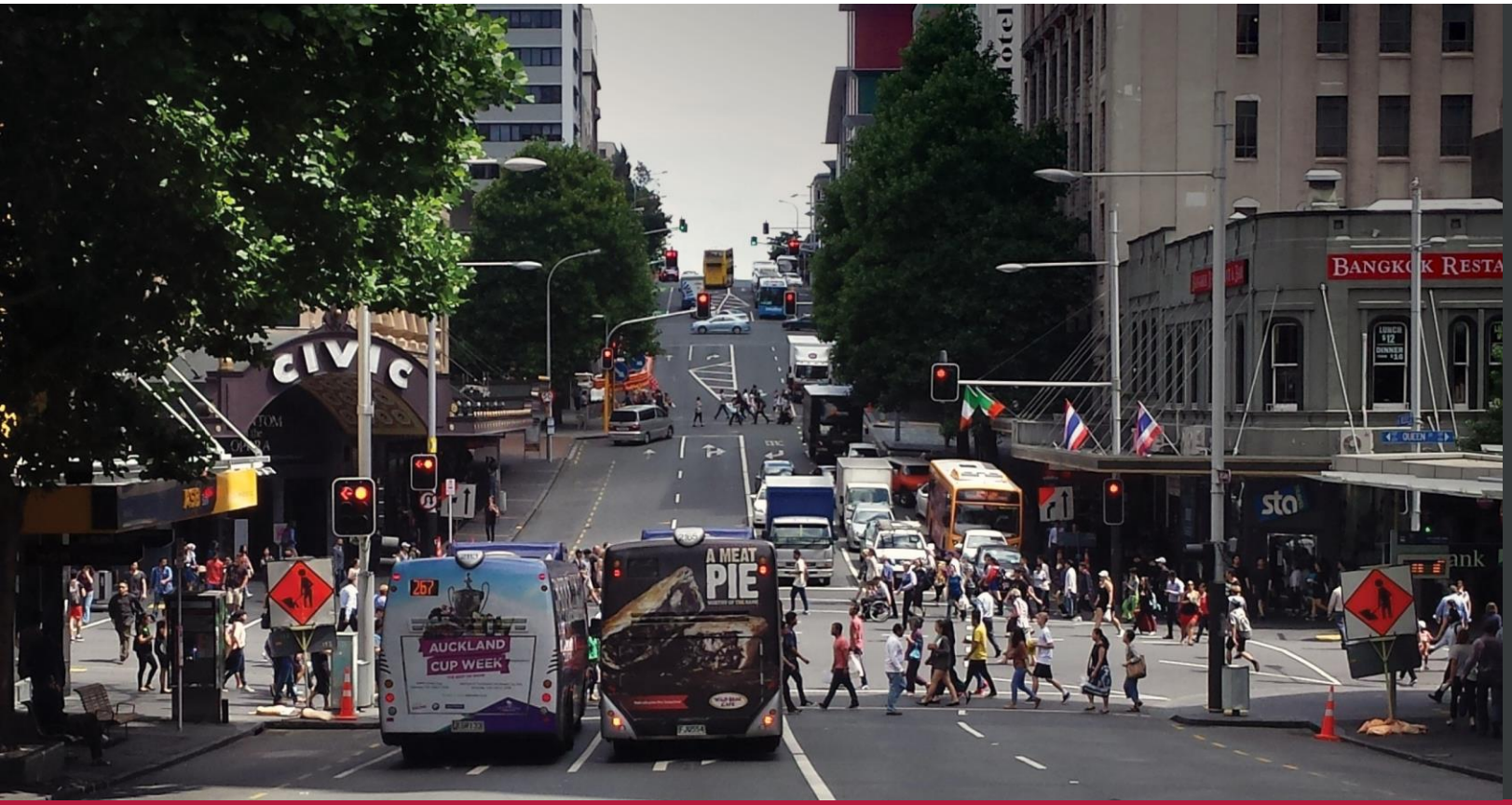
Developing New Zealand Accessibility Metrics



Stacy Rendall, Abley

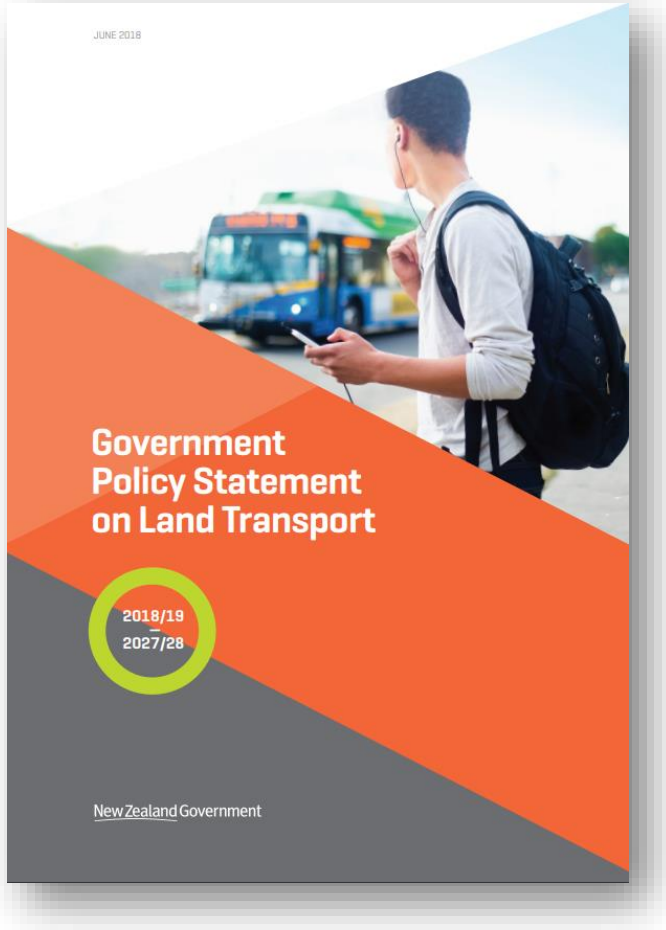
Ian Binnie, NZTA

15 November 2018

Government transport strategies highlight the importance of access

Government Policy Statement on land transport (GPS)

- One of four strategic priorities is “a land transport system that provides access to economic and social opportunities”.
- A focus on “transport and land use planning that improves access by reducing the need to travel long distances to access opportunities like employment, education and recreation”
- One way of measuring progress is “how many people can access major areas of activity within a reasonable timeframe”.



Government transport strategies highlight the importance of access

Ministry of Transport outcomes for the transport system

- ‘Inclusive access’ is one of the core outcomes that the Ministry of Transport has in its Statement of Intent for the transport system.
- Also improving access will be highlighted in NZTA’s upcoming strategic documents.

NZTA currently exploring access measurement

Projects include:

- **Proximity to frequent public transport** - overlay this with other ‘access to transport’ measures
- **Survey questions on journeys that didn’t happen**: understand common barriers and groups affected
- **Distance measure (time and mode) between people’s homes and social and economic opportunities**
- Access to employment (discussed later)

