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Cycle route network planning using GIS

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Useful data for cycle planning in GIS

- General **topographical features** such as rivers, coastlines, railways and town or activity centres;
- Centrelines of **roads and cycle route networks** (both on-road and off-road);
- **Municipal boundaries**;
- **Zone boundaries** for conventional transport planning computer models;
- **Census population and employment data**, aggregated into transport planning zones;
- **School rolls**, aggregated to zone level; and
- Cycle **crash locations** for the last five years

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Demographic density

- Residential, employment and education totals from Census and school data
- Combine within transport planning model zones
- Display as persons per hectare using GIS
- Cycle network should service highest density areas first

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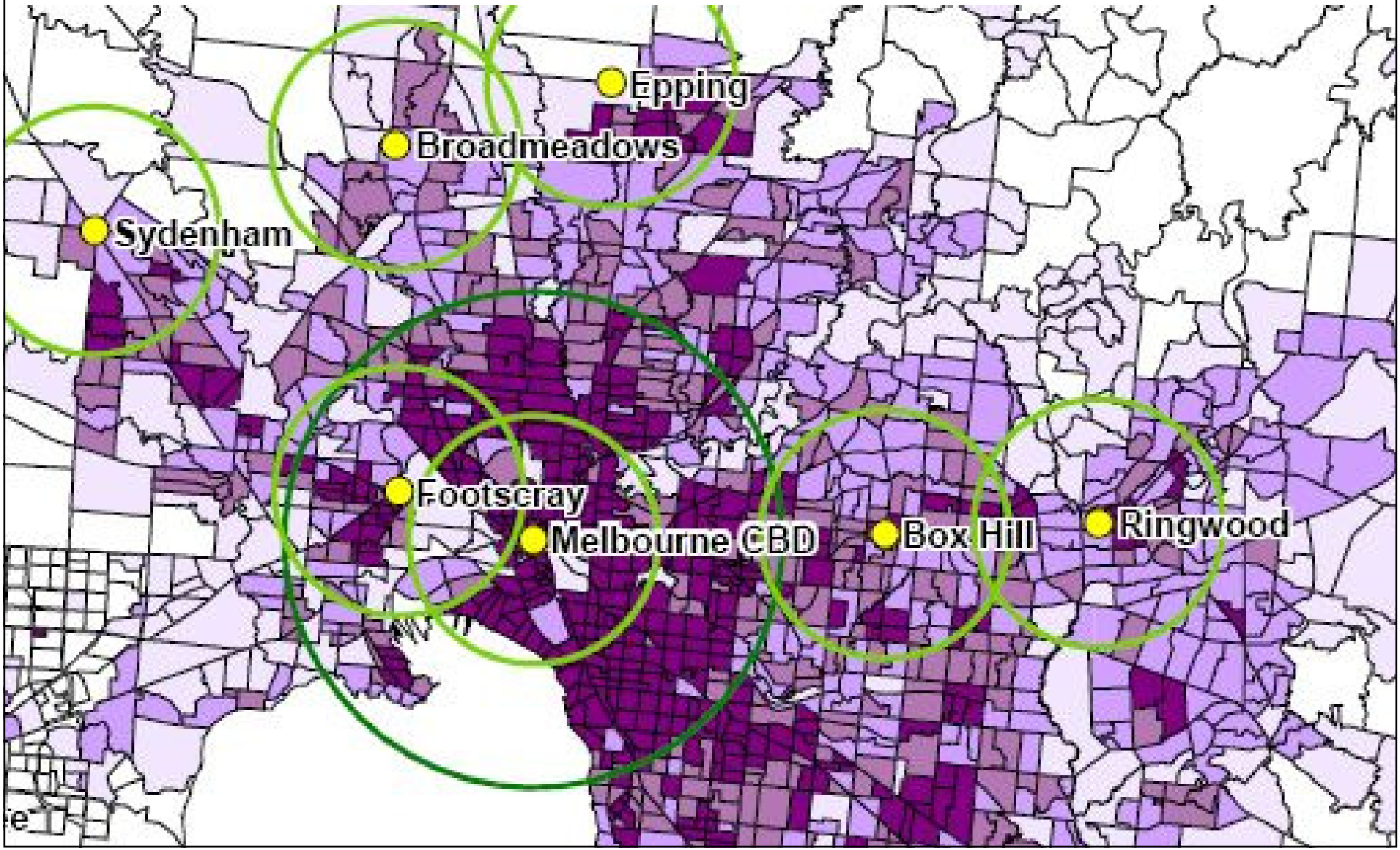
Demographic density



Chch cycle to work Census data 2006

- Another useful spatial data set for planning cycle networks
- Density of trips (persons per ha) can be calculated at meshblock level and plotted
- Can help understanding of existing cycle use for journey to work in any city or district
- Chch data analysed by Canterbury DHB – not just TLAs who are interested in this

