We can quantify the economic impact of investing in roads for drivers - why not pedestrians?

John Lieswyn
July 2023
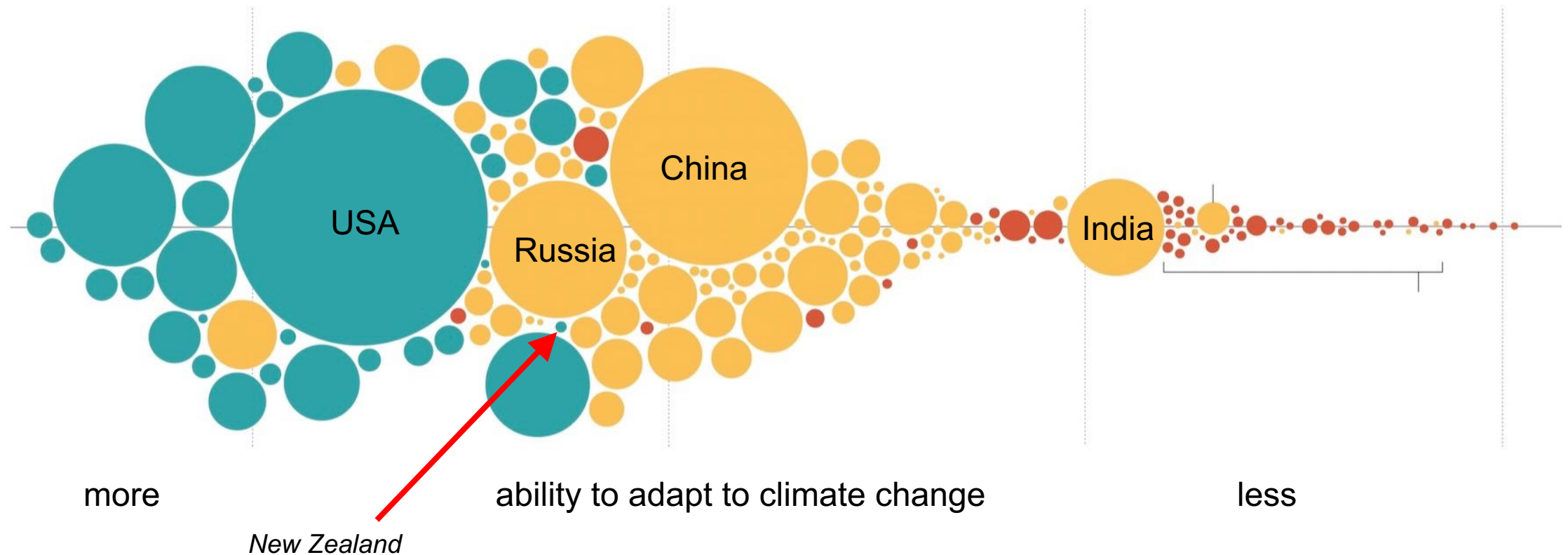Living Streets Walking Summit, Christchurch
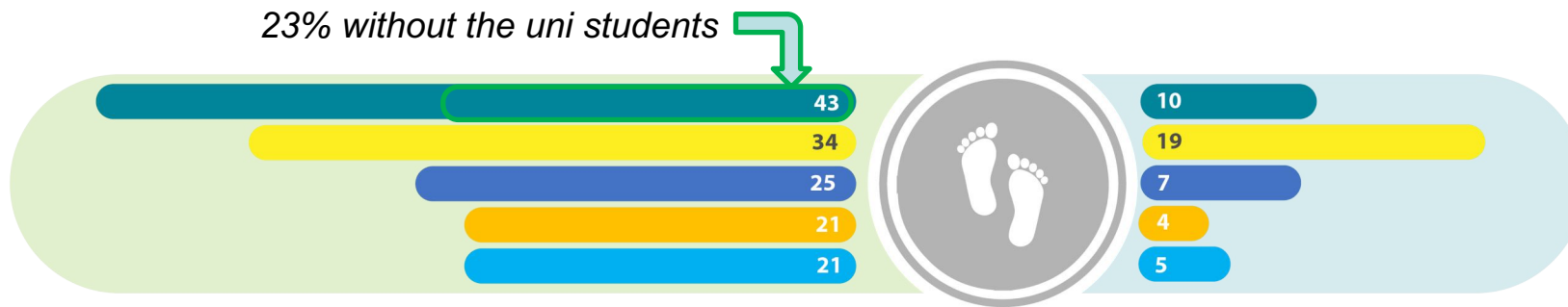
Contribution to climate change

"We are on a highway to climate hell"

- UN Secretary General, COP27, 8 November 2022

more   ability to adapt to climate change   less

New Zealand

Source: New York Times

CYCLING

	DUNEDIN	WELLINGTON	NELSON	CHRISTCHURCH	NZ OVERALL
Trips to education %	2	2	10	9	4
Trips to work %	2	4	6	6	2

23% without the uni students

WALKING / JOGGING

	DUNEDIN	WELLINGTON	NELSON	CHRISTCHURCH	NZ OVERALL
Trips to education %	43	34	25	21	21
Trips to work %	10	19	7	4	5

Trips to education %

Trips to work %

DUNEDIN | WELLINGTON | NELSON | CHRISTCHURCH | NZ OVERALL

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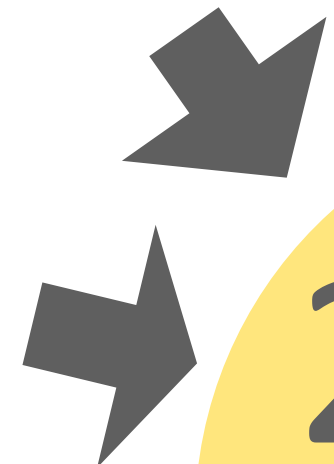2018 Census

Mode shift targets

Dunedin City target

To achieve a 50% reduction below 18/19 levels in land transport emissions by 2030/31 we need... *(all trips mode share figures)*

Central government goals, target

— Reducing carbon emissions, mode shift
— Growing and connecting safe urban networks

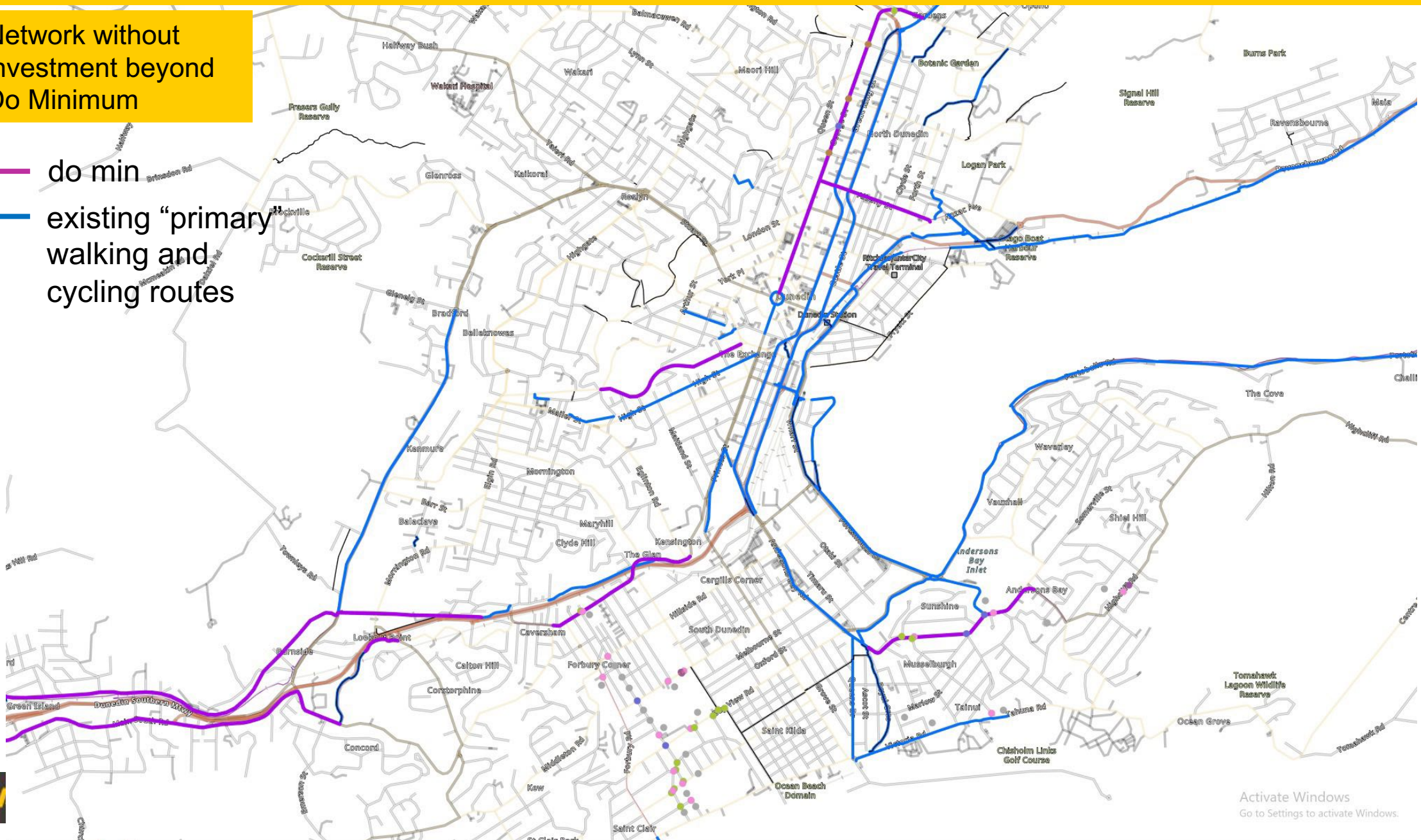|	WORK	SCHOOL	All trips (2018)	All trips (2030)
	9.6%	40.9%	5%	21%
	2.0%	2.4%	0.5%	18%

20% reduction

In total kilometres travelled by light vehicles by 2035

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Do Minimum network

- Network without investment beyond Do Minimum

—— do min

—— existing "primary" walking and cycling routes

What will that get us?

