  - We've covered some potential solutions, and how you get them over the line
  - We've shown that evaluation and learning are critical
- Councils are the key to unlocking healthier, more active, more sustainable and more liveable communities – for the people of today and for generations to come



Bicycle Network – Open Streets Program