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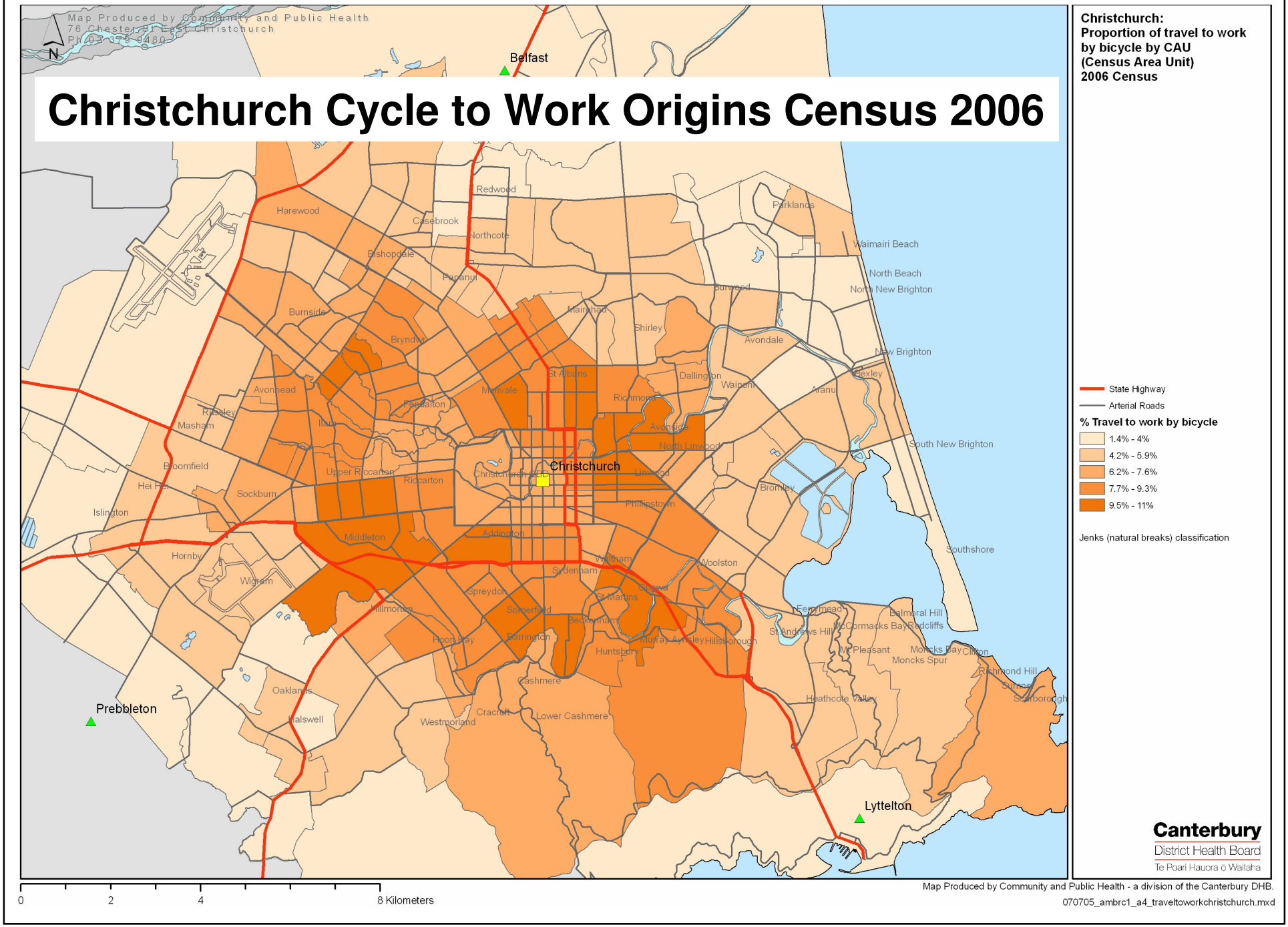

Christchurch:
Proportion of travel to work by bicycle by CAU (Census Area Unit)
2006 Census

Canterbury District Health Board
Te Poari Hauora o Waitaha

Map Produced by Community and Public Health - a division of the Canterbury DHB.
070705_ambrc1_a4_traveltoworkchristchurch.mxd

Crash data and cycle network

- Crash data and cycle network can be mapped
- Often cycle crash data align with proposed cycle routes
- Intention is to render cycle routes safe so that crashes diminish

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Auckland cycle network and crash data

Auckland network models

- Model 1: The sum of the parts
- Model 2: Regionally strategic parts of Model 1
- Model 3: Town centres
- Model 4: Town centres with regional links

