The Golden Mile Economics Assessment report: A review

August 2022

tailrisk economics
te maha hoki o nga pihikete

About Tailrisk economics

Tailrisk economics is a Wellington economics consultancy. It specialises in the economics of low probability, high impact events including financial crises and natural disasters. Tailrisk economics also provides consulting services on:

- The economics of financial regulation
- Advanced capital adequacy modelling
- Stress testing for large and small financial institutions
- Regulatory compliance for financial institutions
- General economics.

Tailrisk is prepared to undertake economics analyses of public policy proposals on a discounted or pro bono basis.

Principal Ian Harrison (B.C.A. Hons. V.U.W., Master of Public Policy SAIS Johns Hopkins) has worked with the Reserve Bank of New Zealand, the World Bank, the International Monetary Fund and the Bank for International Settlements.

Contact: Ian Harrison – Principal Tailrisk Economics
harrisonian52@gmail.com
Ph. 022 175 3669 04 384 857

The Golden Mile Economics Assessment report: A review

Introduction

This paper reviews the cost benefit analysis of Lets Get Wellington Moving's (LGWM) Golden Mile 'revitalisation' proposal. It is presented in the paper 'Economic Assessment of the Preferred Option' that was prepared by MRCagney (NZ) Ltd, an Auckland transportation consultancy.

Their conclusion was that the costs (capital and increased maintenance) were $86 million and the present value of the benefits was $399 million. The net benefit is $313 and the benefit to cost ratio was 4.6.[1]

This looks too good to be true, and it is.

The benefits are substantially generated by a 'pedestrian realm' benefit. Pedestrians were assumed to be prepared to pay $ 247 million just so they did not have to walk alongside cars on the Golden Mile. This was an absurd result. When we inspected the Waka Kotahi modelling that MRCagney used to generate this number we found that it was not fit for purpose and and should not have been used.

On the other hand the street closures were estimated to cause almost no congestion. Each vehicle journey would take an average of only about three seconds longer.

Then there were a string of omissions, errors and optimistic assumptions that all generated positive outcomes for the project.

Once these and other issues are addressed a very different picture of the benefit cost ratio energes. Our estimate is 0.38. The costs well exceed the benefits and the economic loss is $ 121 million.

[1] The benefit cost ratio should have been measured by a gross basis. That is gross costs of $106 million and gross benefits of $419 million. This generates a benefit cost ratio of 3.95.

This a significant outcome. The Wellington public has been told that this is a high quality project that will deliver a net benefit of over $300 million. But that is simply untrue. MRCagney has delivered this result by understating congestion costs and relying on the flimest of analyses to pump its benefit numbers. Given our results LGWM should revisit its decision on the Golden Mile project

Detailed review of the cost and benefit components

The following is a discussion of the components of the MRCagney cost benefit analysis, which are set out in figure one. Where we disagree with the MRCagney assessments we have provided our own estimates.

Figure one: MRCagney cost benefit analysis components

Cost/Benefit	Present value ($m)
Costs	
Construction costs	$80
Maintenance costs	$6
Total costs	**$86**
Benefits	
Car travel time impact	-$20
Emission reduction benefit	$17
Health benefit from mode shift	$48
Public transport travel time impact	$18
Public transport reliability impact	$27
Pedestrian travel time impact	$25
Pedestrian crash reduction benefit	$37
Pedestrian realm benefit	$247
Total benefits	**$399**
Net benefits	$313
Benefit-cost ratio	**4.6**

Capital

We have used the 95th percentile capital cost estimate rather than the mean estimate of $80 million. Infrastructure builds have a propensity to experience escalating costs, so the 95th percentile estimate may be more realistic.

Cost of private travel time impact - $20 million

The - $20 million (a cost not a benefit) is the present value of the $1.1 million annual private vehicle travel time costs caused by the road closures. The $1.1 million was generated by multiplying the average number of vehicle journeys, pre and post the intervention, by the change in the average journey time and the cost of time. Working back from the $1.1 million the average increase in journey times is under three seconds. [2]

However, when we reviewed the supporting documentation[3] we found no mention of the $20 million cost. The average increase in the journey time was 2 percent which equated to a present value cost of $38 million when driving demand is adjusted for the impact of increased travel times, and $78 million if demand is fixed. The reason for this low average increase in journey times is that most travel is unaffected and the increases are concentrated in a few routes. People travelling from and through Kelburn, Highbury and the Aro valley could face travel time increases of up to 50 percent.

The problem with the explanations in the Economic report is that they do not appear to be internally consistent and consistent with the underlying modelling. Driving demand is expected to fall by about 10 percent. However, the assumed elacticity of travel with respect to journey time is - 0.7 which means that there should be a 14 percent increase in journey times.

