



Stantec



Beca

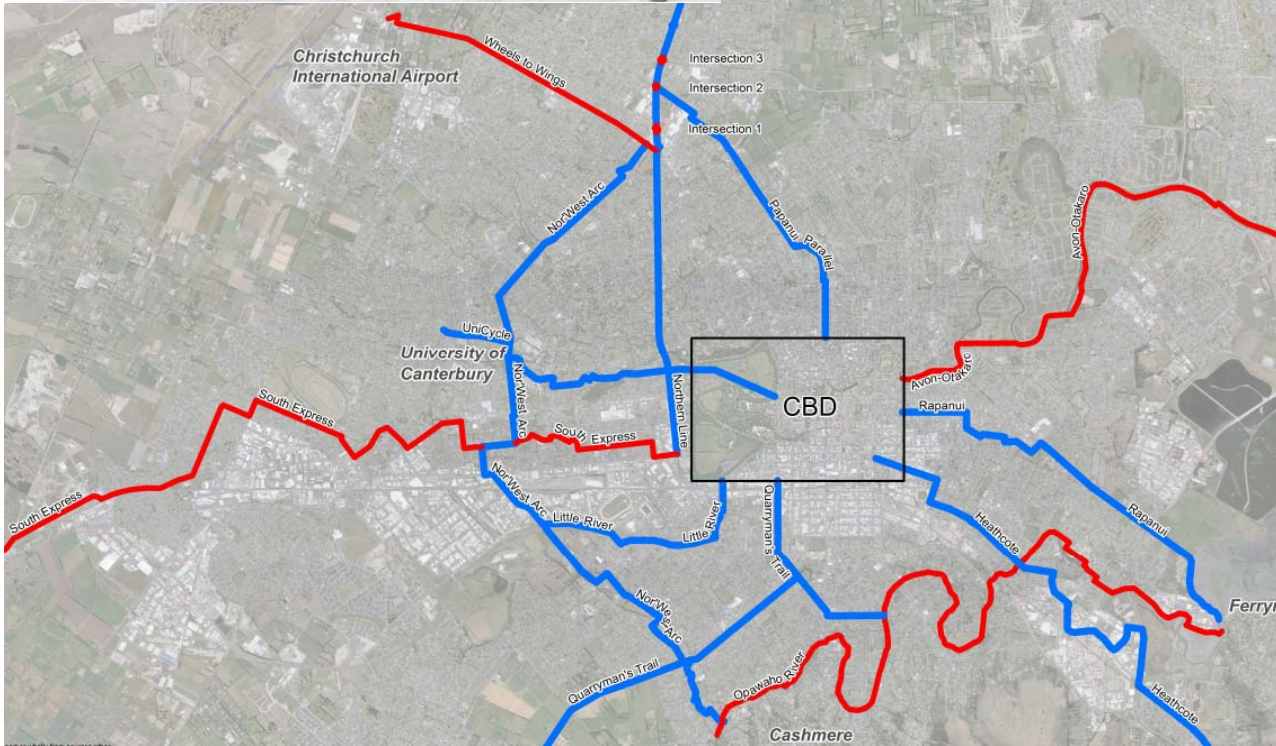
Using Multi-Criteria Analysis (MCA) to define Cycleway Routes

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13 Major Cycleways

Network length = 101 km

- \$206 million committed over 10 years
- Peloton has designed 8 routes

2015-2018 progress

- 5 routes built / in construction
- 6 routes in design
- 2 river routes on hold

Purpose



- To provide a **transparent, defensible, objective** comparison of options which can **withstand scrutiny**.
- Provide **stakeholders** an understanding of the key reasons behind the recommendation made.
- **Stakeholders** can greatly influence project implementation