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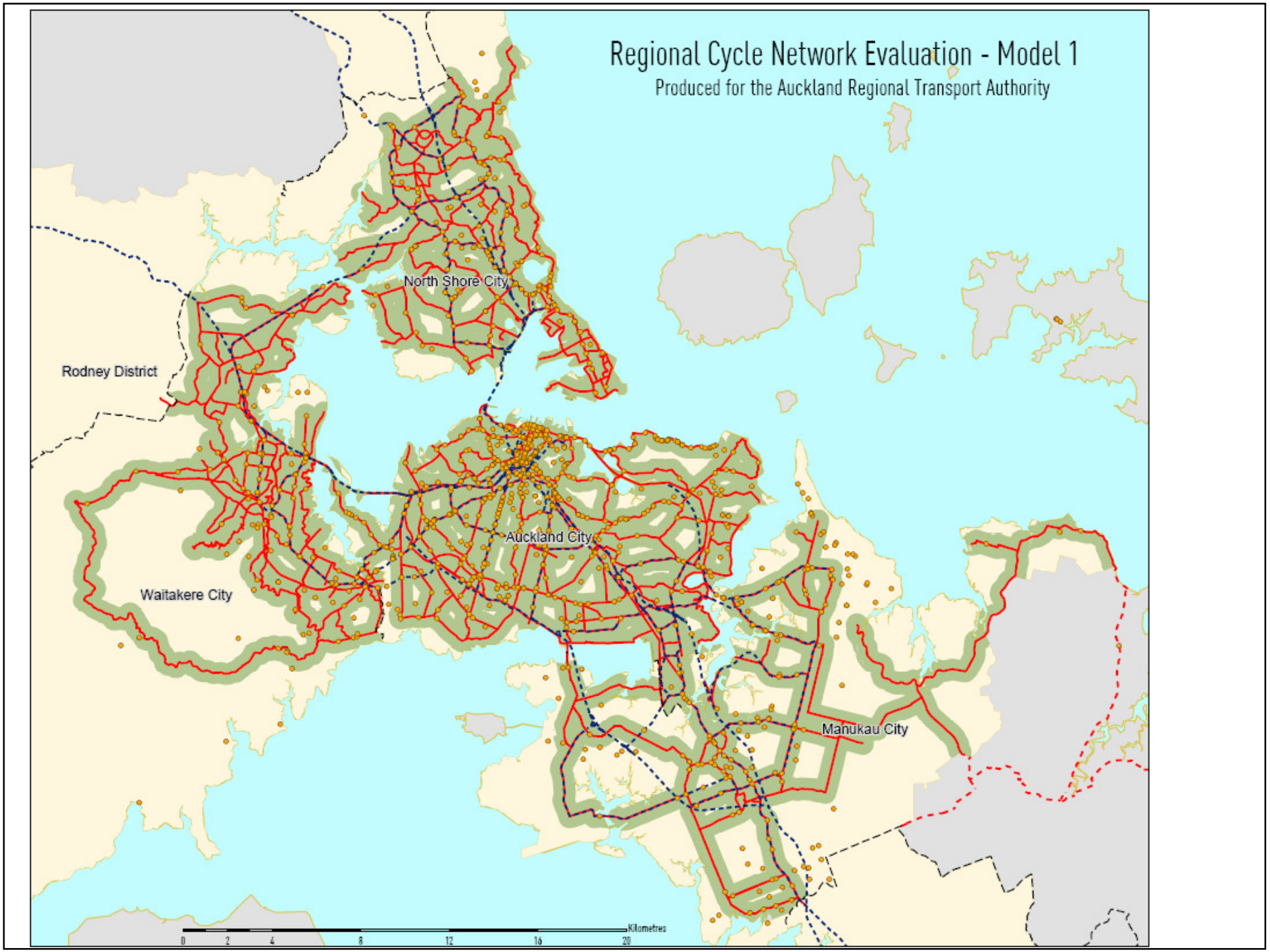