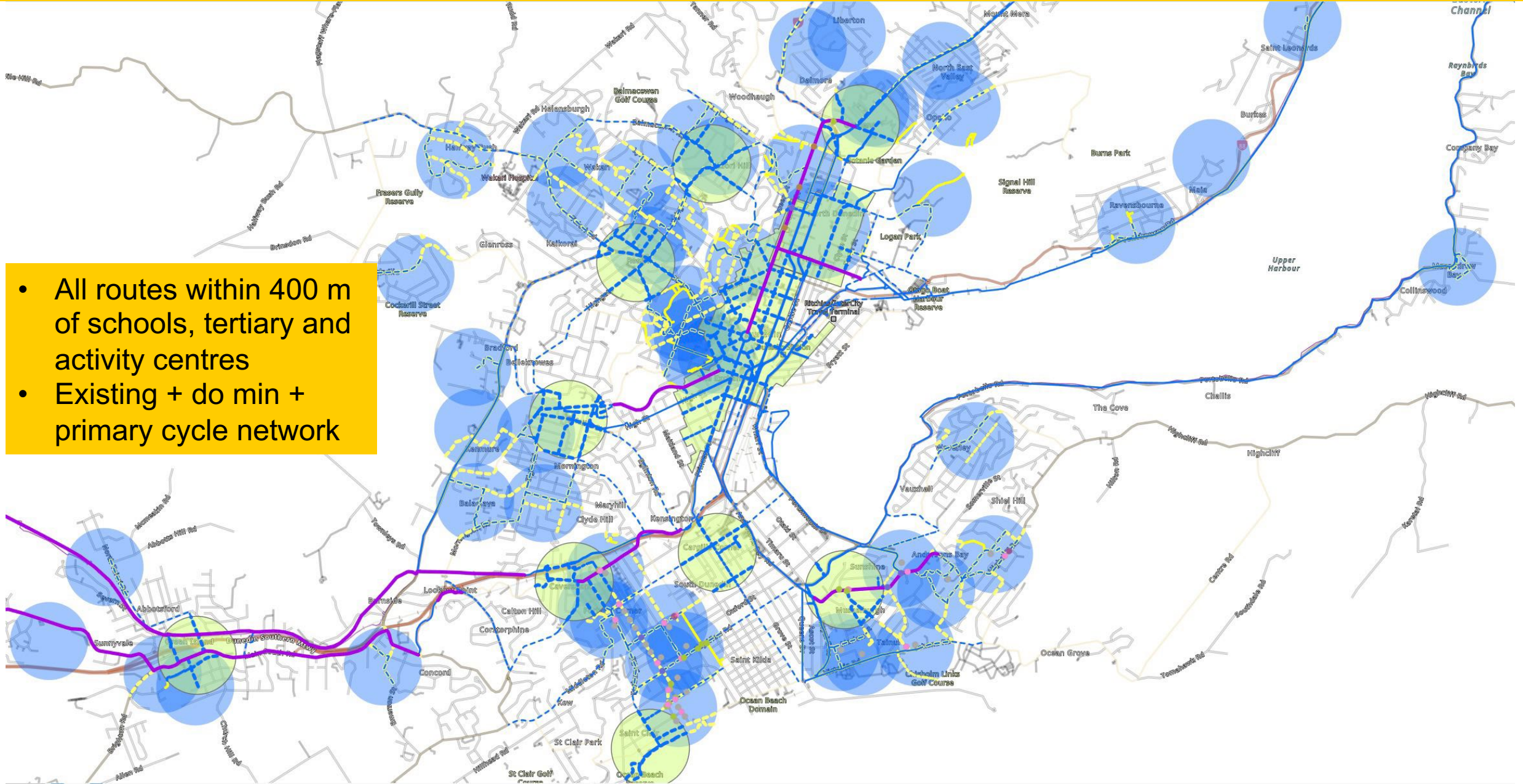Dunedin is already a walking city in NZ terms

For walking, looking at (optimistically) a 5% mode shift for a low impact programme

Need a high impact programme + all other policy and intervention levers to really move the needle

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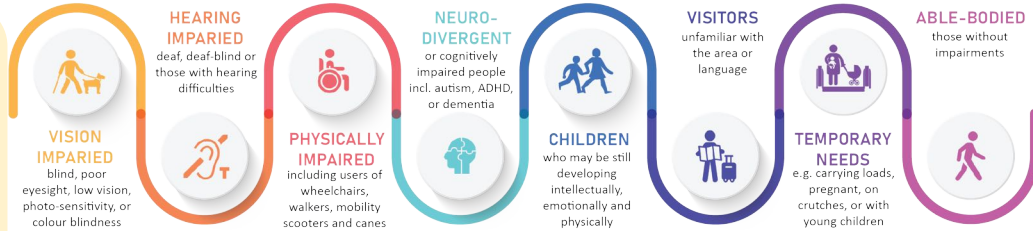# Hybrid: Connected Communities + Education Focus

- All routes within 400 m of schools, tertiary and activity centres
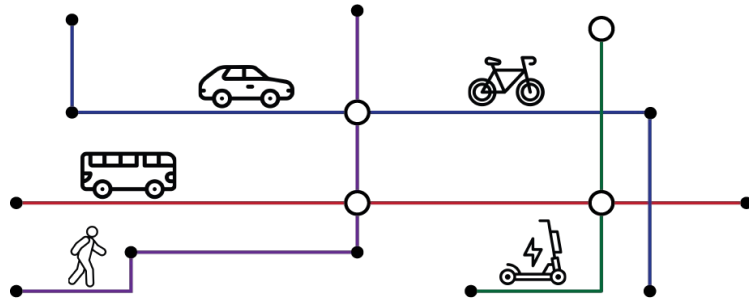- Existing + do min + primary cycle network

Six principles - overview

An inclusive all ages and abilities environment

HEARING IMPARIED deaf, deaf-blind or those with hearing difficulties

VISION IMPARIED blind, poor eyesight, low vision, photo-sensitivity, or colour blindness

PHYSICALLY IMPAIRED including users of wheelchairs, walkers, mobility scooters and canes

NEURO-DIVERGENT or cognitively impaired people incl. autism, ADHD, or dementia

CHILDREN who may be still developing intellectually, emotionally and physically

VISITORS unfamiliar with the area or language

TEMPORARY NEEDS e.g. carrying loads, pregnant, on crutches, or with young children

ABLE-BODIED those without impairments

No way, no how
approx **30%**

Interested but concerned
Grade 1: Beginner skills
approx **60%**
Separated cycleways, pathways

Somewhat confident
Grade 2: Intermediate skills
approx **10%**
Cycle lanes and space to ride

Highly confident
Grade 3: Advanced skills
approx **1%**
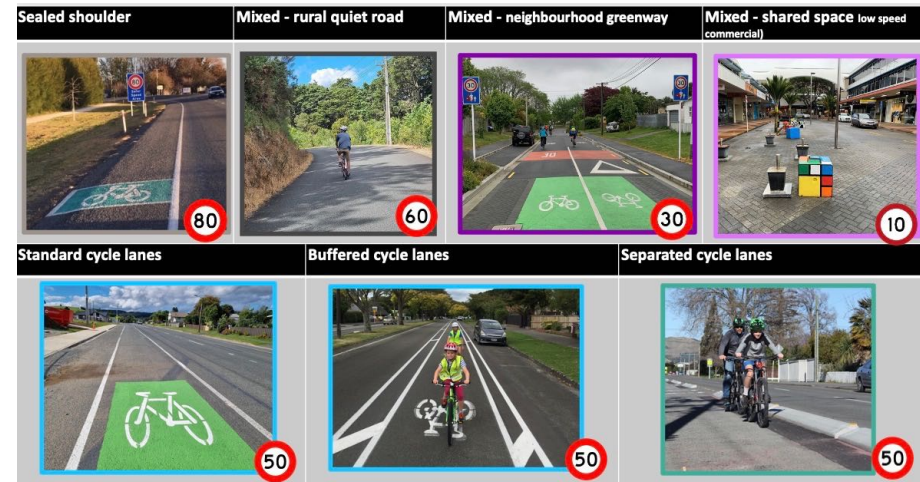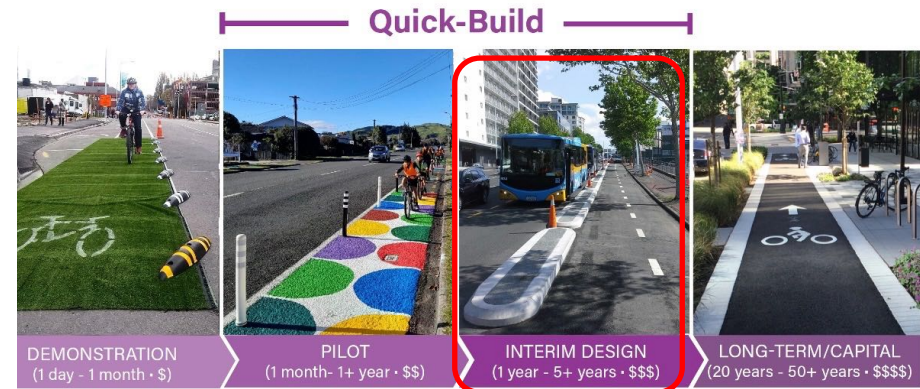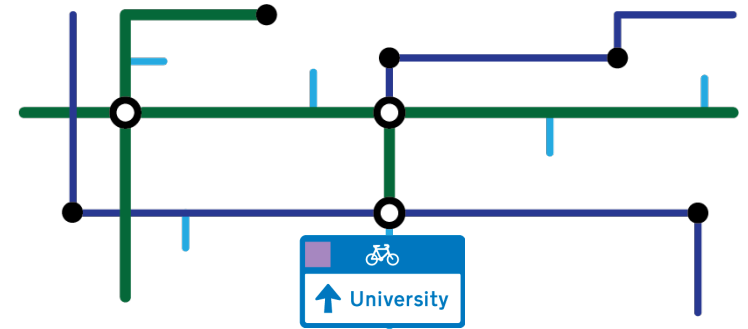Any conditions

Neighbourhood greenways, quiet streets, shared spaces

An integrated network considers all modes of travel

Every street is a people street

Cohesive routes that get people where they want to go

University

Quick-Build

Interim approaches will help roll out the network at speed

DEMONSTRATION (1 day - 1 month · $)

PILOT (1 month- 1+ year · $$)

INTERIM DESIGN (1 year - 5+ years · $$$)

LONG-TERM/CAPITAL (20 years - 50+ years · $$$$)