The process



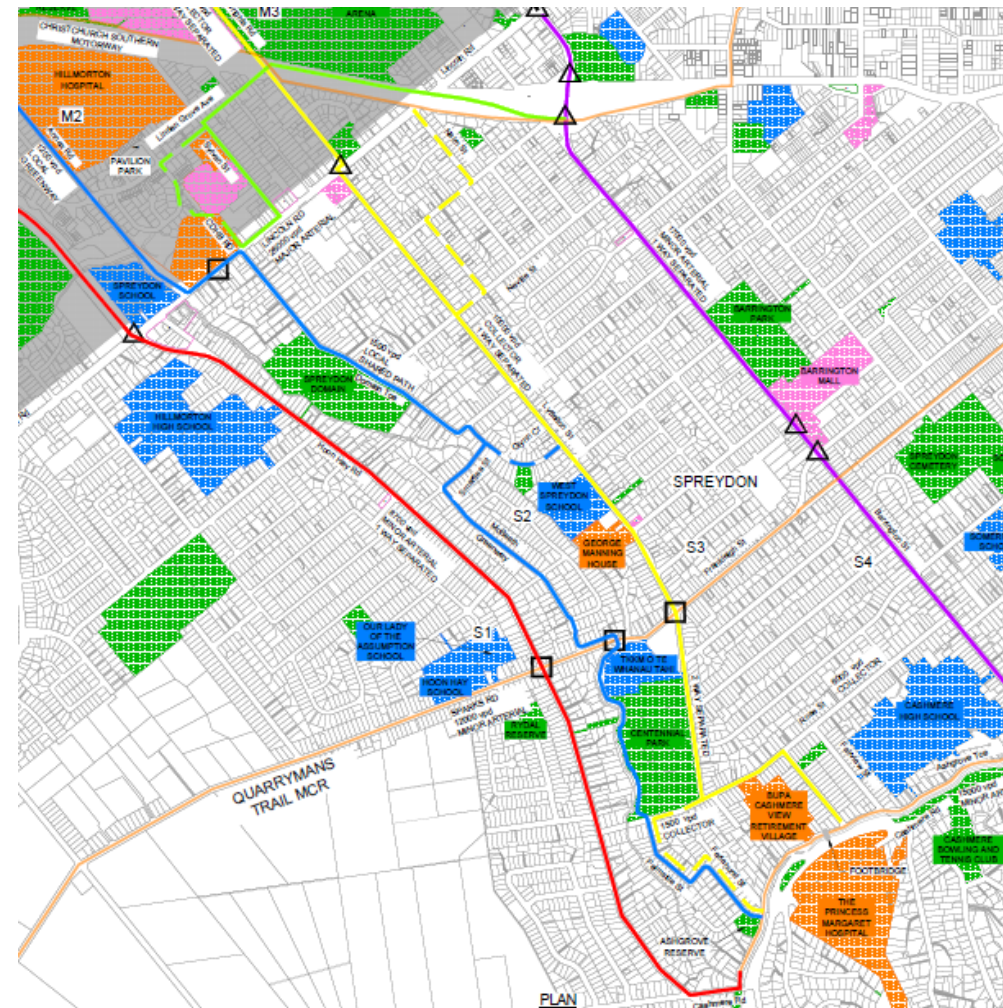
The process

1. Context (Urban Designers)

- Start and end points
- Extent of the corridor
- Connectivity with key attractors and destinations schools etc
- Planned developments
- Growth areas
- Opportunities

2. Develop Route Options

- Street types
- Desire lines
- Major roads, traffic volumes, conflicting road use, black spots
- The surrounding environment, watercourses



The group

Diverse so a wide range of issues are considered and tested

- Facilitator
- Range of skills (specialists)
- Engineers/non Engineers
- Planners
- Landscape Architects
- Different riding abilities
- Male/female
- Different ages
- People familiar with the area



Stage 3 : MCA Criteria/Categories

Multi Criteria Analysis

Cyclists	Community/Stakeholder Interests	Project Costs and Programme Risks
Safety	Local Business Impacts	Ease of Construction & Cost
Directness	Local Resident Impacts	Land Requirements / Easements / Agreements
Coherence	Operational and Network Impacts	
Attractiveness		
Comfort		
CPTED		

* Other Criteria – project specific



Cyclist Category – Criteria

Multi Criteria Assessment 6 Key Cycling key objectives

1. **Safety** – safe, personal security, limited conflict
2. **Directness** – desire lines, few delays
3. **Coherence (incl. connectivity)** – continuous & recognisable, link origin and destinations, consistent protection
4. **Attractiveness** – integrate and complement surroundings, look attractive, contribute to cycling experience
5. **Comfort** – lanes to be smooth, non-slip, well maintained, gentle slopes, simple manoeuvres
6. **CPTED** – Crime prevention through environmental design

Criteria

Community and stakeholder interest

- Local business impact
- Local resident impact
- Operational and network impacts



Christchurch cycleway blamed for near closure of business

MADDISON NORTHCOTT
Last updated 13:30, March 7 2017



JOSEPH JOHNSON / FAIRFAX NZ

Peter Wang has asked the council to reconsider the route for the Papanui Parallel cycleway.