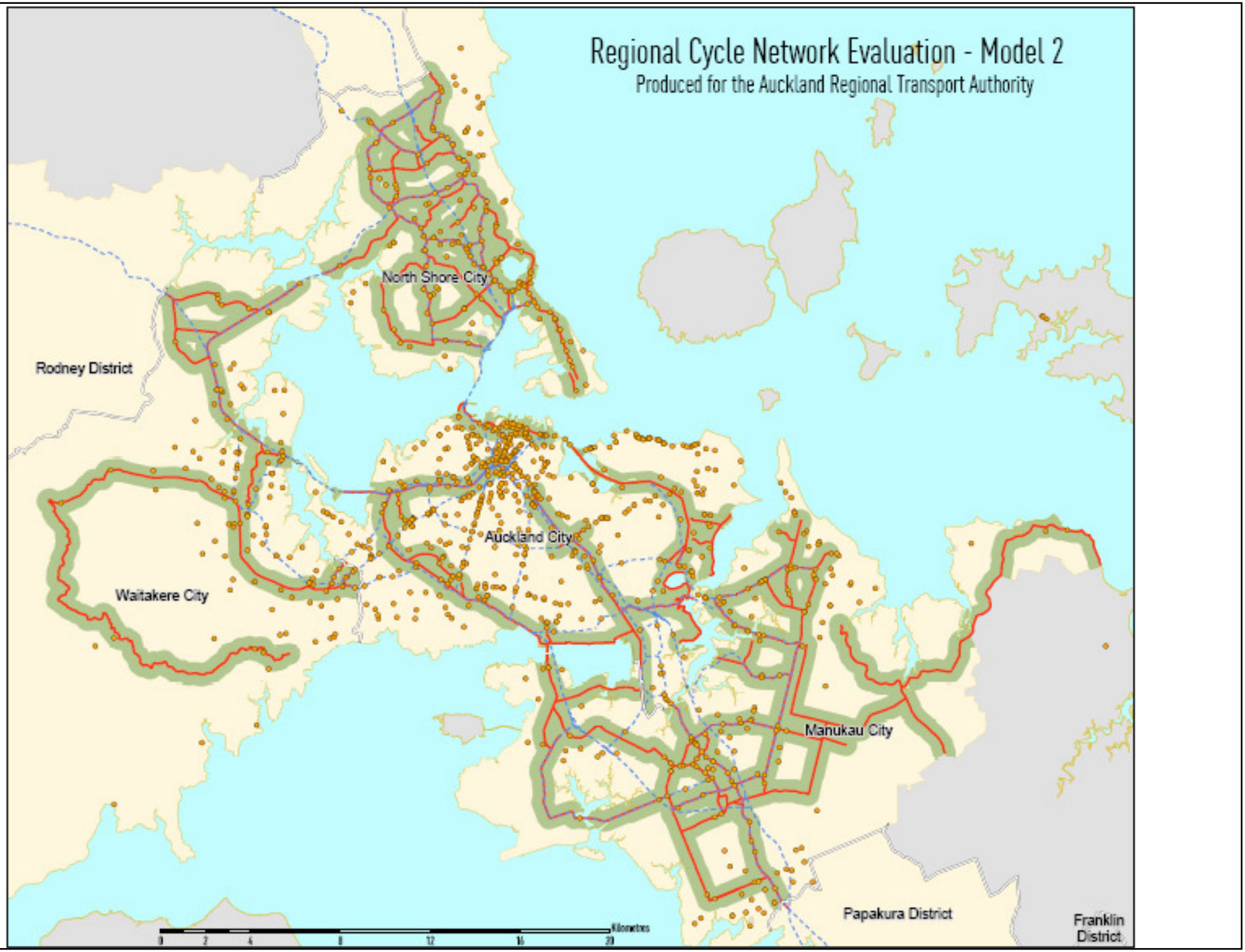
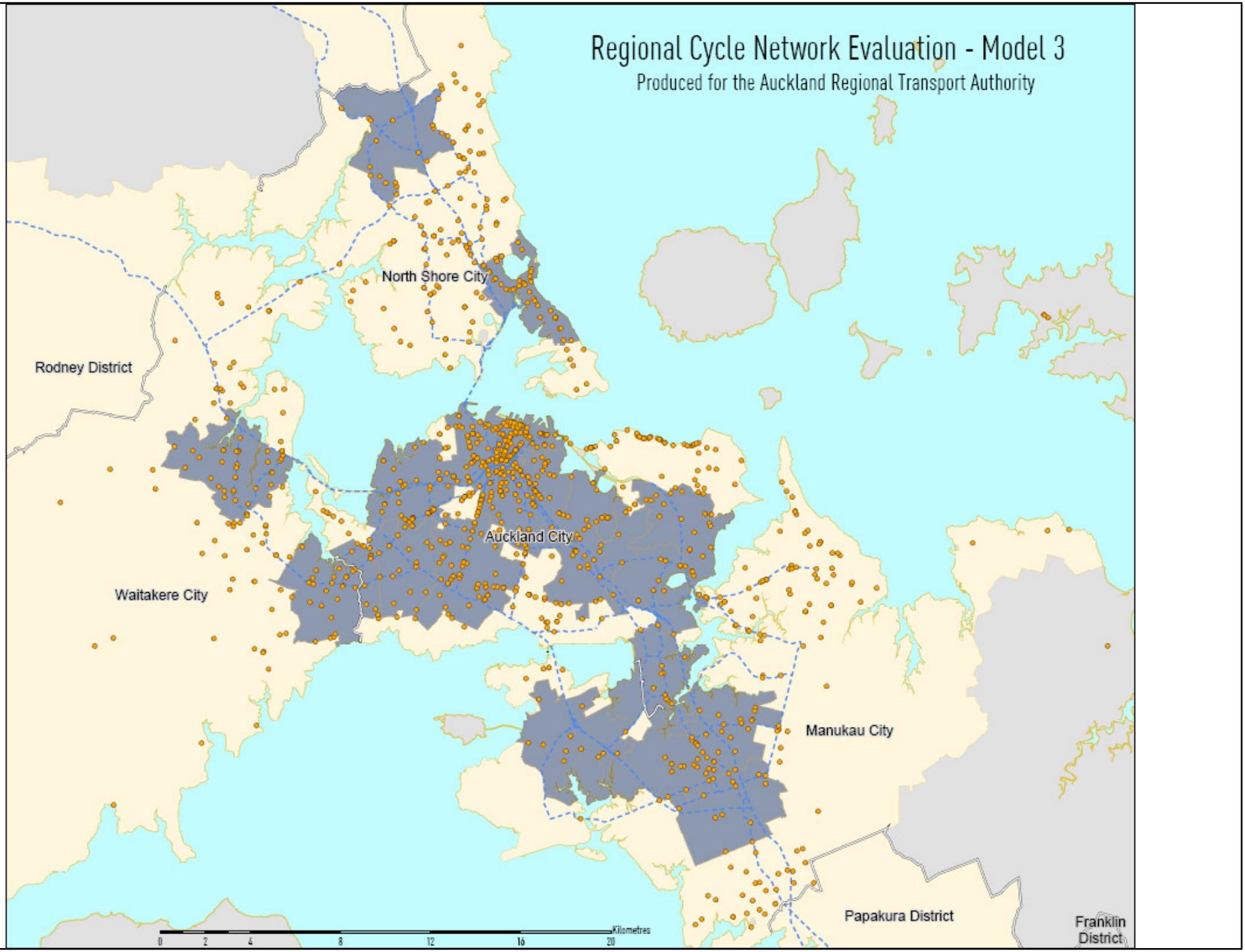
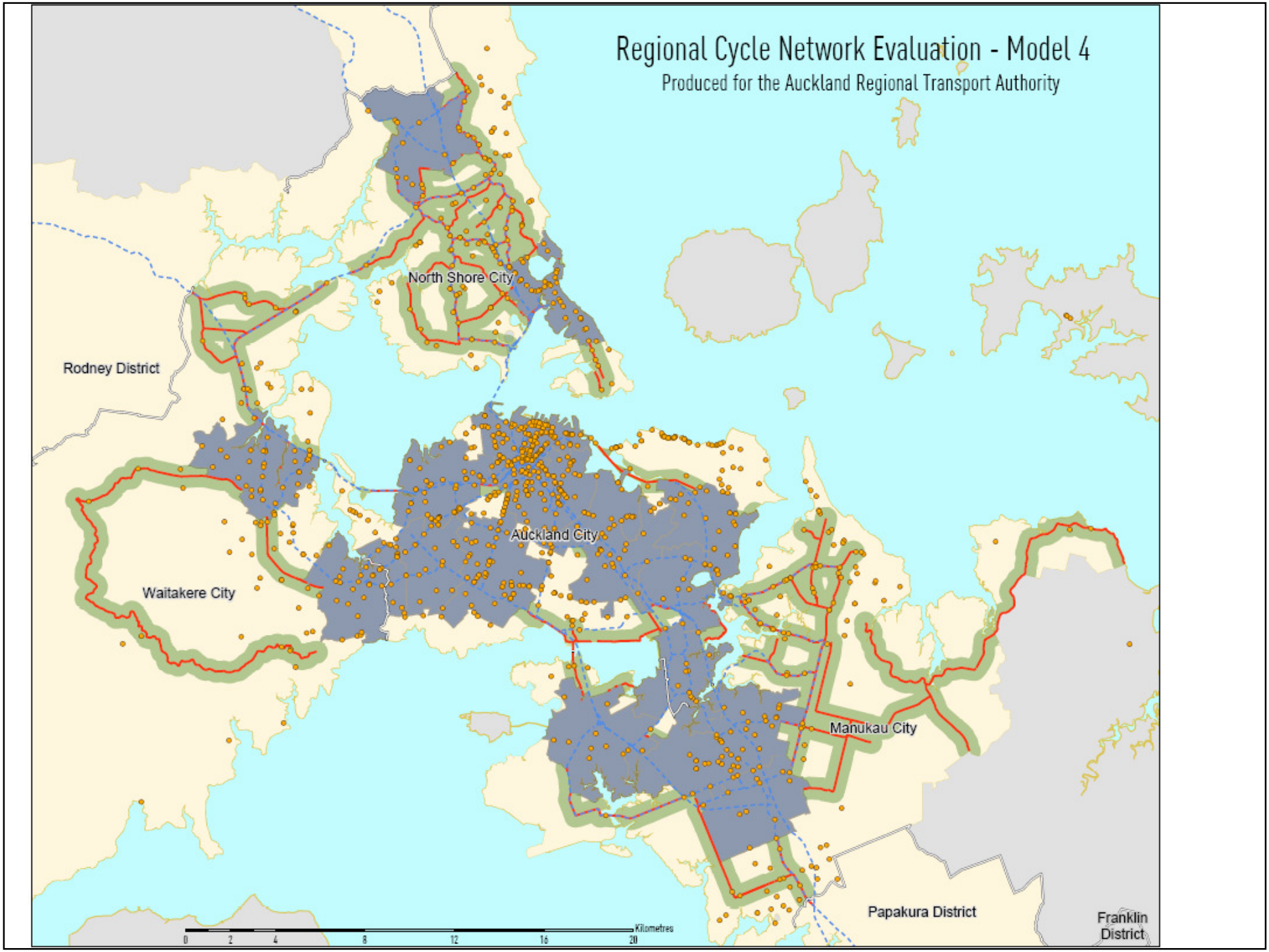