The right design for the right situation

Sealed shoulder — 80

Mixed - rural quiet road — 60

Mixed - neighbourhood greenway — 30

Mixed - shared space low speed commercial — 10

Standard cycle lanes — 50

Buffered cycle lanes — 50

Separated cycle lanes — 50

PEOPLE WHO USE OUR FOOTHPATH NETWORK

VISION IMPARIED
blind, poor eyesight, low vision, photo-sensitivity, or colour blindness

HEARING IMPARIED
deaf, deaf-blind or those with hearing difficulties

PHYSICALLY IMPAIRED
including users of wheelchairs, walkers, mobility scooters and canes

NEURO-DIVERGENT
or cognitively impaired people incl. autism, ADHD, or dementia

CHILDREN
who may be still developing intellectually, emotionally and physically

VISITORS
unfamiliar with the area or language

TEMPORARY NEEDS
e.g. carrying loads, pregnant, on crutches, or with young children

ABLE-BODIED
those without impairments

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We CAN build the network… but we have to justify it first ☹

We can quantify $ benefits

- 2020 $ = facility length x # new peds x 365 x $**4.40**
- 2023 $ = facility length x # new peds x days x $**9.90**
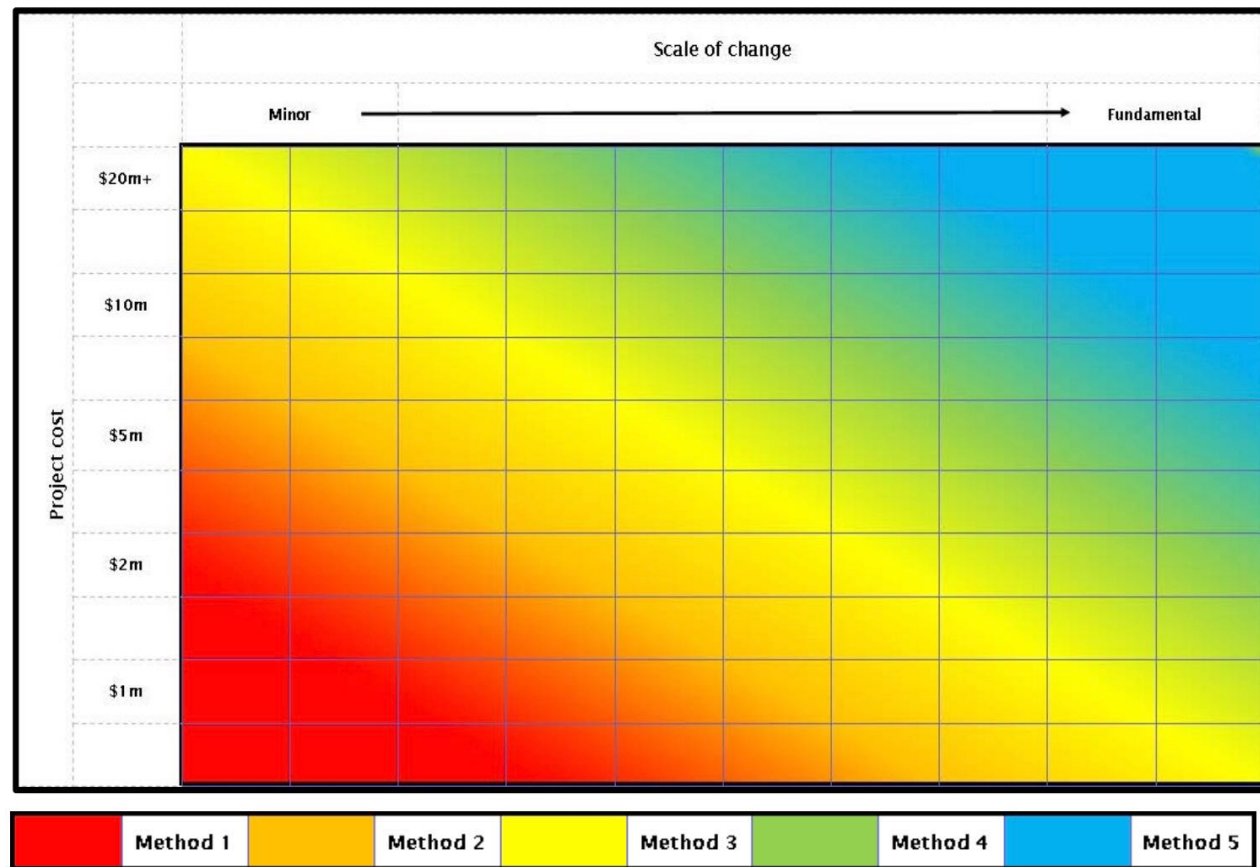
- But it's capped at $3,100/yr

SP11 Walking and cycling facilities
Worksheet 5 - Benefits for walking and cycling facilities

Spreadsheet released 14-Apr-2023

WAKA KOTAHI NZ TRANSPORT AGENCY

Worksheet 5 is used to calculate the walking and cycling facility benefits for the various options. Only one category for walking and one category for cycling may be used in an evaluation of a proposal. If an activity contains more categories, they must be submitted as separate evaluations.

Activities that combine walking and cycling may claim benefits for both modes but safety issues arising from pedestrian/cycle conflicts must be addressed, and if there are additional crash costs these must be accounted for in worksheet 6. Make sure the estimates of the new number of pedestrians and/or cyclists generated by the facility are realistic.

Required information:
L   Length of walking or cycling trip. Consider if this is a total trip length (i.e. return trip) for each of the number of new users, and note the average trip lengths defined in the MBCM.
NPD   Number of additional pedestrians per day
NTD   Number of additional cycle trips per day
NSD   Number of additional and existing cycle trips per day
DF   Discount factor. The discount factor may differ by mode depending on the growth rate

Health benefits for walking facility

Pedestrian growth rate (per annum)

1 Health and environment benefits for footpaths and other pedestrian facilities

Benefit = Capped annual benefit per pedestrian based on the maximum annual benefit of $3,100 per user x NPD x frequency distribution of pedestrians x discount factor

L   NPD   DF   19.21   **Total PV Capped benefit = $**   0   (a)

Days/week		Annual benefit per new pedestrian		Capped annual benefit per pedestrian		Frequency distribution		PV of Capped benefit
1	x L x 52 x $9.90= $	-	= $	0	x NDP x	19%	x DF = $	0
2	x L x 52 x $9.90= $	-	= $	0	x NDP x	19%	x DF = $	0
3	x L x 52 x $9.90= $	-	= $	0	x NDP x	17%	x DF = $	0
4	x L x 52 x $9.90= $	-	= $	0	x NDP x	11%	x DF = $	0
5	x L x 52 x $9.90= $	-	= $	0	x NDP x	13%	x DF = $	0
6	x L x 52 x $9.90= $	-	= $	0	x NDP x	4%	x DF = $	0
7	x L x 52 x $9.90= $	-	= $	0	x NDP x	17%	x DF = $	0

2 Health benefits from improvements at hazardous sites
(provision of overbridges, underpasses, bridge widening or intersection improvements for pedestrians)

Benefit = number of additional pedestrians/day x 365 x $9.90 x discount factor

But how do we estimate new walkers?

WAKA KOTAHI
NZ TRANSPORT
AGENCY

Latent demand for walking and cycling

March 2021

J Beetham, WSP, Lower Hutt
V Ivory, WSP, Lower Hutt
J Thomas, WSP, Lower Hutt
P Kortegast, WSP, Nelson
D Cooper, WSP, Lower Hutt
J Burton, WSP, Lower Hutt
C Bowie, WSP, Lower Hutt (formerly)
L Malde, WSP, Napier
C Moore, WSP, Lower Hutt

NZ Transport Agency research report 676
Contracted research organisation – WSP New Zealand Ltd

Method 1:
Sketch plan equation (cycling). Informed expert estimation (walking).

Method 2:
Sketch plan equation with informed expert calibration (cycling). Informed expert estimation (walking).

Method 3:
Comparison approach combined with an evaluation of level of service and potential use. Employ modifying factors based on the local context.

Method 4:
Geospatial assessment combined with an evaluation of level of service and potential use. Employ modifying factors based on the local context.

Method 5:
Transport model with locally specific data and factors.