NZTA currently exploring access measurement

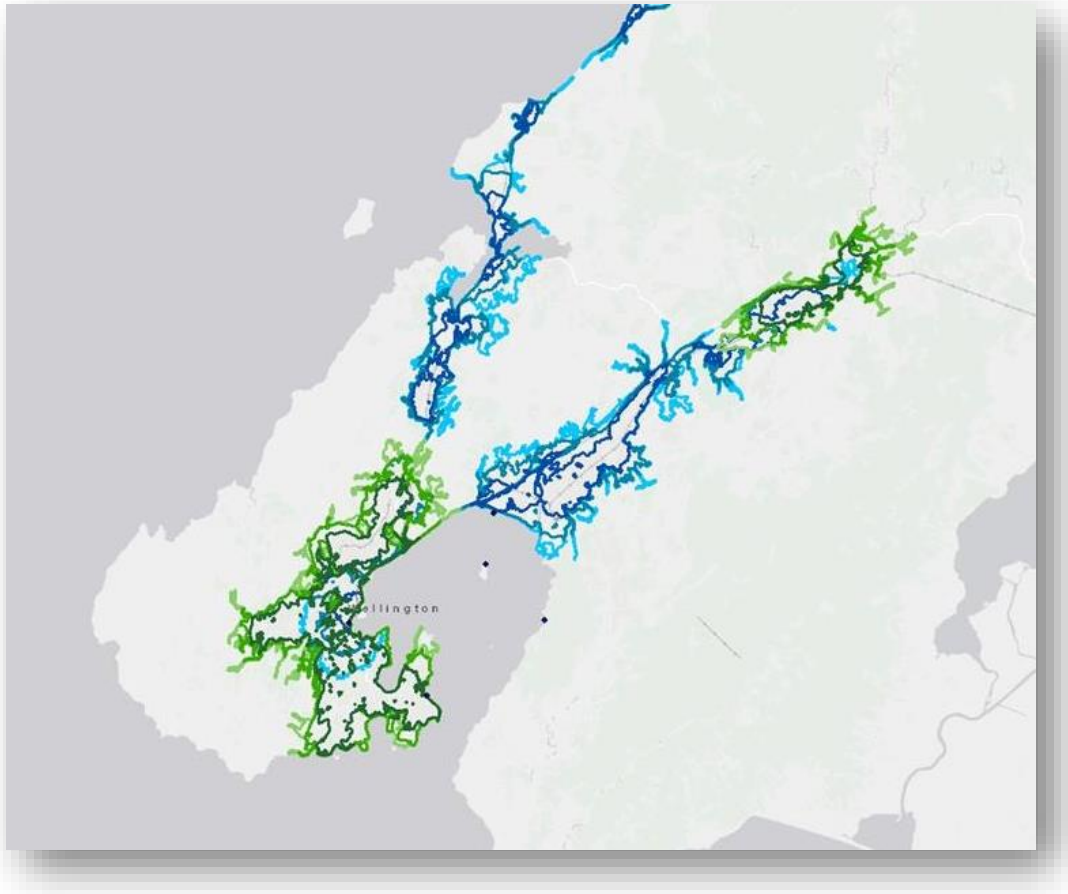
But… increased recognition for the need for segmentation and understanding the distribution of outcomes. E.g. measuring the experience of disabled New Zealanders, those experiencing material hardship, and other vulnerable transport users.

Proximity to frequent Public Transport

Geo-spatial analysis of population catchments (500m walk-isochrones) linked with temporal data sourced from GTFS files (PT stops with service frequency <15 minutes). Additional overlay with other geo-demographics such as deprivation/local Census data.

PT literature suggests ‘frequency is freedom’ but lack of consistent measurement in NZ until now.

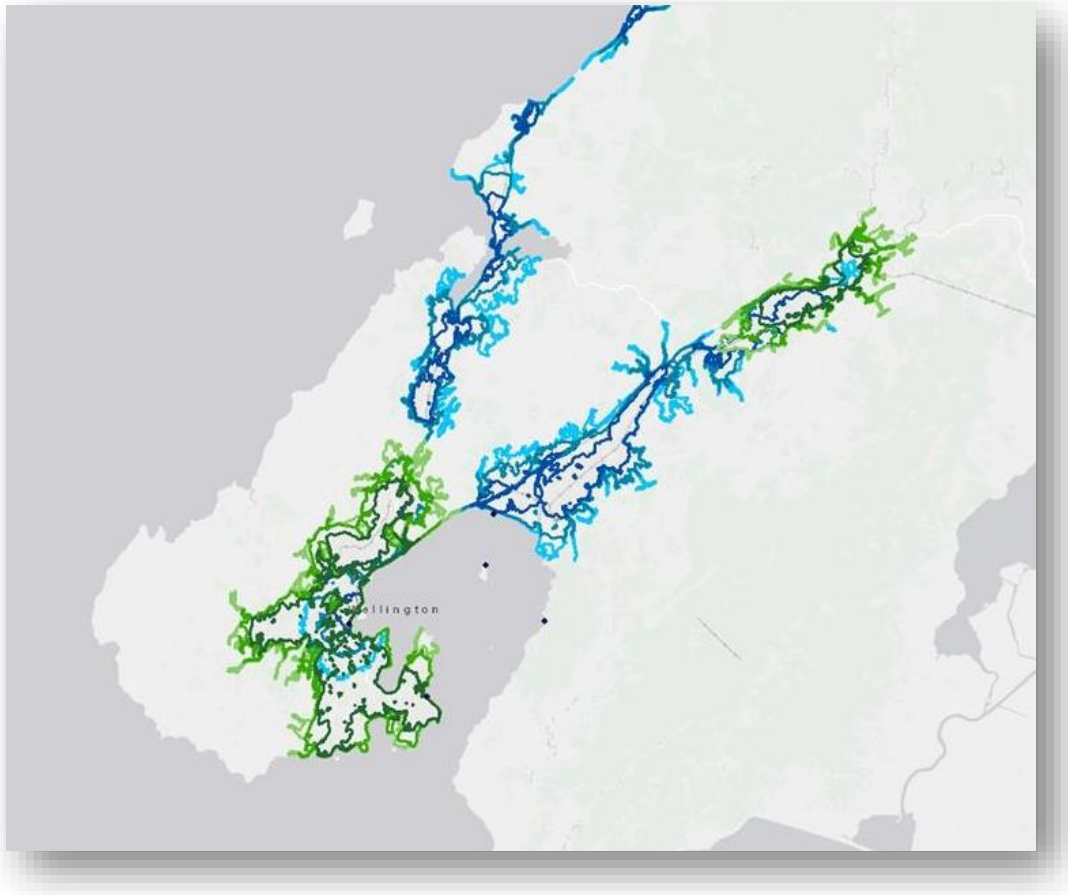
Frequent Public Transport



Some findings:

- 30% of metropolitan population are within 500m walk distance (isochrones not crow's fly) of a frequent PT stop (train, bus or ferry). [frequent= at least every 15 mins during weekday a.m. peak]. (We also measured other definitions of frequency and access by cycling).
- Deprived areas relatively well-served in South Auckland.
- People living immediately outside these catchments have a significantly greater tendency to use private vehicle to commute to work.

Frequent Public Transport



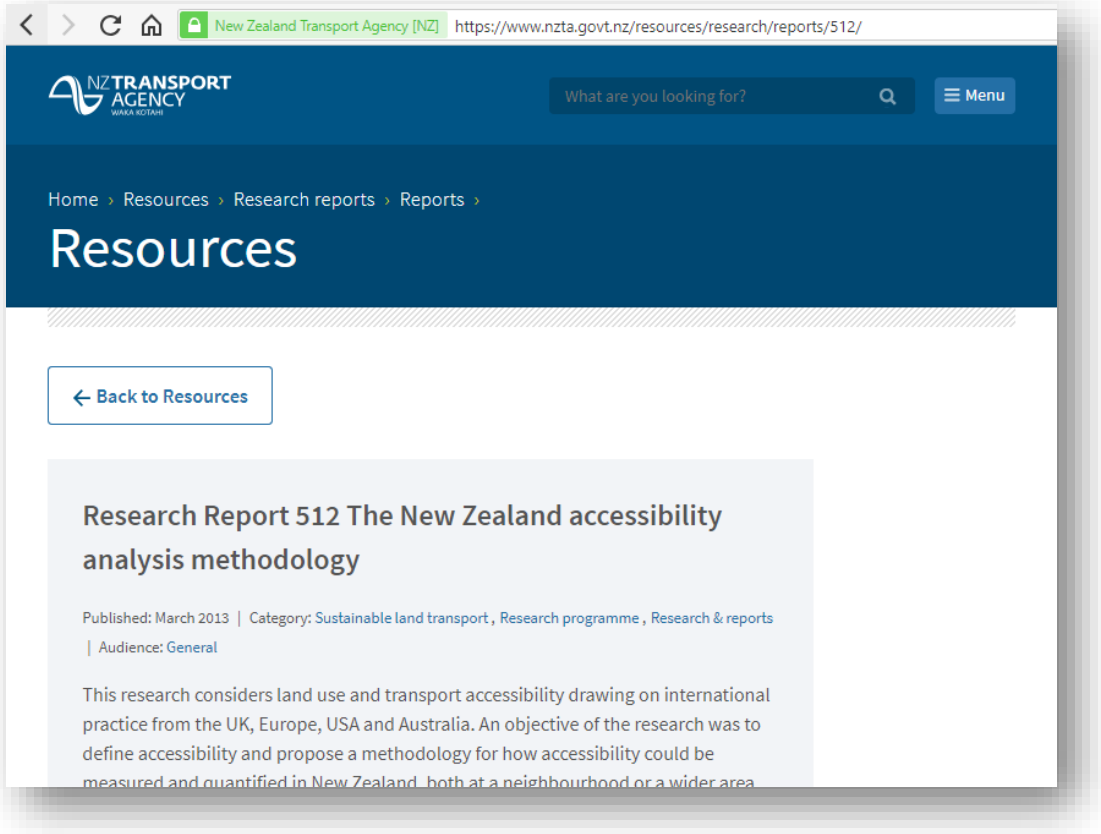
Next steps…

- Shapefiles available (Wellington example shown here).
- We are now expanding measurement beyond metropolitan areas.
- As with other access measures it speaks to the integration of transport & land-planning. Can be impacted by growing population density around PT nodes and/or improvement in PT network.