Regional Cycle Network Evaluation - Model 1
Produced for the Auckland Regional Transport Authority
North Shore City
Rodney District
Auckland City
Waitakere City
Manukau City
0
2
4
8
12
16
20
Kilometres


Regional Cycle Network Evaluation - Model 2
Produced for the Auckland Regional Transport Authority
North Shore City
Rodney District
Auckland City
Waitakere City
Manukau City
Papakura District
Franklin District


Regional Cycle Network Evaluation - Model 3
Produced for the Auckland Regional Transport Authority
North Shore City
Rodney District
Auckland City
Waitakere City
Manukau City
Papakura District
Franklin District
Kilometres
0
2
4
8
12
16
20


Regional Cycle Network Evaluation - Model 4
Produced for the Auckland Regional Transport Authority
North Shore City
Rodney District
Auckland City
Waitakere City
Manukau City
Papakura District
Franklin District
Kilometres
0
2
4
8
12
16
20

Network comparisons

	Model 1	Model 2	Model 3	Model 4
Demographic Coverage	82%	**47%**	55%	74%
Safety (crash coverage)	74%	**24%**	60%	80%
Raw Score (out of 200)	155	**71**	115	154
Cycle Network Length (km)	854	**375**	1,192	1,420
Final Score (normal-ised by length)	**0.18**	**0.19**	**0.10**	**0.11**

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Model 2 network length, crashes

	Total Road Length	Model 2 Cycle Network Length		Total Cycle Crashes	Model 2 Cycle Crashes	
	km	km	% of road length	2001-05	No.	% of cycle crashes
Auckland City	1,354	75	**6%**	642	51	**8%**
Manukau City	1,300	143	**11%**	188	83	**44%**
North Shore City	804	91	**11%**	173	112	**65%**
Waitakere City	937	66	**7%**	135	26	**19%**
Total	**4,395**	**375**	**9%**	**1138**	**272**	**24%**

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Model 2 (old & new) network length

	Total Road Length	Original Model 2		New Model 2	
	km	km	% of road length	km	% of road length
Auckland City	1,354	75	6%	247	18%
Manukau City	1,300	143	11%	169	13%
North Shore City	804	91	11%	119	15%
Waitakere City	937	66	7%	131	14%
Total	**4,395**	**375**	**9%**	**666**	**15%**

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Network comparisons

	Model 1	Model 2	Model 3	Model 4	New Model 2
Demographic Coverage	82%	47%	55%	74%	82%
Safety (crash coverage)	74%	24%	60%	80%	92%
Raw Score (out of 200)	155	71	115	154	173
Cycle Network Length (km)	854	375	1,192	1,420	666
Final Score (normal-ised by length)	**0.18**	**0.19**	**0.10**	**0.11**	**0.26**

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Existing and proposed routes

- Buffers around cycle network show demographic coverage
- Can be superimposed on demographic densities to identify missing key links
- Visual inspection provides useful clues
- Has been trialled in Melbourne
- Further work needed to develop a tool to optimise the technique