New route based cycling demand model

Last Year ⚲ Whole Domain

Daily Average

91,939

Current Year ⚲ Whole Domain

Total

21,032,100
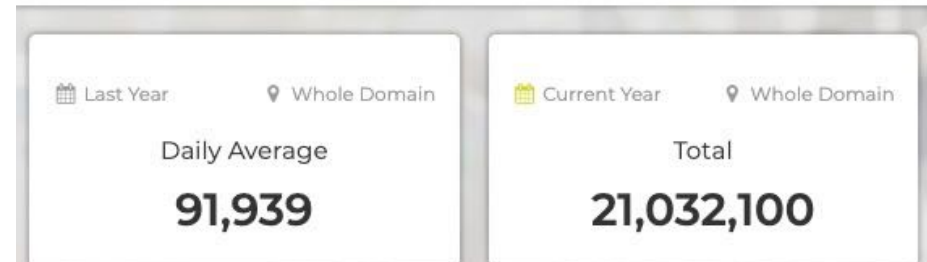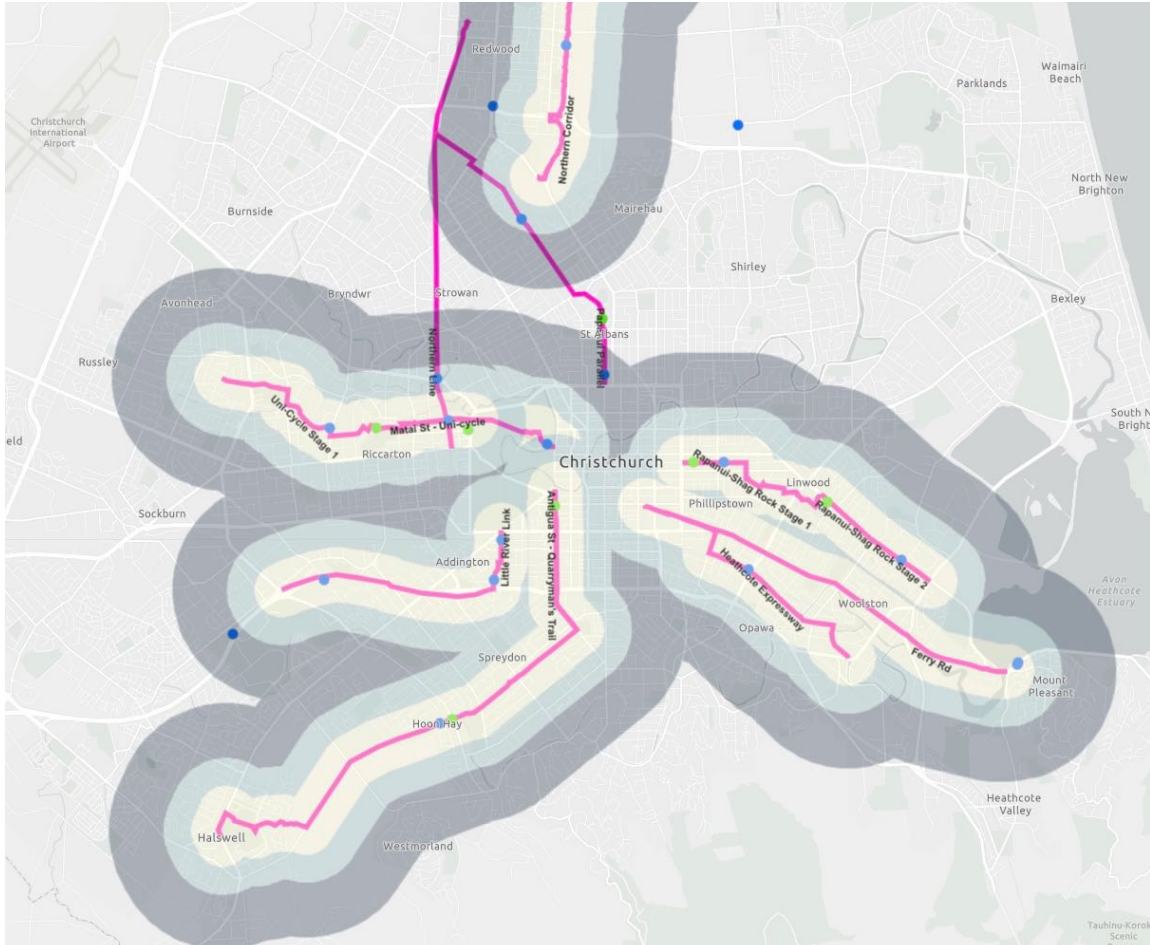
- Based on the 22 sites considered in the modelling, a half-point improvement in QoS score results in an increase of approximately 130 riders per day.

- For the 22 sites, the average change in ridership after implementation was a +81% increase in daily cycling numbers.
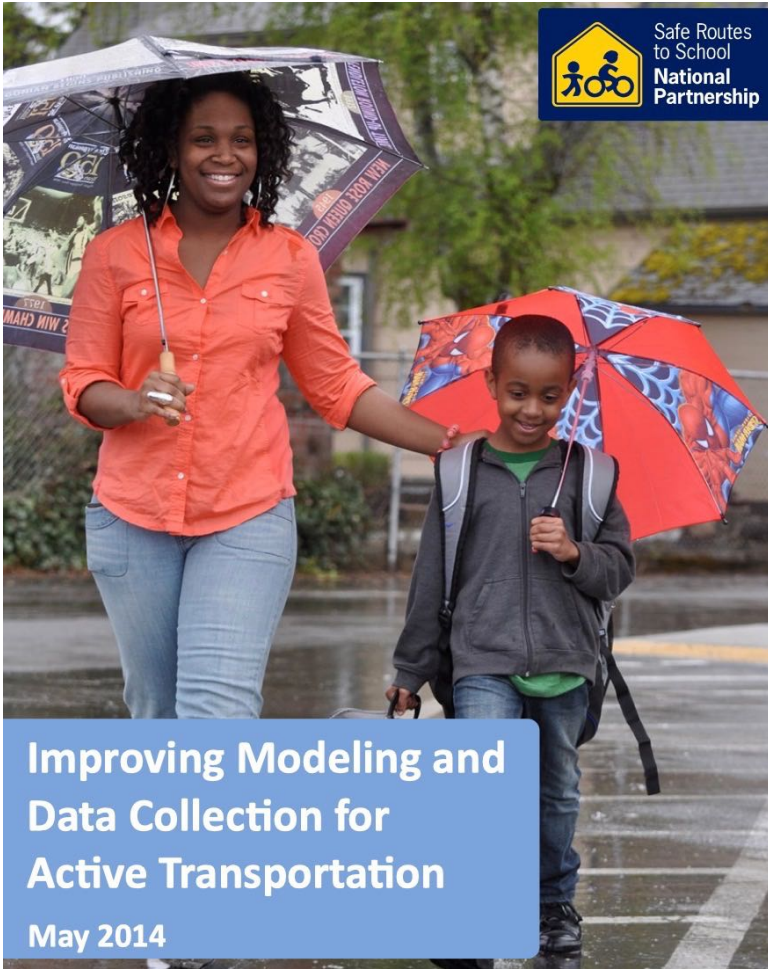
VIASTRADA

Pedestrian counters in Dunedin
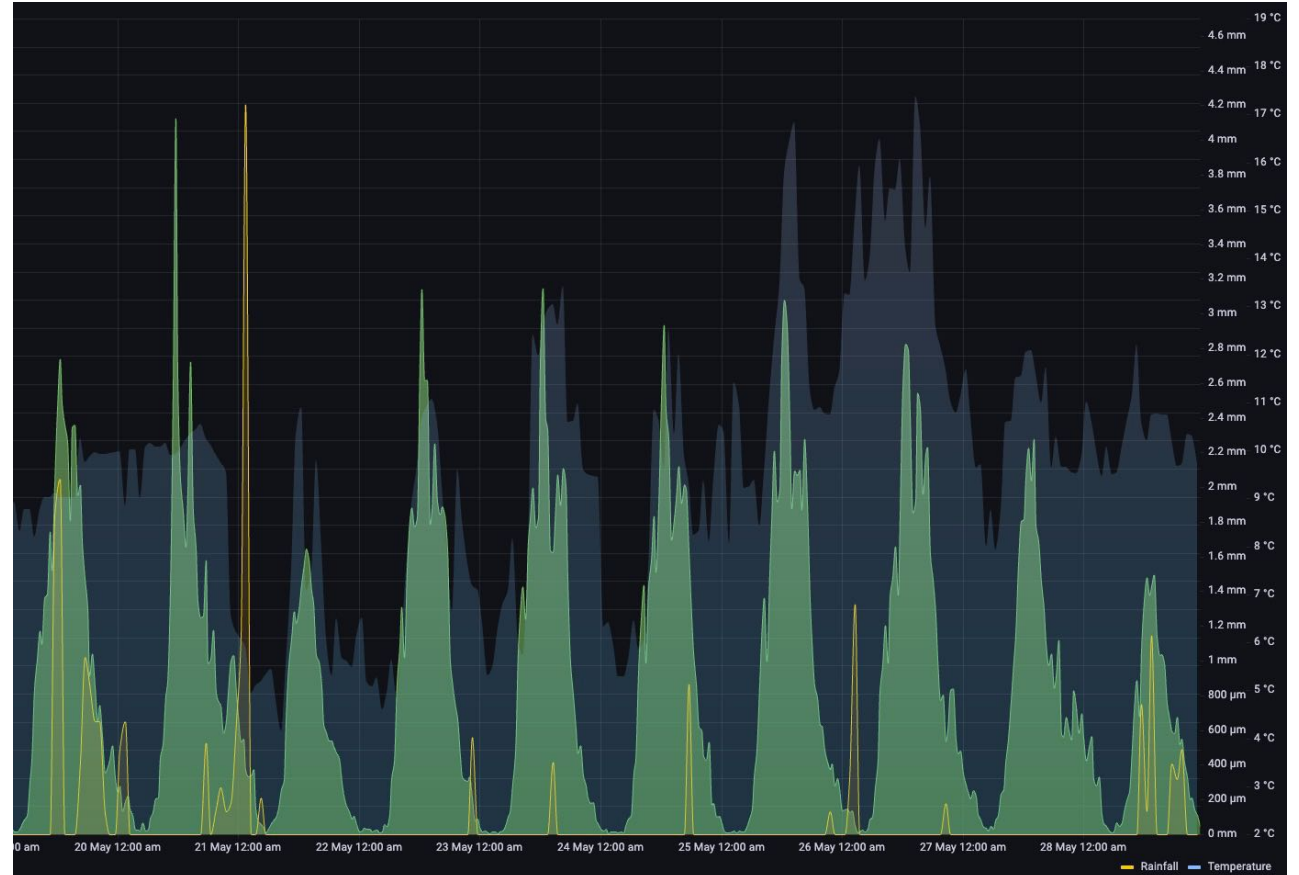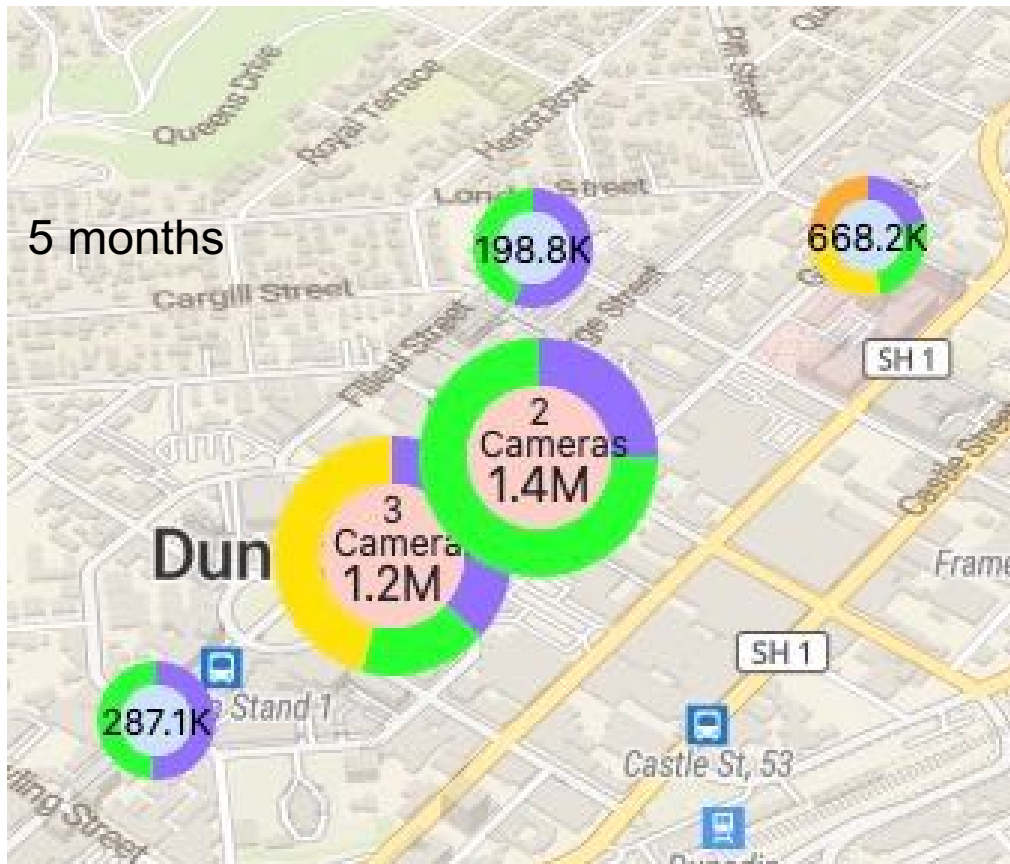
Safe Routes to School National Partnership