Journeys that didn’t happen

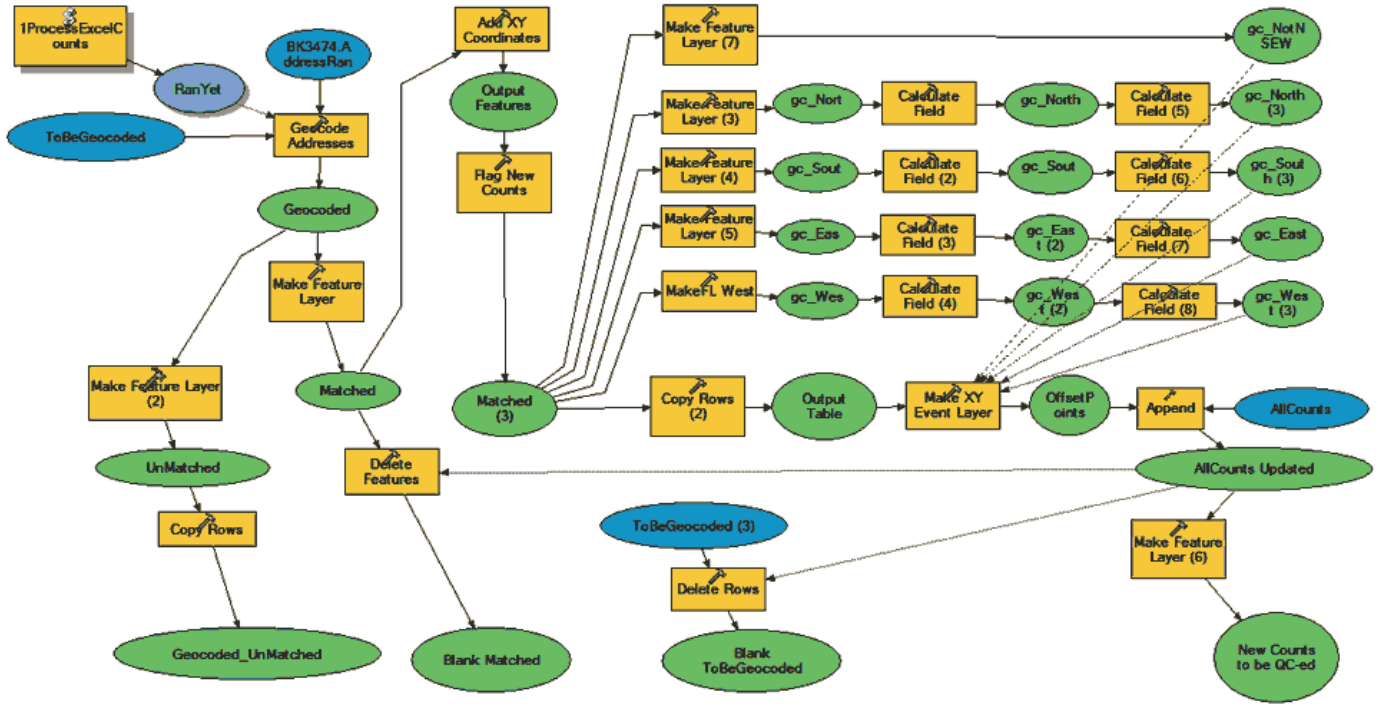
An NZTA journey monitor (n=2,000 per quarter) asked some additional questions related to ‘journeys that didn’t happen’ in the past week – which is a slightly different way of thinking about our customers. Results to the survey are still in draft form and being finalised – contact ian.binnie@nzta.govt.nz 029 913 3002 for details.

Accessibility in NZ



- Capability
- Mobility
- Opportunity

Accessibility in NZ



Accessibility in NZ

Table 10.3 Data requirements and sources

Data	Primary source	Other sources
Parcel boundaries	LINZ CRS via Terralink	
Neighbourhood boundaries	Statistics NZ meshblock or area units	Terralink community boundaries
Land use or planning zones	Local councils	
Land activity locations	Local councils/Ministry of Transport/ existing research	Critchlow, Terralink, LINZ, Zenbu
Road network	Critchlow/Terralink	Local and regional councils. RAMM
Compiled road network	Terralink	
Cycling network	Local councils	Regional councils
Walking network	Local councils	Regional council
Public transport data	Regional councils	Local councils
Existing household travel data	Ministry of Transport	
Demographic data	Statistics New Zealand	
Hours of activity operation	Local councils	Local business organisations
Quality of active mode networks	Local councils	Key stakeholders, eg Living Streets Aotearoa
Other key deterrence factors	Ministry of Transport	

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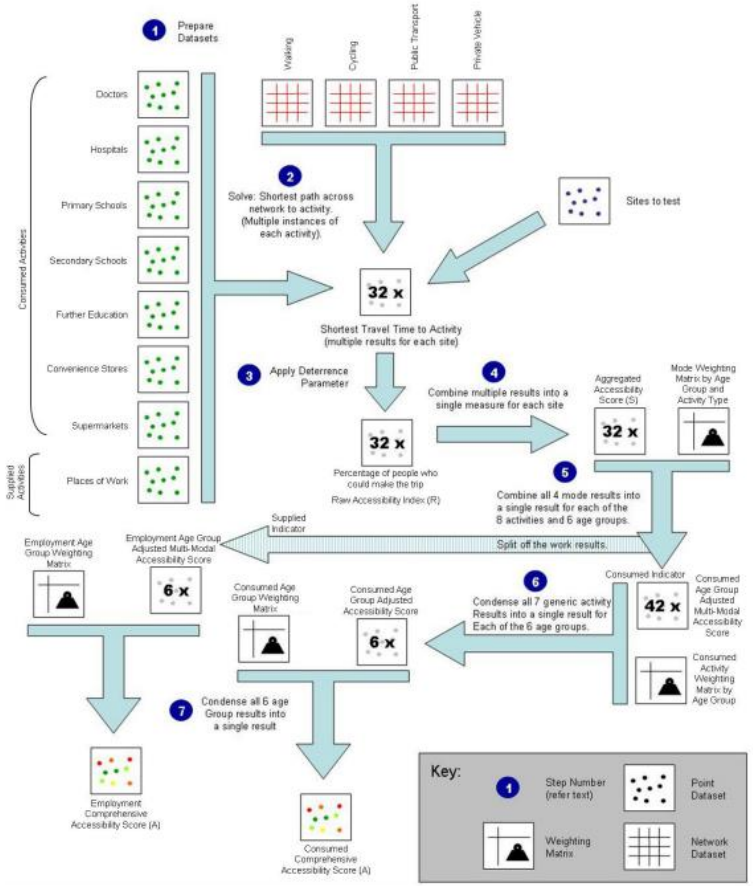
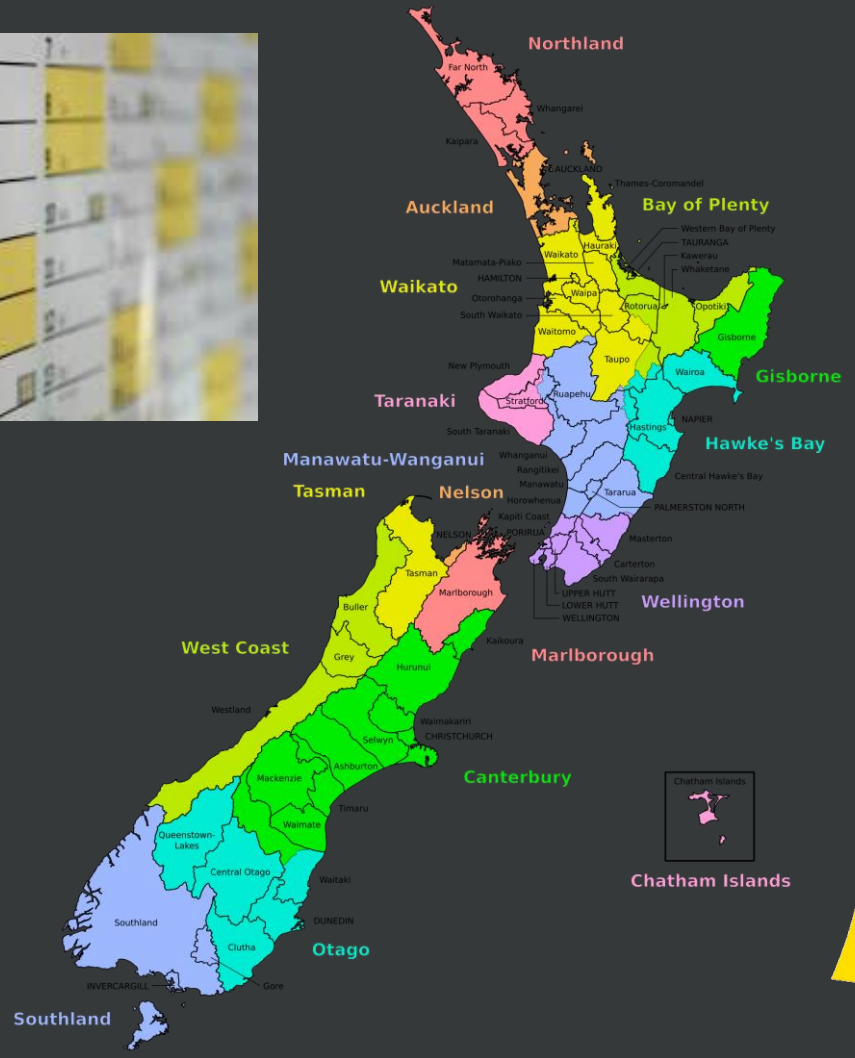
Accessibility in NZ