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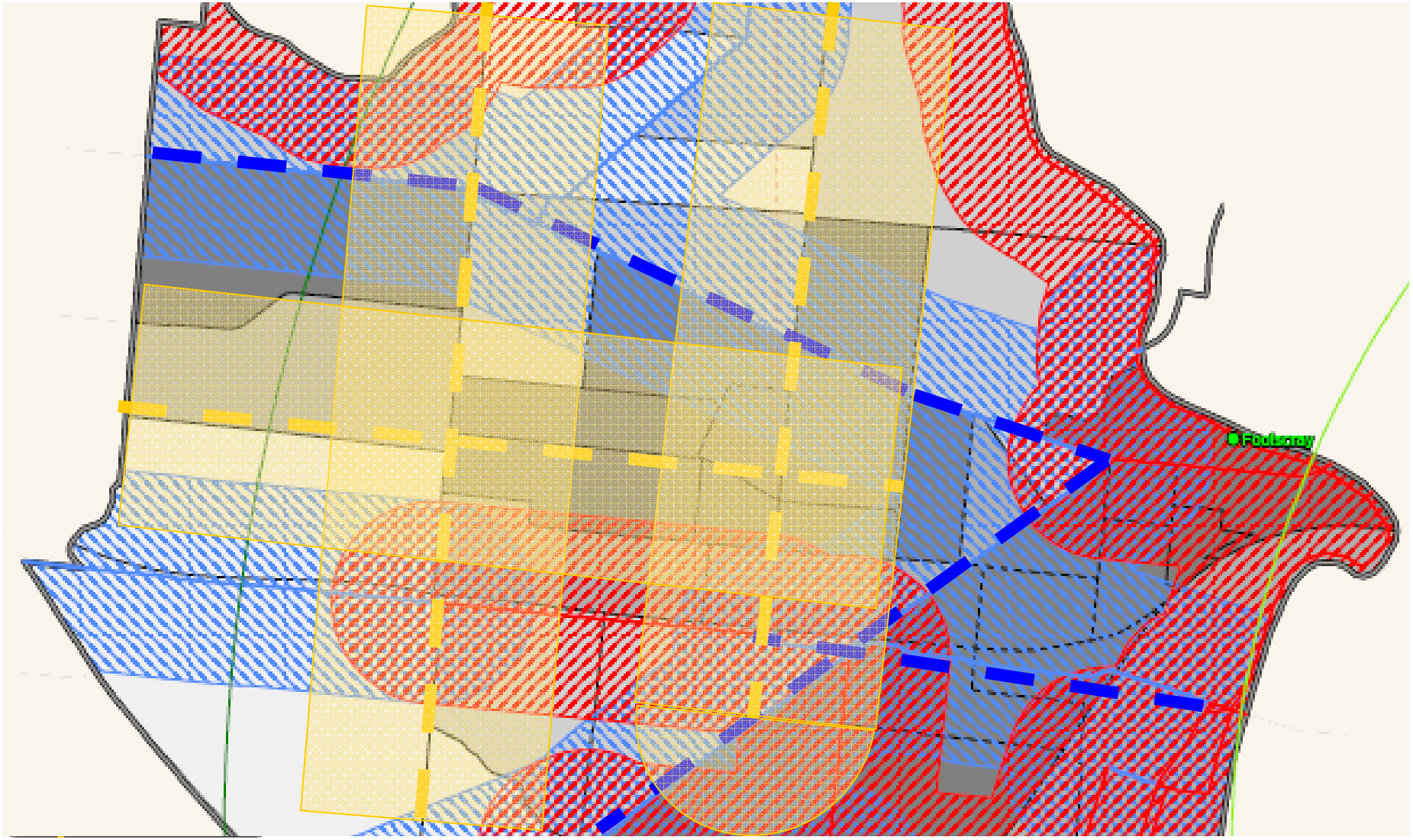
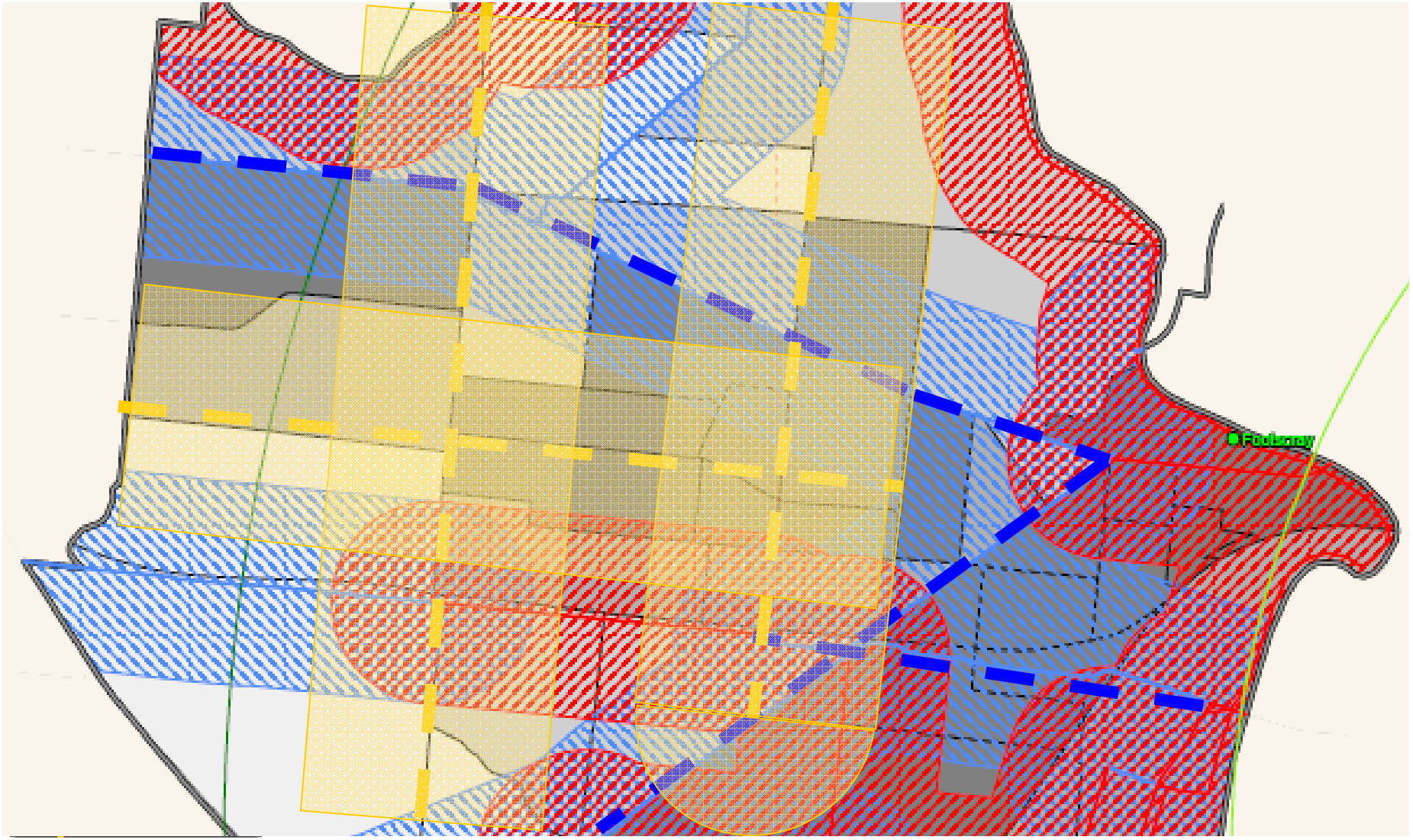
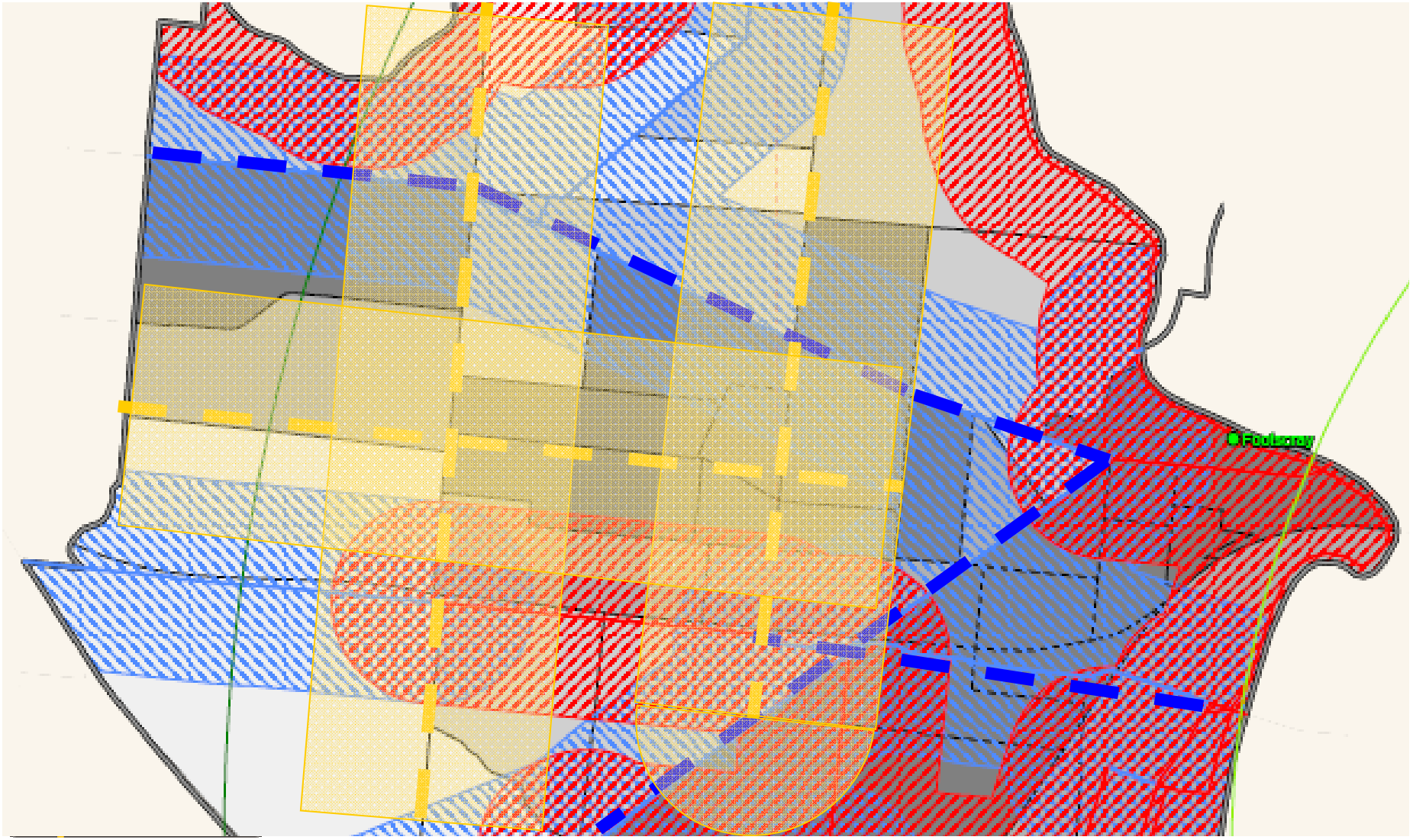
Existing and proposed routes, buffers