Improving Modeling and Data Collection for Active Transportation

May 2014

ACTIVITY BASED MODELS (ABMs)

- Additional funding resources need to be dedicated by MPOs to expand the capabilities of ABMs and validate their outputs to track active transportation trips accurately.
- ABMs need local geographic data at a small scale for calibration to ensure accuracy. Agencies should invest in the collection of this data to ensure their ABMs are producing accurate results.
- ABMs need more demographic data from active transportation trips to be sensitive to different network users. Agencies should invest in the collection of this data to ensure their ABMs are producing accurate results.

We don't have ABMs & don't collect enough of this demographic data in NZ

### LAND USE AND SCENARIO PLANNING MODELS

- Strategies should be developed for modeling the "journey to school" and school-based travel trips to inform land use and transportation models.
- Scenario planning models should be used in early planning stages and scenarios should be developed with stakeholder input.
- Existing land use models need to be improved to project the impact land use has on active transportation rates and greenhouse gas reductions.
- Models should examine the benefits of improving the jobs housing fit, the impact of providing low income housing, the impacts of transit oriented development and mixed use development, the impacts on public health outcomes and the access to different land uses such as parks and schools.

We are just starting this in NZ

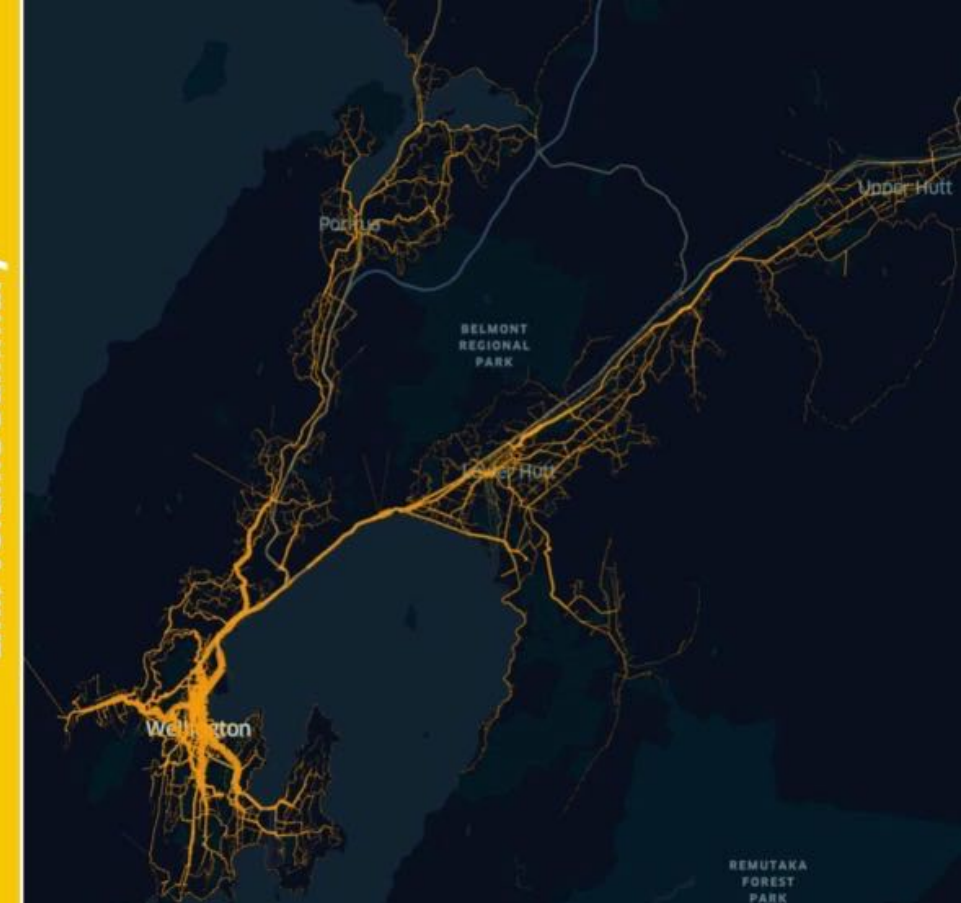# 1. Upgrade a traditional model
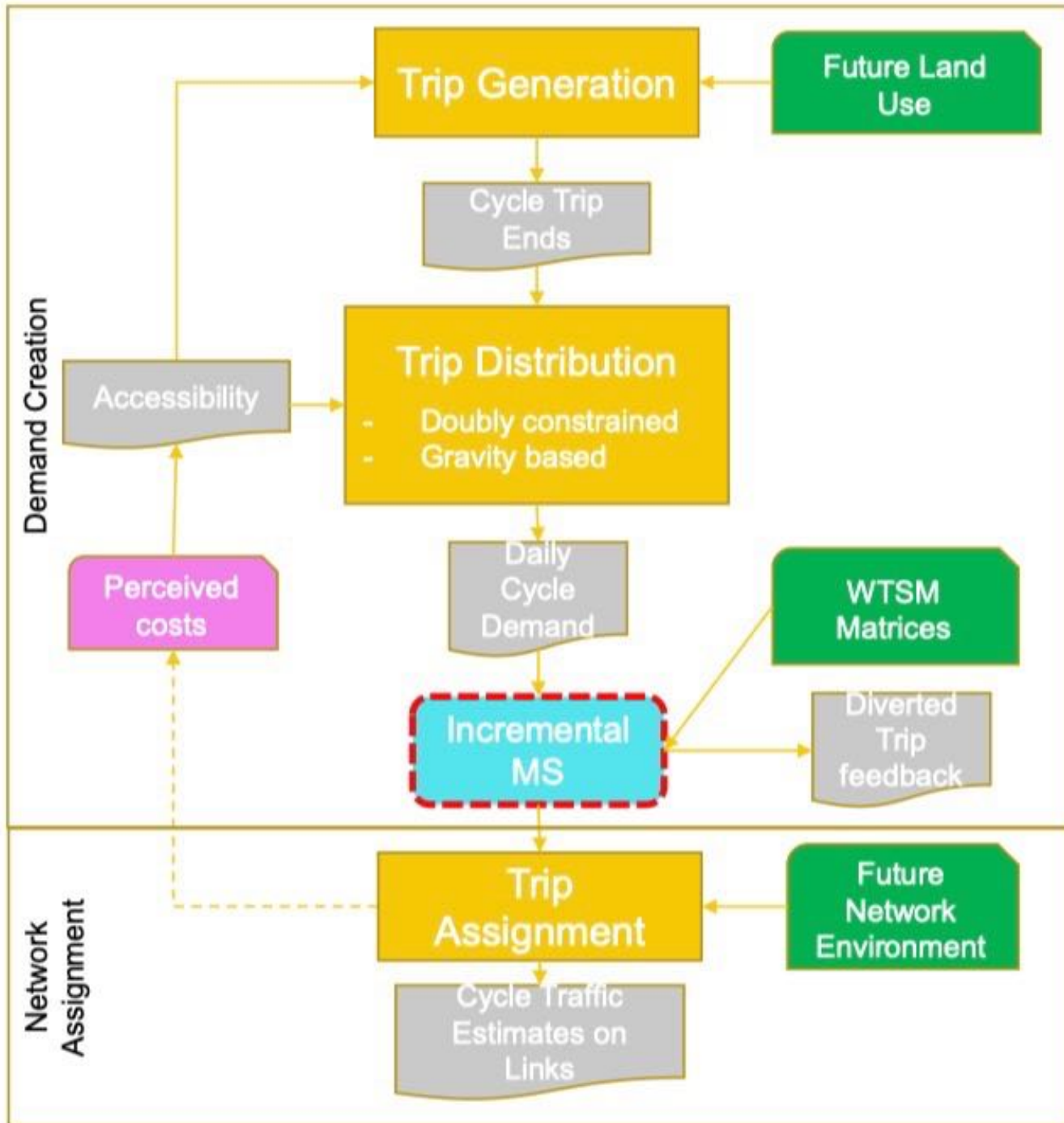
Vicky Li & Caleb Deverell, NZMUGS 2022