Deterrence function $f(t) = e^{-\lambda t}$

Saturation functions

Name	Formulae	Advantages	Disadvantages
Mean	$\left(\sum_{1}^{n} R_i\right) / n$ n = number of accessible opportunities	• All destinations count • Measures overall opportunity in travel range • Simple to interpret, percentage of people who find activity pool accessible.	• Distant opportunities dilute score of closer opportunities. • Does not consider saturation of opportunity.
Sum	$\sum_{1}^{n} R_n$ n = number of accessible opportunities	• All destinations count • Measures overall opportunity in travel range • Closer opportunities not diluted • Can be used when sites are of unequal value. • Simple to interpret, measure of accessible activity equivalents.	• Does not consider saturation of opportunities.
Harmonic series	$\sum_{1}^{n} (R_i / n)$ n = rank accessible opportunities	• All destinations count • Measures overall opportunity in travel range • Closer opportunities not diluted • Additional opportunities have lesser value (saturation of opportunity) • Simple to interpret, measure of accessible activity equivalents.	• The decay of value of successive opportunities cannot be fairly applied when the value of each instance of the activity is not equal.



National accessibility

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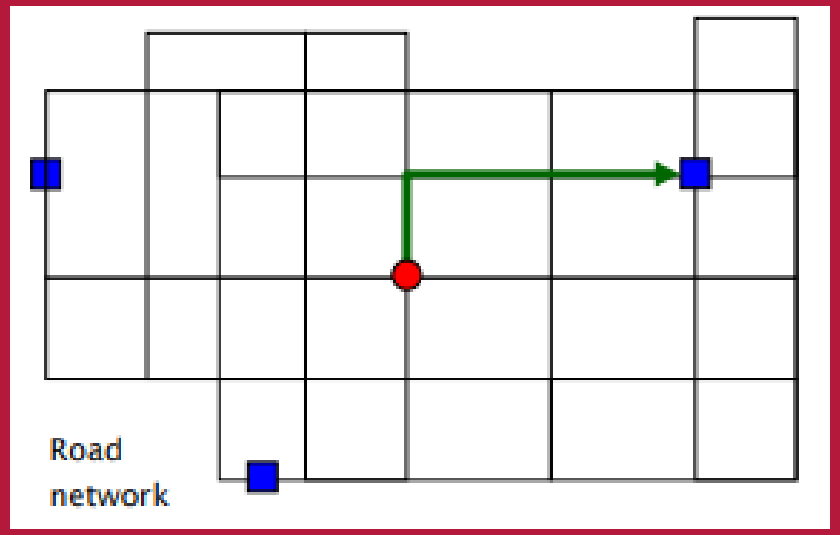
Implementation



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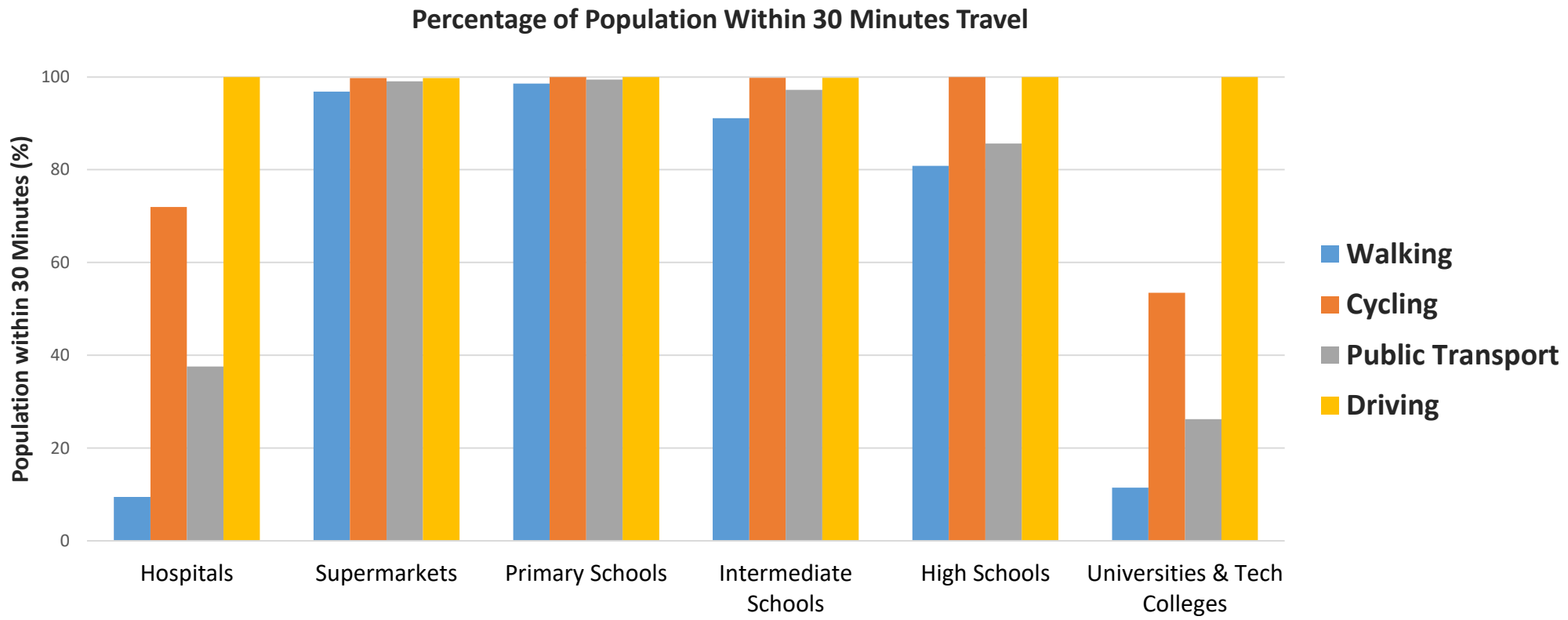
Implementation

Modes:

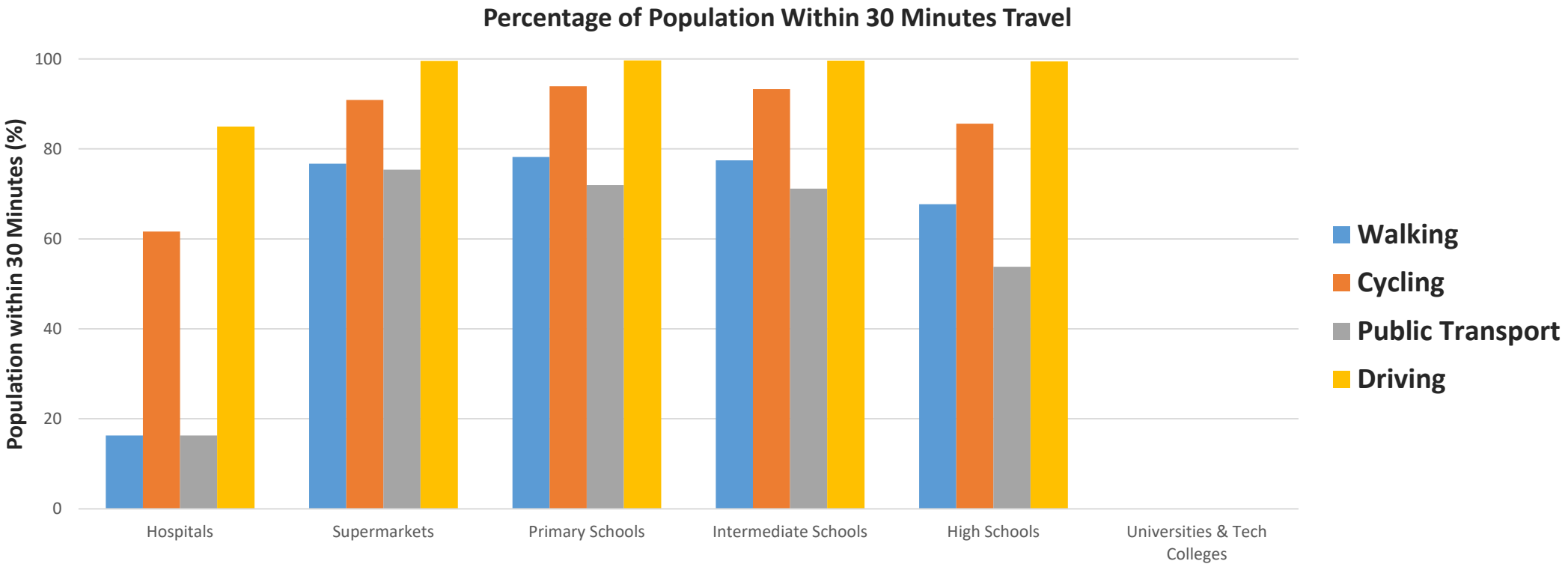
Destinations:

- Schools (by level)
- Tertiary Education
- Hospitals
- Supermarkets
- Employment hubs

Results - Hamilton



Results - Timaru

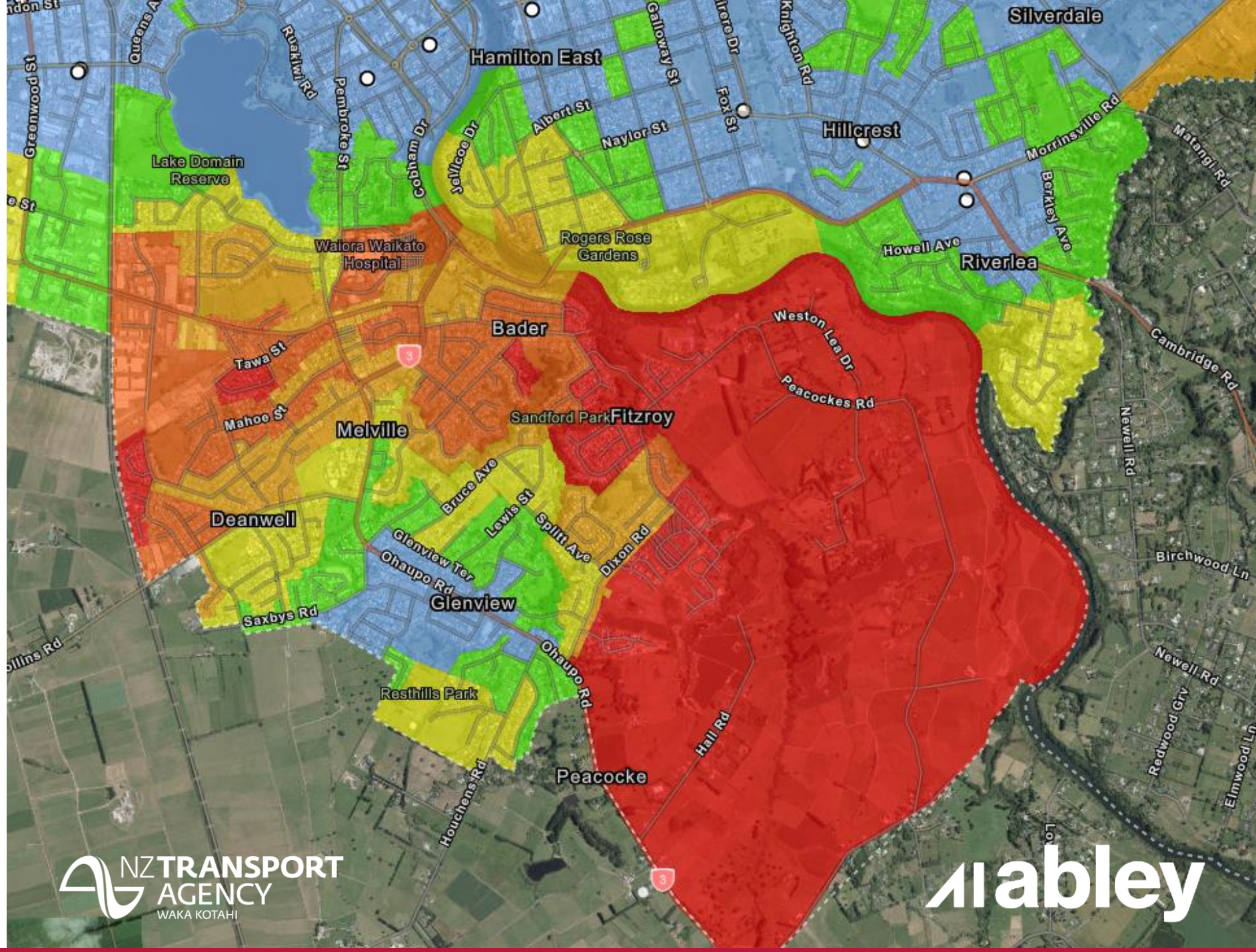


Results

Walking

Supermarket

Hamilton



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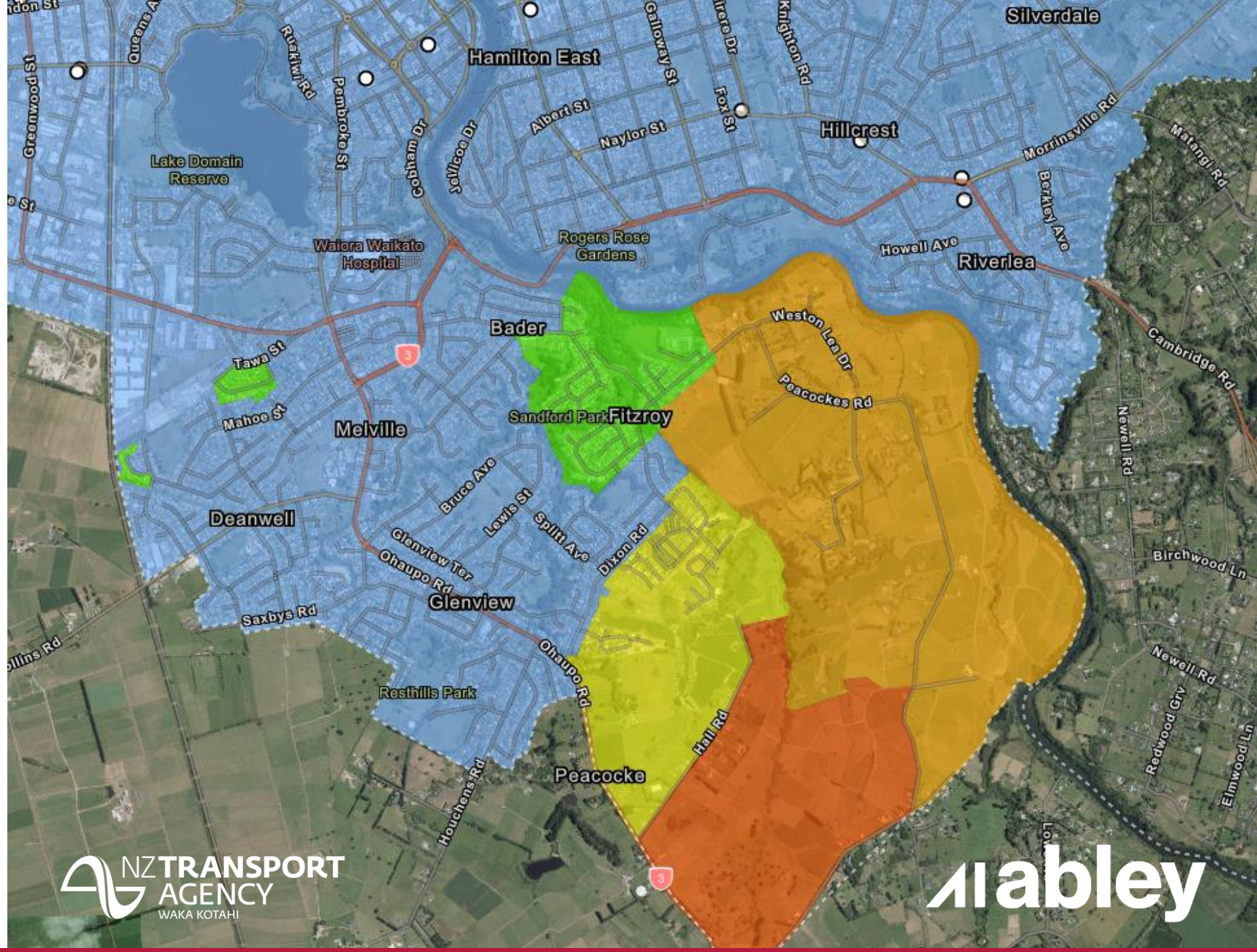
Results