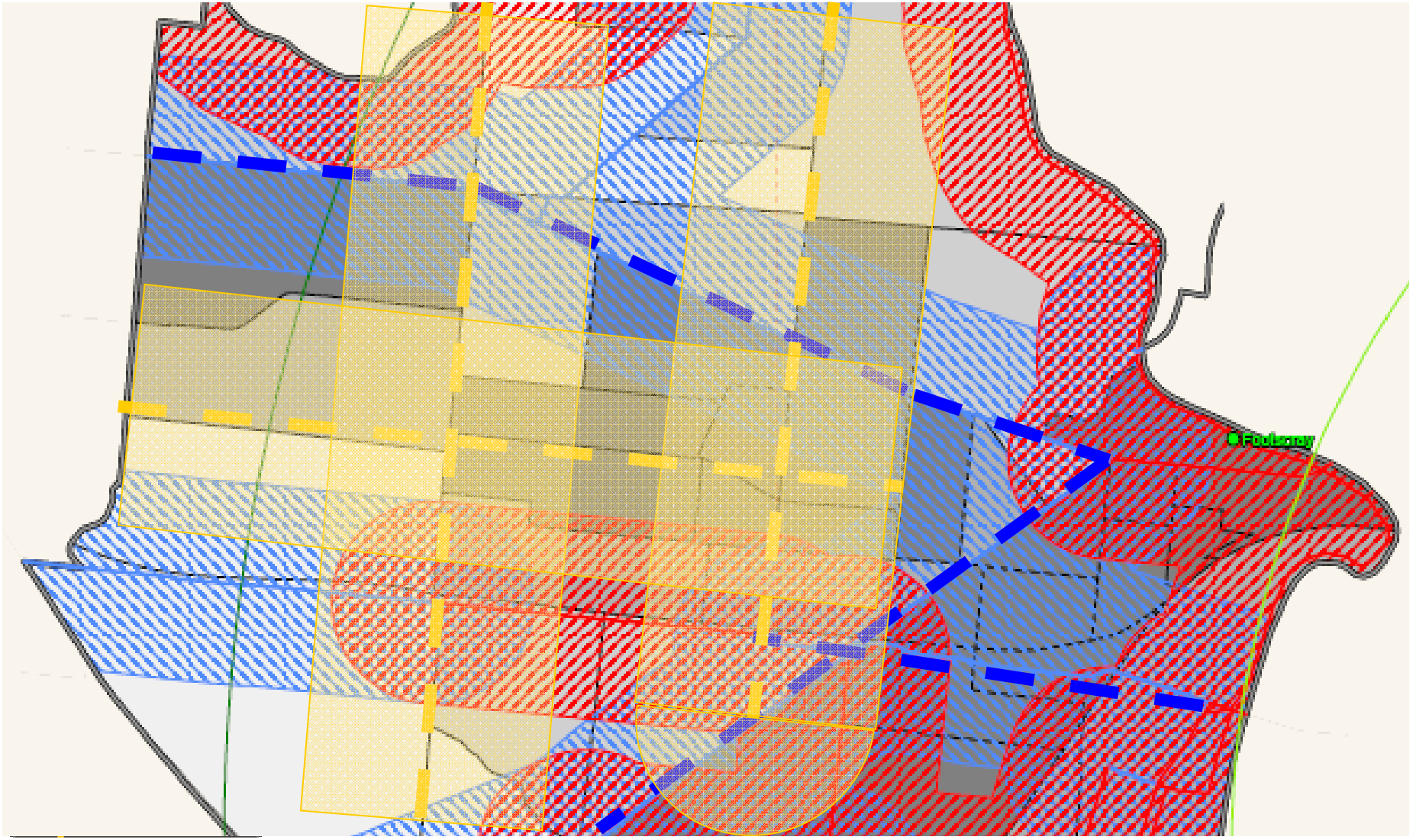
Existing and proposed routes, buffers



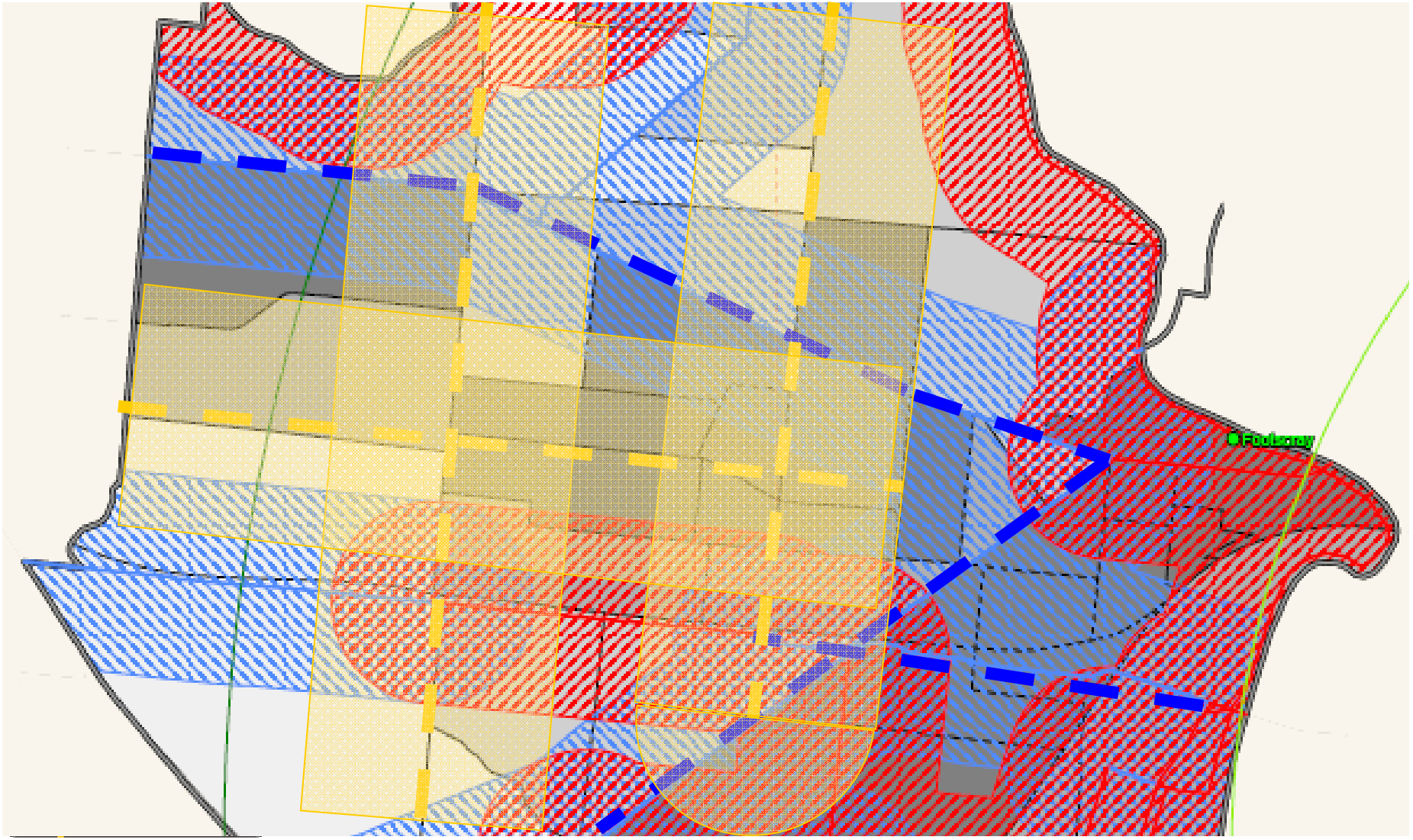
Existing and proposed routes, buffers



Existing and proposed routes, buffers



Existing and proposed routes, buffers



Coverage of different buffers

- Assume people living within 500 m of cycle network have access to it
- 500 m = 2 minutes at 15 km/h
- Average time to access network = 1 min.
- Can calculate demographic coverage for a network for any given buffer