2. Accessibility Approach to Estimating Bike / Ped Demand

NCHRP 08-78

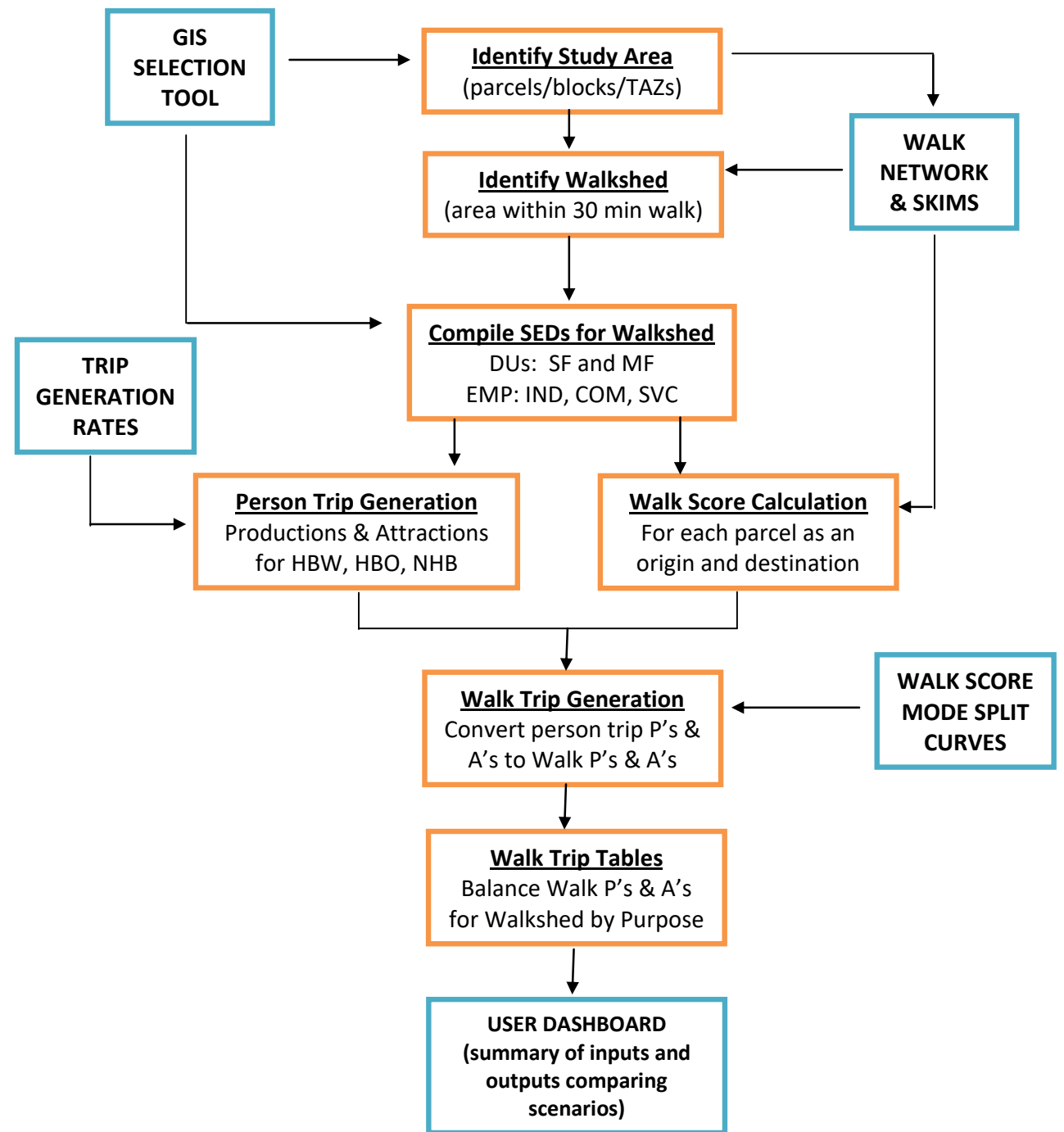Renaissance Planning Group

Rich Kuzmyak

Chris Sinclair

Alex Bell

TRB National Transportation Planning
Applications Conference
May 6, 2013
Columbus, Ohio

GIS SELECTION TOOL → **Identify Study Area** (parcels/blocks/TAZs)

WALK NETWORK & SKIMS

Identify Walkshed (area within 30 min walk)

Compile SEDs for Walkshed DUs: SF and MF EMP: IND, COM, SVC

TRIP GENERATION RATES

Person Trip Generation Productions & Attractions for HBW, HBO, NHB

Walk Score Calculation For each parcel as an origin and destination

Walk Trip Generation Convert person trip P's & A's to Walk P's & A's

WALK SCORE MODE SPLIT CURVES

Walk Trip Tables Balance Walk P's & A's for Walkshed by Purpose

USER DASHBOARD (summary of inputs and outputs comparing scenarios)

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Suburb Ranking

(All, Christchurch, Walking)

Suburb	Time
Christchurch Central	8m
Richmond South (Christchurch City)	9m
St Albans North	9m
Wigram South	9m
Jellie Park	10m
Riccarton South	10m
Riccarton West	10m

Walking Duration:
- 5 min
- 10 min
- 15 min
- 20 min
- 20+ min

© 2023 Urban Intelligence.

The X Minute City ❓

Christchurch ▾

Amenity/Service: All ▾

Mode: Walking ▾

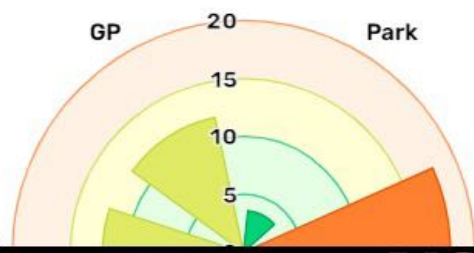On average, for walking to all amenities, Christchurch is a **20 minute city.**

11% of residents live within a 10 minute walk of all amenities.

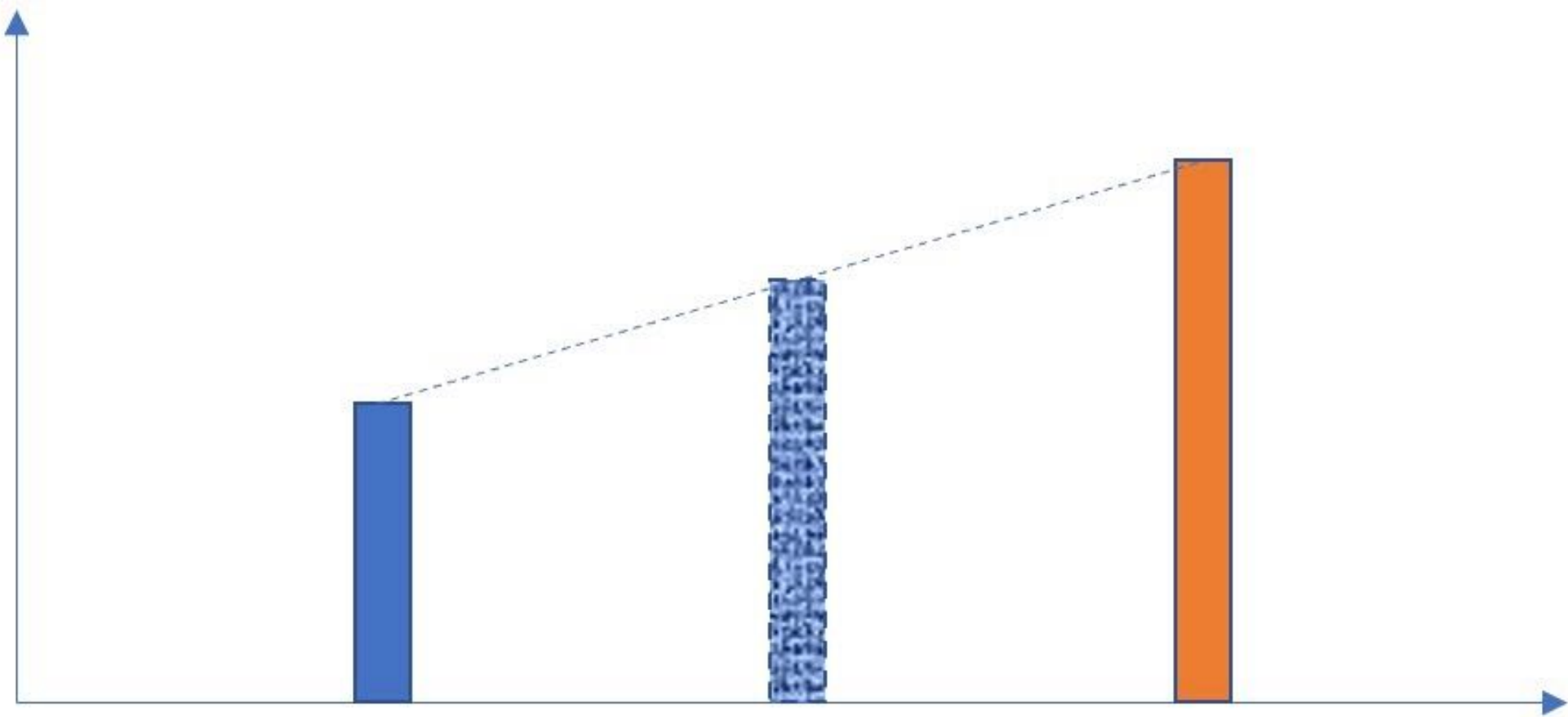Christchurch's least accessible amenity by walking is **a supermarket.**