Cycling

Supermarket

Hamilton



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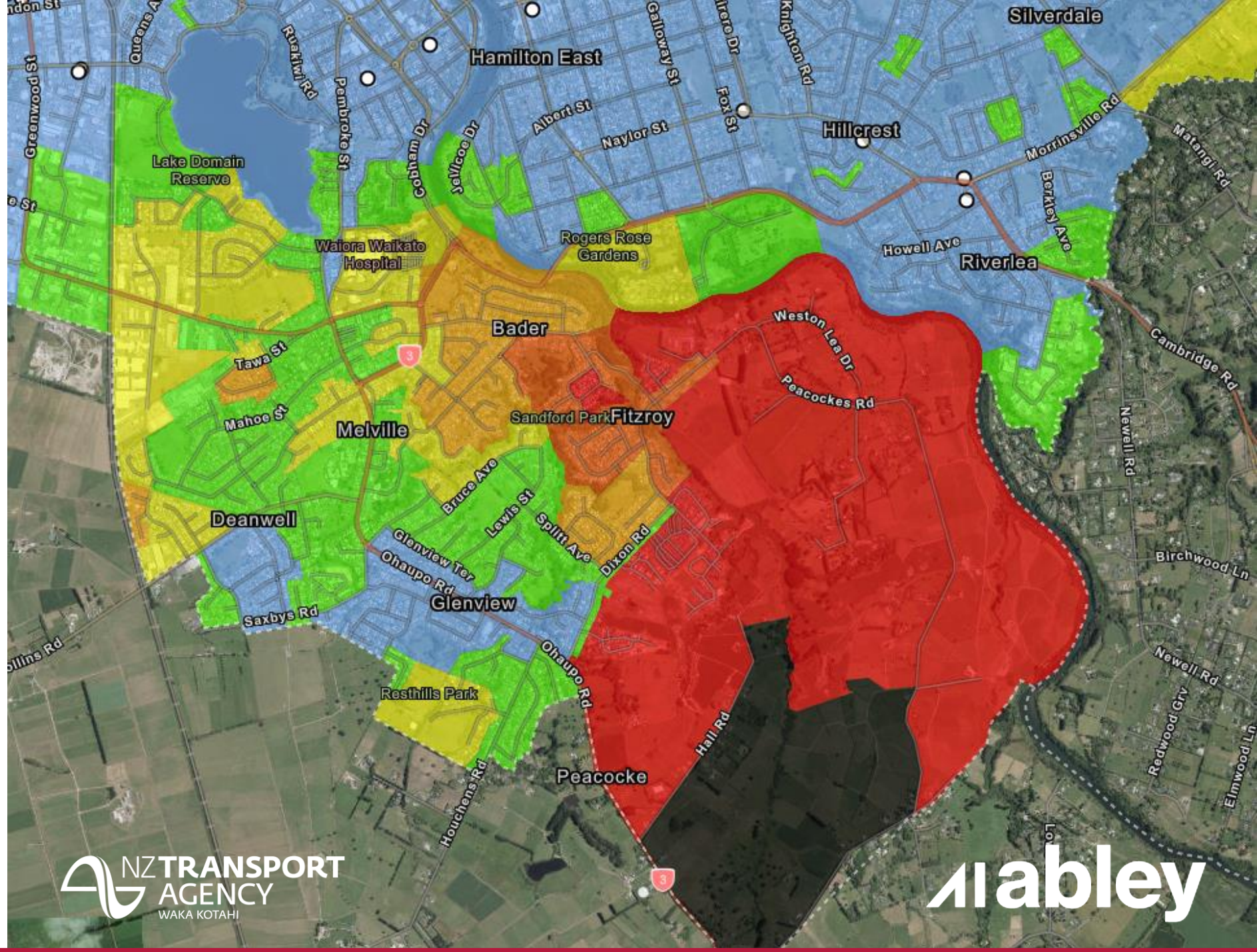
Results

Public Transport

Supermarket

Hamilton



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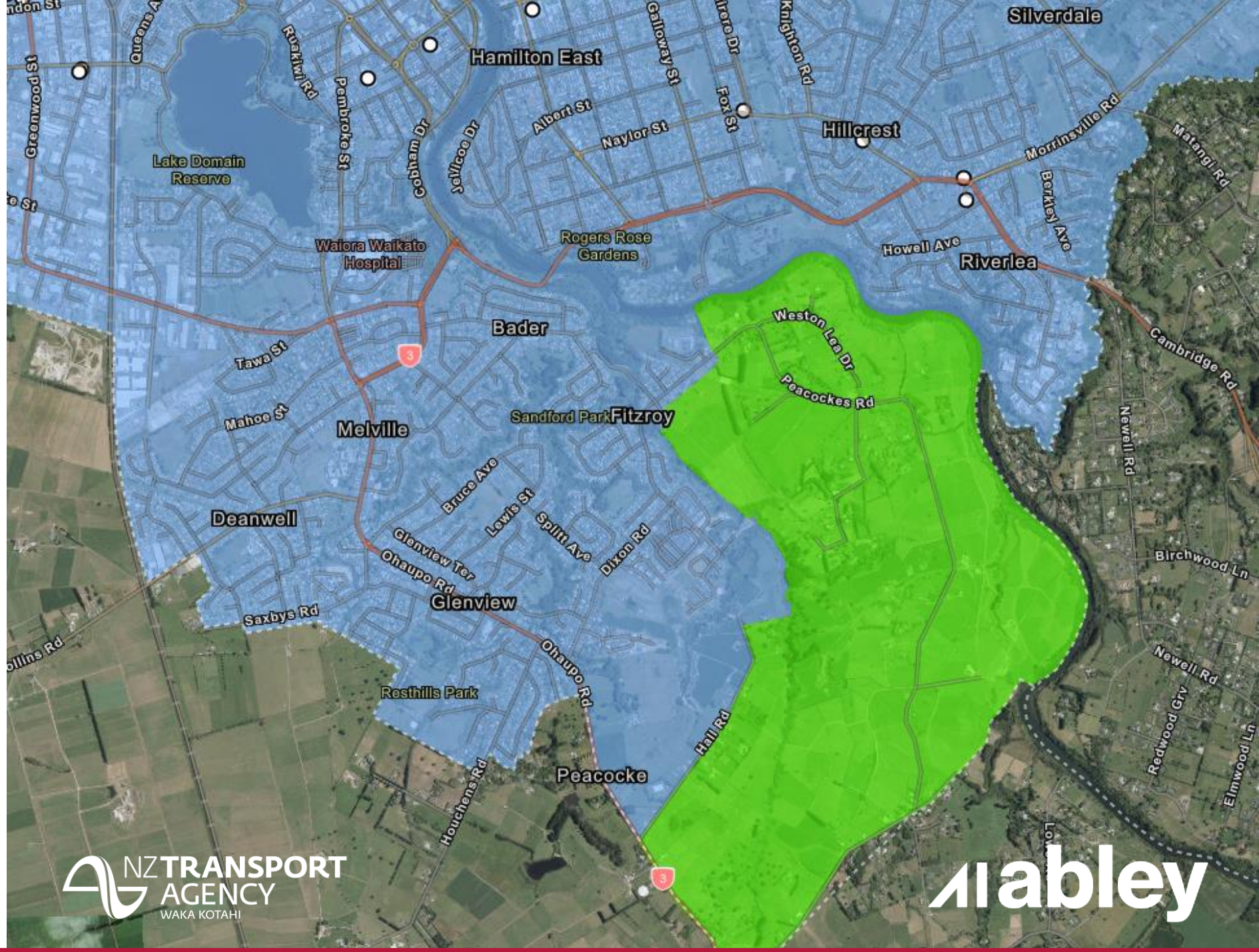
Results