- Can compare coverage of different networks or existing and proposed networks

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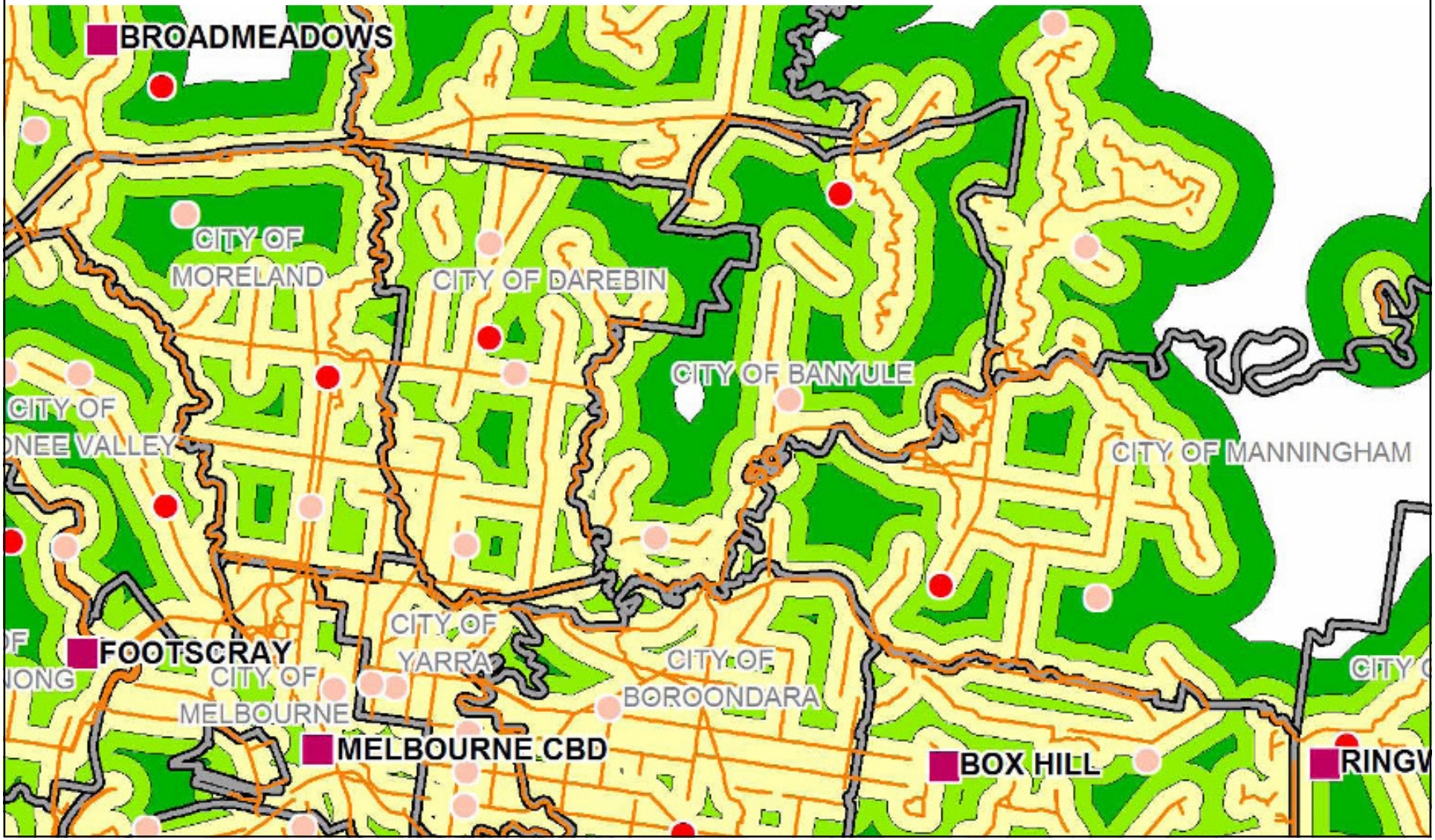
Coverage of 400 m, 800 m & 1.6 km buffers



Conclusions

- GIS helps analyse and visualise complex spatial data
- Improves objectivity of cycle route network planning
- Helps rationalise spending for most effective cycle network projects

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