Christchurch Travel Time | Population Distribution

GP — 20 — Park

15

10

5

Pharmacy | Supermarket

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha

Method: assess Pedestrian Network LoS

19 objective measures
5 outcomes
Web-based tool

https://www.nzta.govt.nz/resources/research/reports/667/

RR 667 – DEVELOPING METHODOLOGIES FOR IMPROVING CUSTOMER LEVELS OF SERVICE FOR WALKING

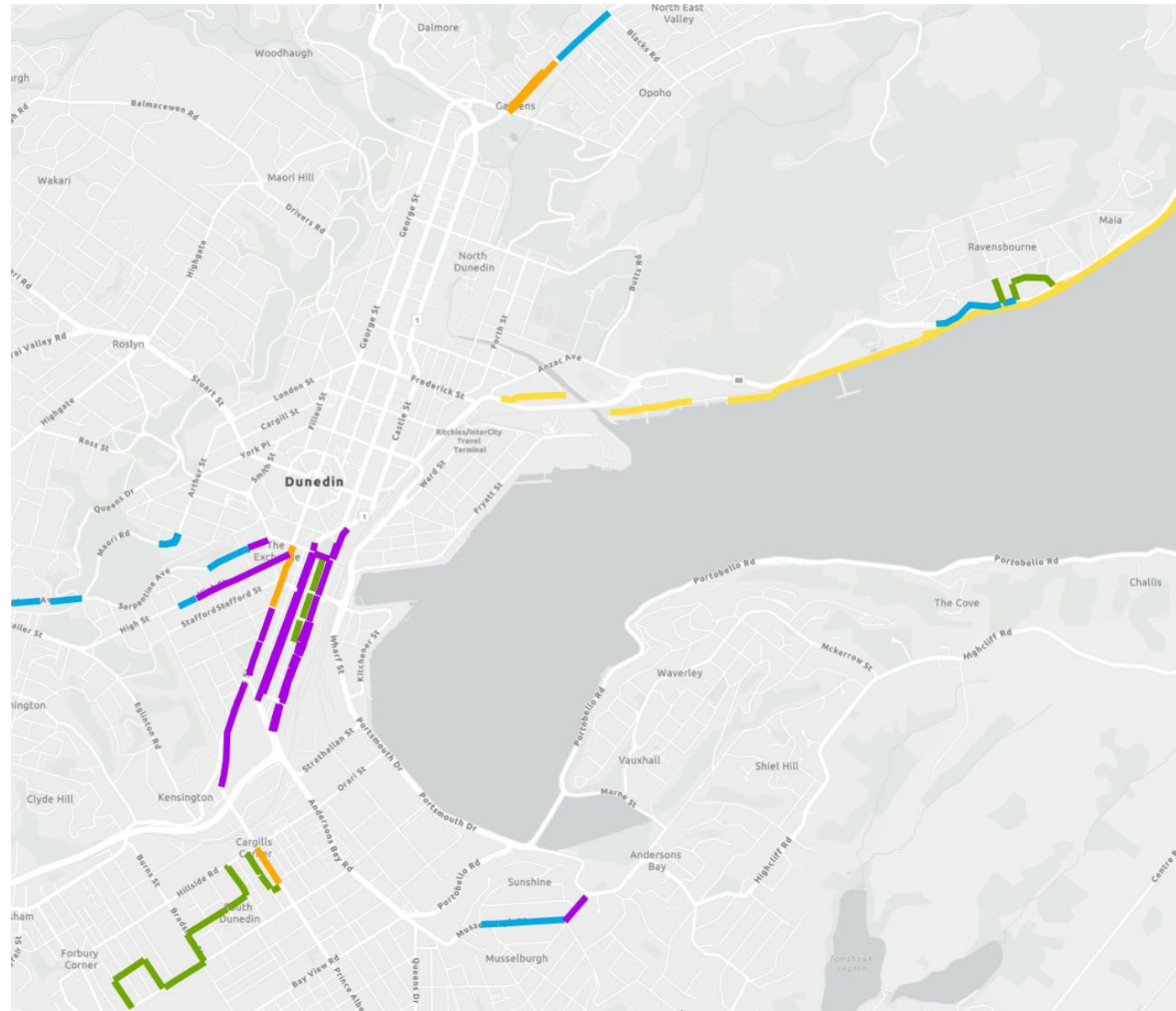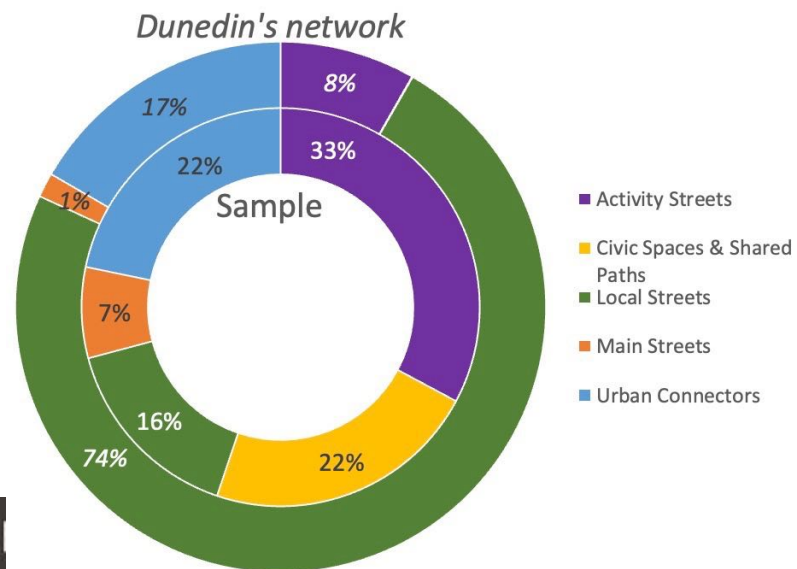WAKA KOTAHI RESEARCH SUMMARY   SEPTEMBER 2020

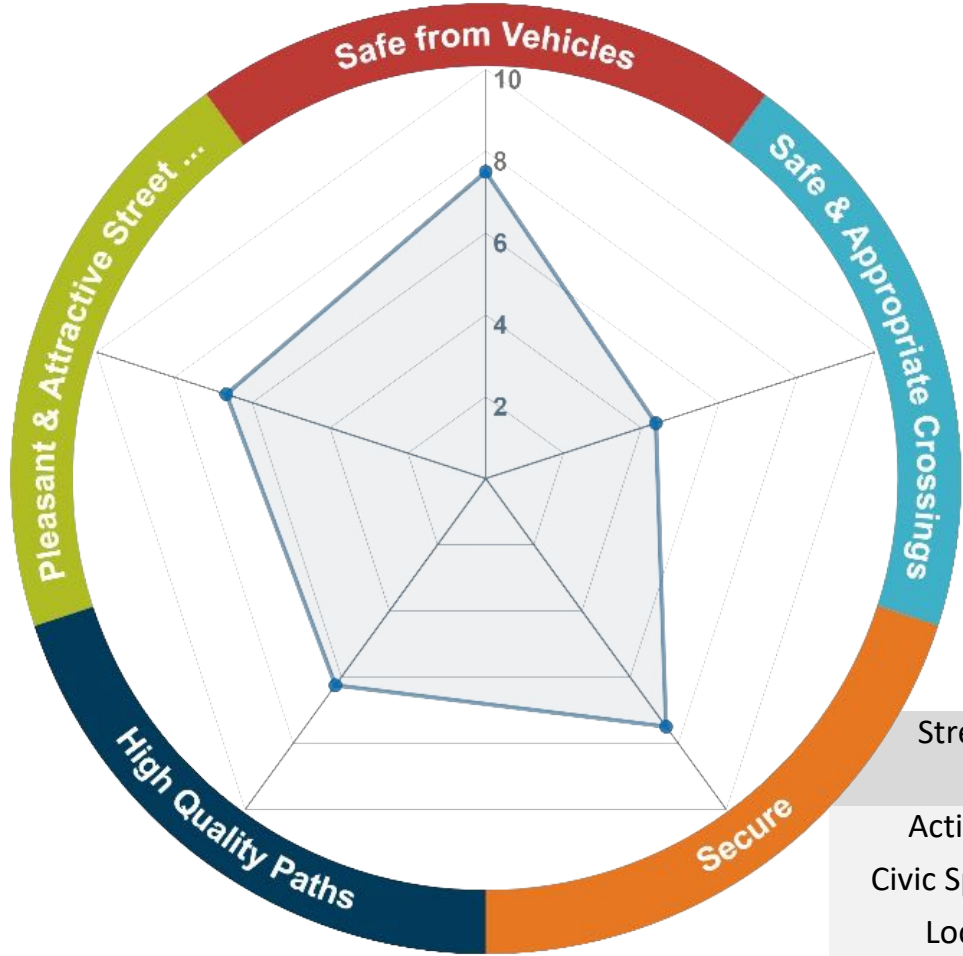How can we make walking safer and more enjoyable for pedestrians?

Assessed PLoS for representative sample of streets

- Crawford and Cumberland Streets (SH1) between Queens Gardens and the Oval
- Princes Street
- Safer Street project street segments – MacLaggan Street, Hawthorn Ave, Musselburgh Rise, Māori Road
- Factory Road, Mosgiel
- South Dunedin
- Waterfront shared path and its connection to schools
- North Road (Northeast Valley)

Dunedin's network / Sample

- 8% Activity Streets
- 33%
- 22%
- 16%
- 74%
- 22%
- 7%
- 1%
- 17%

Legend:
- Activity Streets
- Civic Spaces & Shared Paths
- Local Streets
- Main Streets
- Urban Connectors

Proposed level or quality of service for walking

Existing: 5.9 / 10

Street family	Safe from vehicles	Safe crossings	Secure	High quality paths	Pleasant & attractive	Overall score
Activity Street	5.8	3.1	8.8	8.1	5	6.1
Civic Space & paths	9.2	6.9	6.3	10	9.6	8.7
Local Street	6.3	3.8	8.8	6.3	5.4	5.8
Main Street	5.8	3.8	7.5	7.5	5.8	6.1
Urban Connector	7.5	2.5	7.5	6.9	6.7	6.1
Weighted average	6.5	3.5	8.6	6.6	5.6	5.9

Level of service vs. walking mode share

	Ped LoS	Commute mode share	Schools mode share
Dunedin	5.9	10%	23%*
Whangarei	5.2	4%	13%
Timaru	5.4	5%	22%
Wellington	5.5	19%	34%

* excludes University and Polytech walkers (forced, generally able bodied adult walkers?)
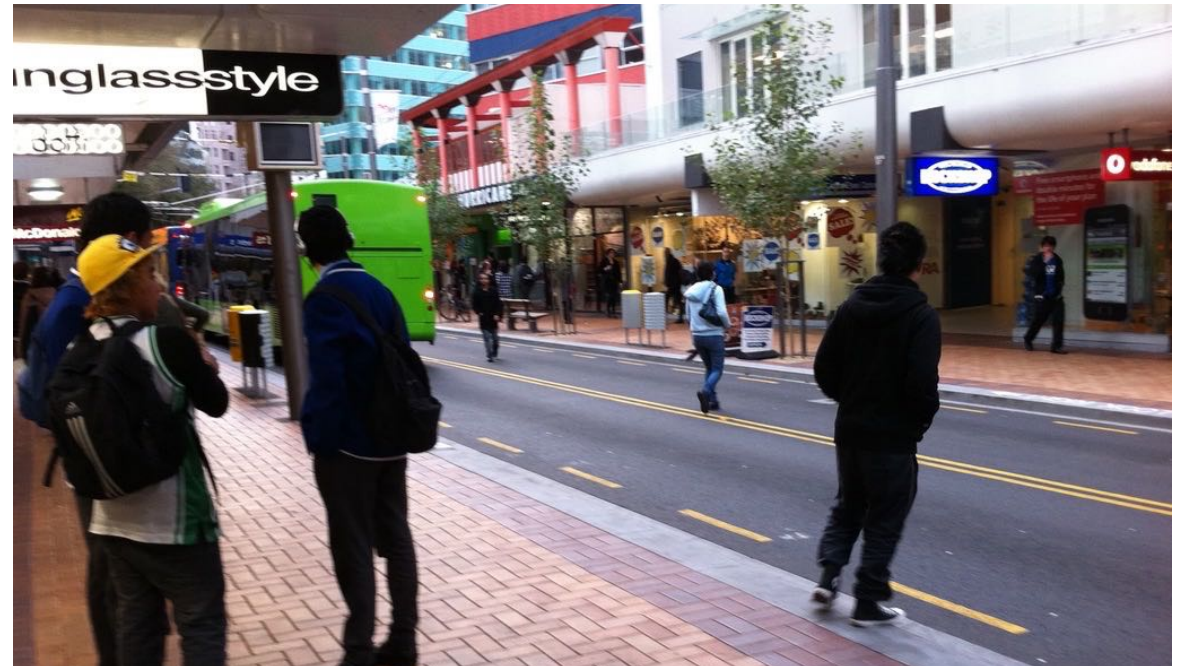
Dunedin vs Wellington