Driving

Supermarket

Hamilton



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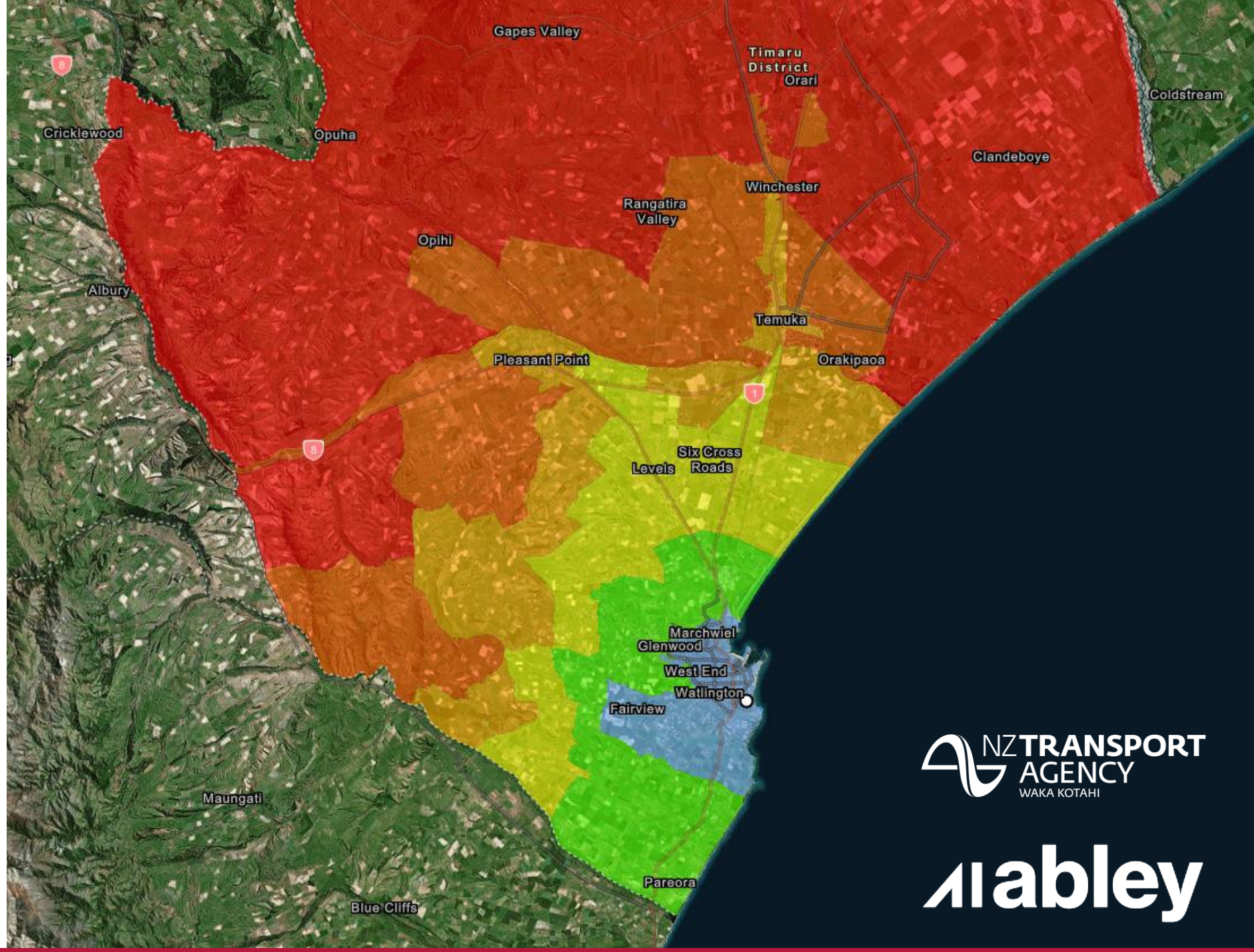
Results

Driving

Hospital

Timaru



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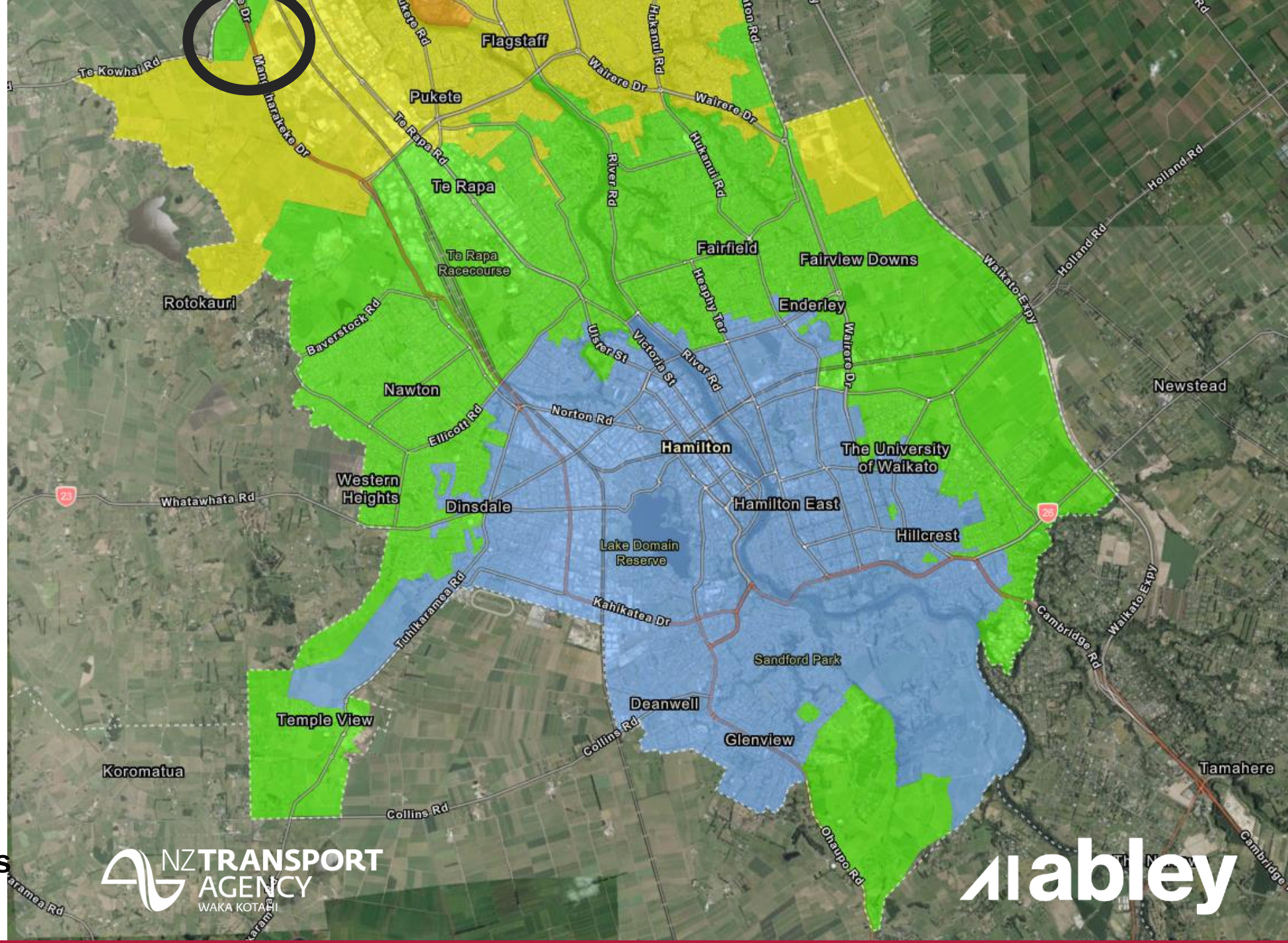
Results