Criteria

Project cost and programme risk

- Ease of construction and costs
- Programme risk / Land Requirements



Christchurch cycleway nearing completion after houses demolished

MICHAEL HAYWARD

Last updated 18:55, June 5 2018



MCA Scoring

- Scoring each option against each criteria.
- Score options relative to each other.
- A ranking assessment ensures a clear and defensible score.
- Any showstoppers?

Scoring recommended by NZTA
to compare options

<i>Criteria effect</i>	<i>Scoring (score after mitigation)</i>
Significant adverse effect that <u>cannot be mitigated</u>	-3
Moderate / major adverse effect that <u>can be mitigated</u>	-2
Minor adverse effect	-1
Neutral / no change	0
Minor positive effect	1
Moderate / major positive effect	2
Significant positive effect	3

MCA Weightings and Sensitivity

- Weightings - are applied to each category – start with a neutral weighting
- Sensitivity - provides a bias towards one category over others (suggest using 70%)
- Sensitivity Testing – influence on option selection

Refer NZTA MCA for Transportation Business Case – guidance document

MCA Assessment Weighting Scenario's			Cycleway Design context					Stakeholder / Network Impacts			Costs & time risks	
			Safety	Directness	Coherence	Attractiveness	Comfort	CPTED	Business Impacts	Resident Impacts	Operational and Network Impacts	Constructability and costs
	Base Case	Weighting	50%					25%			25%	
Sensitivity	Cycleway users	Weighting	70%					15%			15%	
	Stakeholder/ Network	Weighting	15%					70%			15%	
	Programme /cost	Weighting	15%					15%			70%	

MCA Results - What does it mean?

Assessment Options

Assessment criteria	P-1 blue	P-2 green	P-3 pink	P-4 orange	P-5 black
Safety	1.0	0.5	1.5	1.0	1.3
Directness	-1.5	1.0	1.5	1.5	-2.0
Coherence	0.3	1.5	1.0	1.5	-1.0
Attractiveness	0.5	-1.0	1.5	0.5	1.0
Comfort	0.5	0	1.5	0.5	1
CPTED	1	0	-2	1.5	-0.5
Design score	2.8	2.3	4.8	7.8	0.1
Local Business Impact	-1	-1	-0.5	-2	-0.5
Local Resident Impact	-1	-1	-0.5	-2	-1
Operational and Network Impacts	1	-1	-1	1	-1
Stakeholder score	-1.0	-3.0	-2.0	-3.0	-2.5
Ease of Construction/ Costs	-0.5	-0.5	-0.5	-2	-0.5
Land Requirements/ Easements	0	0	0	-1	0.0
Cost & programme score	-0.5	-0.5	-0.5	-3.5	-0.5
Overall score	1.3	-1.3	2.3	1.3	-2.9
Cycle weighted	2.0	0.5	3.5	4.3	-1.4
Stakeholder weighted	-2.1	-6.7	-3.7	-7.4	-6.1
Cost & programme weighted	-1.2	-2.2	-0.9	-9.2	-2.5

Assessment Options

Assessment criteria	M-1	M-2	M-3	M-4
Safety	2.0	0.5	0.5	0.0
Directness	-2.0	0.5	1.0	0.0
Coherence	-1.0	1.5	0.5	0.0
Attractiveness	0.5	1.0	0.0	-0.5
Comfort	0.5	0.5	0	0
CPTED	0.5	1	1.5	2
Design score	2.0	5.3	3.8	1.5
Local Business Impact	0	-1	-1.5	0
Local Resident Impact	0	0	-1.5	-2
Operational and Network Impacts	0.5	0	-1	-2
Stakeholder score	0.5	-1.0	-4.0	-4.0
Ease of Construction/ Costs	0	-0.5	-0.5	-1
Land Requirements/ Easements	-1	-1	-2	-1
Cost & programme score	-1.5	-2.0	-3.5	-2.5
Overall score	0.5	2.3	-3.8	-5.0
Cycle weighted	0.0	7.0	-0.5	-3.5
Stakeholder weighted	1.0	1.3	-7.8	-9.0
Cost & programme weighted	0.0	1.3	-5.3	-6.5

Good Result ?

Great Result !!!!!



Summary

- Multi-disciplinary team (wide range of perspectives)
- Come with an open mind, your 'preferred' route may not be the answer
- It's only one tool in our 'kit'
- Remember your target user and who will use the facility
- Understand the impacts (loss of parking effects on local business - mitigation)
- Effective tool for leading discussions with stakeholders
- Try using it for any situation where you have to choose between different options.