Dunedin

- Parking: $8 / day
- No bus lanes and a culture of driving
- 4 million trips by bus
- 10% commute walk mode share
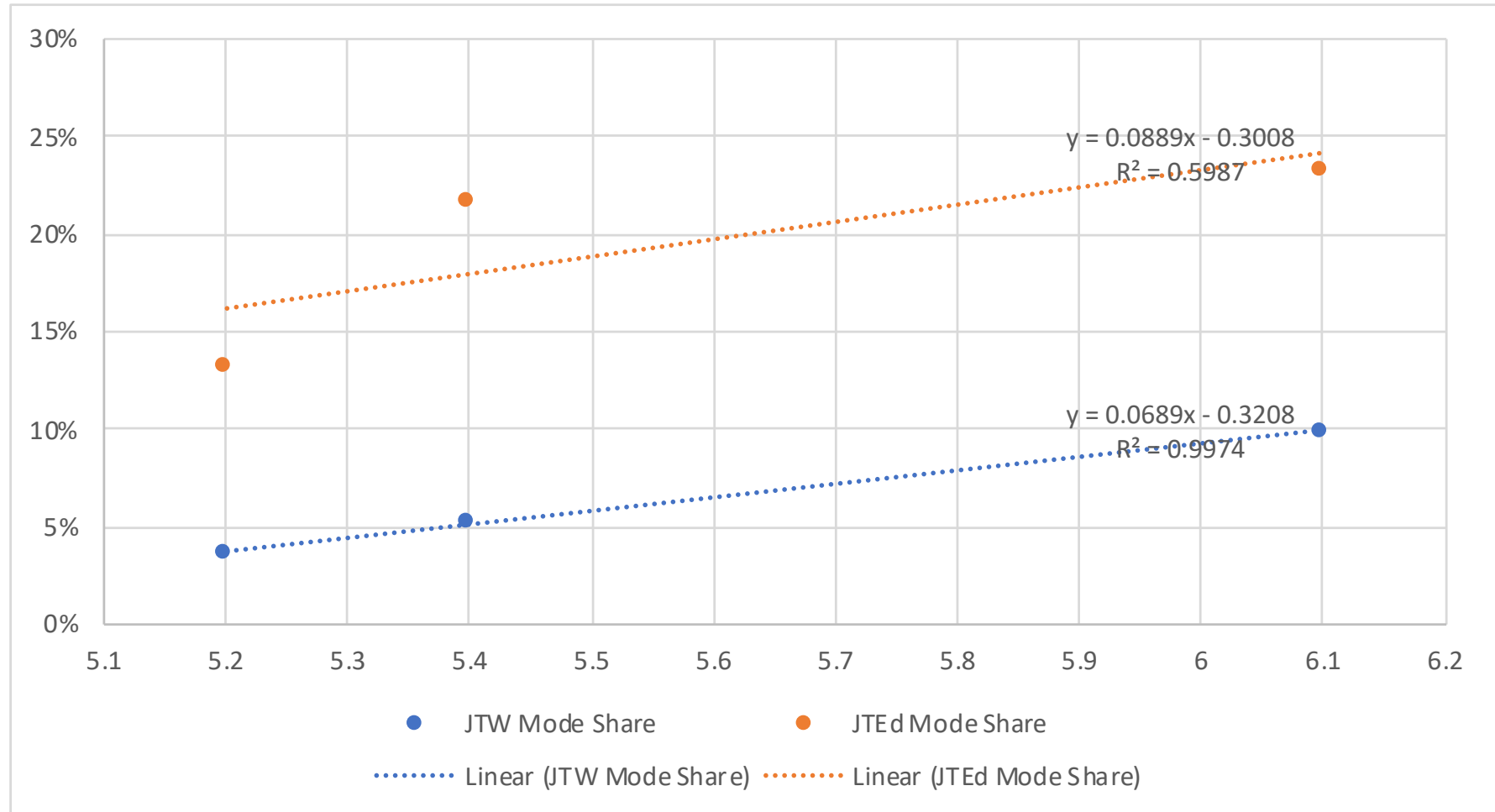

Wellington

- Parking charges: $20 - $40 / day
- Bus lanes everywhere
- 40 million trips by bus
- 19% commute walk mode share

https://www.transport.govt.nz/statistics-and-insights/public-transport/sheet/boardings-all-modes
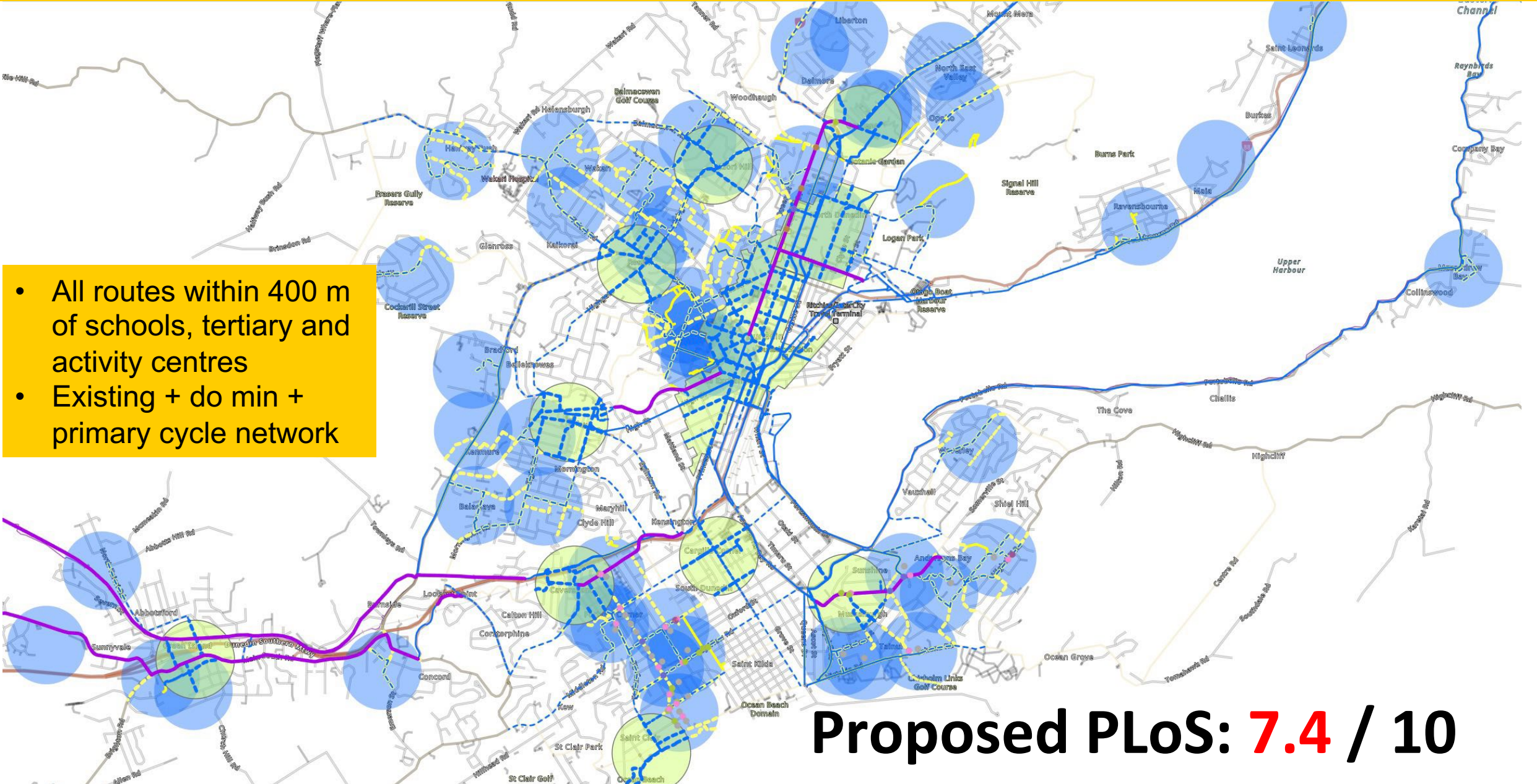
Linear relationship - Ped LoS and mode share

for every 0.1 increase in Ped LOS we get
.89% improvement in JTE mode share
0.69% improvement in JTW mode share

$y = 0.0889x - 0.3008$
$R^2 = 0.5987$

$y = 0.0689x - 0.3208$
$R^2 = 0.9974$

JTW Mode Share   JTEd Mode Share

Linear (JTW Mode Share)   Linear (JTEd Mode Share)

Hybrid: Connected Communities + Education Focus

- All routes within 400 m of schools, tertiary and activity centres
- Existing + do min + primary cycle network

Proposed PLoS: 7.4 / 10

Calculate mode shift and benefits

Network walking demand (JTW)	%change to network	increment in PLOS	Increase in mode share	New mode share	New walking demand (JTW)
			0.69%		
6,318	40%	1.5	4.2%	14.1%	8,995

Network walking demand (JTEd)	%change to network	increment in PLOS	Increase in mode share	New mode share	New walking demand (JTEd)
			0.89%		
15,795	40%	1.5	5.4%	46.4%	17,882

NHTS active mode factor (all trip purposes)	Network walking demand (all purposes)	New network walking demand (all purposes)	Net gain in pedestrians	Capped annual benefit per new ped	Total annual benefits (undiscounted)
5.36	118,526	144,061	25,535	$3,100	$79,158,448

Assume that...

- Average walk trip 1 km
- Annual growth rate in pedestrians = 1%
- 40% of the network is improved
- Annual benefit $79 million
- From point of completion a 40 year discounted benefit would be...

Drum Roll Please...

$ 1,006,996,202

We share more knowledge on
www.viastrada.nz

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TRANSPORT PLANNING AND DESIGN