Driving

Hospital

Hamilton



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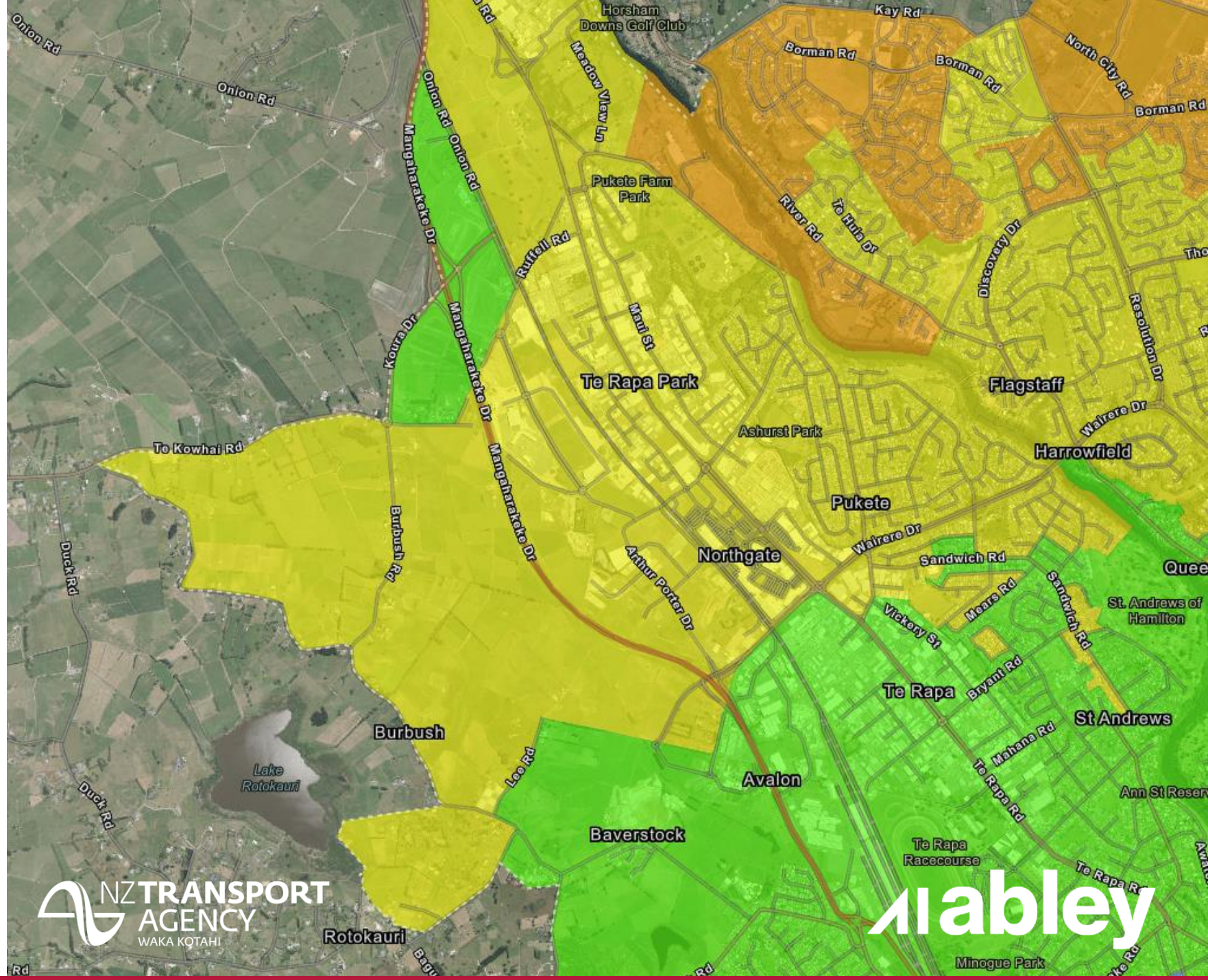
Results

Driving

Hospital

Hamilton

Onramp



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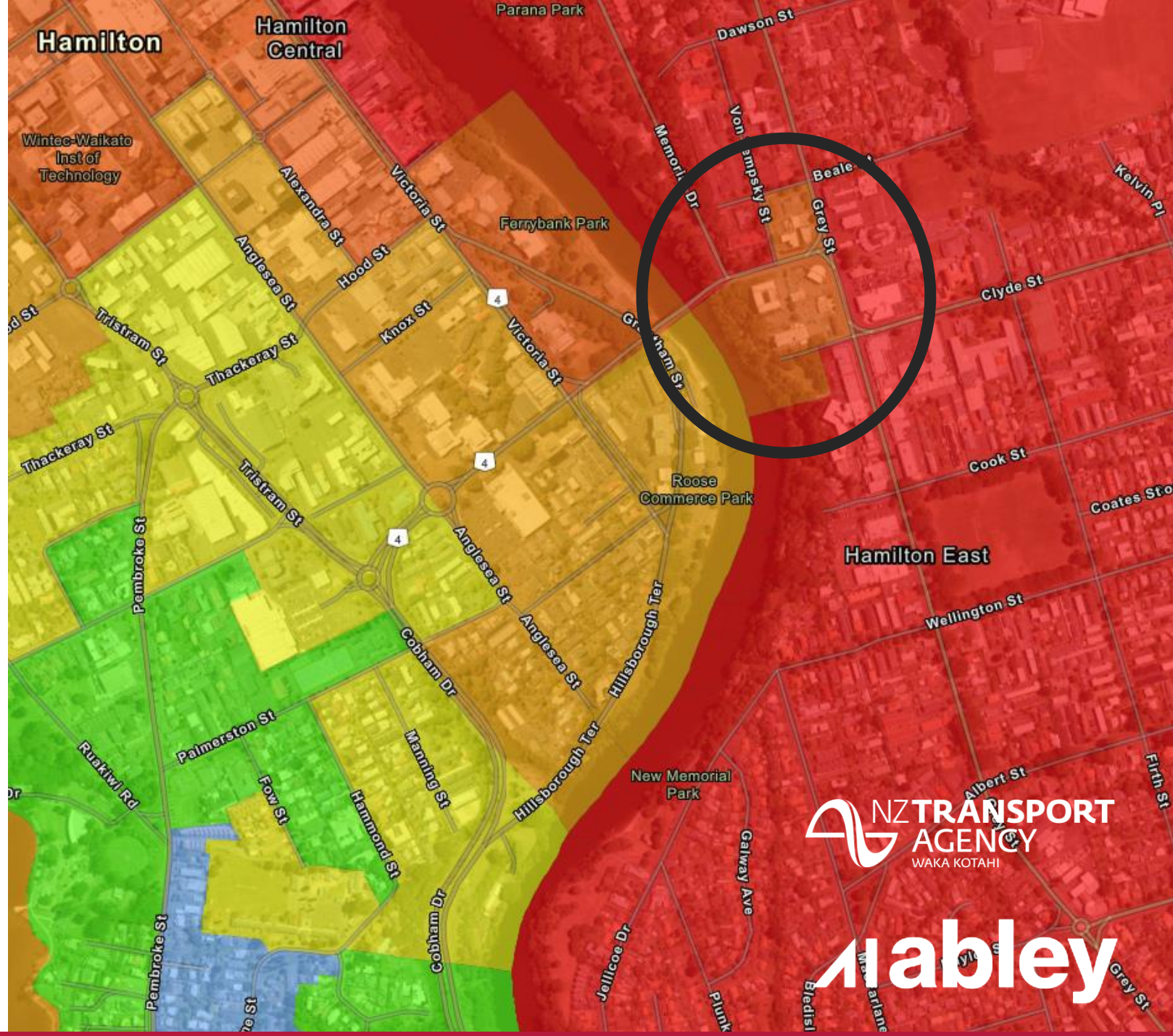
Results

Walking

Hospital

Hamilton

Bridge



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Learning from trial and next steps

- Need clear business rules about the quality of the destination.
- Require a clear explanation of what the metric is / is not.

Learning from trial and next steps

Employment is not a specific destination, and ‘employment zones’ look different in different settings. Considering two alternative measures of access to work:

- **Reachable jobs**
  - How many jobs can be reached within 30 minutes drive time (peak am) or 45 minutes PT in urban areas (peak am) from each Meshblock.
  - This is not a mobility measure, it is more about identifying locations which are poorly served by the main transport networks used for commuting.
- **Typical travel times between residence and place of employment using large tax datasets**
  - Measures link between ‘actual’ employment and residence using linked administrative datasets.
  - Unlike Census, data is continually updated.
  - However, there are data quality issues to tackle.

Learning from trial and next steps

Finally, we recognise the value of a more nuanced approach which examines the value associated with having choice of destination (or opportunity) and the availability/ability to use different travel modes to reach destinations (or opportunities) – as well as segmenting populations based upon their level of access – then measuring their experiences.

Thank you!

Questions?

And for any more questions…

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