The per journey time impact and the reduction in the number of journeys do not seem to jell. Why would 10 percent of car journeys be abandoned when the journey time has gone up by less than three seconds?. If the fall in demand estimate of 10 percent is correct then this would imply a travel time cost of $500 - 600 million.

There is no explaination in the paper of why there is 10 percent reduction in journeys when the underlying model reports a 2 percent reduction. We recently attempted to get an explanation from MRCagney. They did not provide one.

---

[2] $1.1 million / $20 hrly cost = 55,000 hrs. 55,000 x 3600 seconds/ 70,000,000 journeys = 2.8 seconds. Note that some journeys in the area will not be affected by the street closures which would pull down the average, but under three seconds a still a very small effect.

[3] Traffic Assessment Report October 2021

There was a peer review of the economics report by Flow Transportation Specialists [4] another consultancy. They did no spot the consistency issue we have raised. There was a lot of toing and froing between the two consultancies on the traffic circulation modelling that ultimately drives the economics. These exchanges are too complex to recount here but it seems that the travel circulation model is somewhat hair triggered and that a modeller can generate a wide range of results depending on how key parameters are set.

Despite the consultants' discussions on the sensitivity of the results to assumptions there was **no** sensitivity testing of the private travel cost estimate in the economics paper. Sensitivity results were reported for most of the other modelling results. The lack of a sensitivity test means that the reader is not alerted to the possible risk of a blowout in congestion costs.

As it stands the costs benefit analysis reports that the the Golden Mile streets can be closed off at almost no cost to private transportation. This does not appear to be robust. But what to replace it with? Starting with the Traffic Assessment report we have selected the mid point between the reported estimates of $38 million and $78 million. There are several technical reasons justifying this more conservative approach, which are too complex to recount here. We have also made an adjustment for logistics and servicing costs. There has been a lot of feedback on these cost issues from the market but they were not mentioned, let alone an attempted made to estimate them.

Our total estimate is $80 million, but there is a risk that it could be substantially higher.

Emission reduction benefits: $17million

MRCagney's emission reduction model inputs, which are set out in our figure two (from their table 8), are driven by the 10 percent reduction in journeys noted above. As this reduction appears to be overstated by a factor of five a consistent application of the Traffic Assessment model reduces this to $3.7 million. Further, in the emission modeling insufficient account appears to have has been taken of the increasing share of electric vehicles in the fleet in the latter half of the estimation period. The estimates appear to be based on the 2038 fleet shares, when the electric car share is small, but by 2062 almost the entire electric fleet will be electric.

[4] Flow Transportation Specialist Let's Get Wellington Moving Peer Review of Golden Mile SSBC: Traffic Modelling and Economic Analysis September 2021

Emission reductions due to electrification would have occurred without the Golden Mile changes so they should not be counted as project benefits.

Adjusting for the growth in the EV fleet reduces the emission benefit to about $2.5 million.

Figure Two: MRCagney emission reduction impacts

Table 8 2038 vehicle emissions impacts

Emissions type	Change in vehicle kilometres travelled	Emissions rate (g/km)	Reduced emissions (tonnes)	2020 $/tonne	Benefit
CO (carbon monoxide)	21,003,910	0.253	5.31	$4.75	$25
NOx (nitrogen oxides)		0.132	2.77	$18,799	$52,121
PM10 (brake & tyre)		0.023	0.483	$529,014	$255,561
CO2 (carbon dioxide)		178.7	3,753	$178	$668,105

Health benefit from mode shift: $48 million

The health benefit is due to an assumed mode shift from cars to public transport. Twenty percent of the reduction in private vehicle trips is diverted to public transport. As per the discussion above this estimate is overstated by a factor of five.

The public transport journeys are assumed to have an associated 400 metre walking leg (to and from the public transport). A health benefit of $4.58 per kilometer is applied to this 400 metres because it reduces inactivity and so increases life expectancy. The $4.58 is based on Waka Kotahi advice, which, put bluntly, is wrong. The Kaka Kotahi policy paper[5] explains why.

Over 80% of the total deaths related to diseases associated with physical inactivity in New Zealand occurred in the age group of people aged 65 years and above. Excluding people aged 65 years and above resulted in the total benefits being reduced by almost 90%.

Waka Kotahi did not adjust their analysis for the fact that the commuters who dominate public transport travel group will be 18-65 year olds. The 'rationale' was that the original, 1991, study of the value of a statistical life in road accidents did not adjust for age. The death of a 90 year old is assumed is just as costly as the death of a 10 year old, which is at odds with all the analysis that uses the QALY (quality adjusted life years) metric. Being wrong historically is not a justification for continuing to be wrong.

[5] HEALTH AND ACTIVE MODES IMPACTS A technical paper prepared for the Investment DecisionMaking

Waka Kotahi appears to have been driven by a political imperative to boost the health 'co-benefits' of public transport rather than by sound economics.

Our conclusion is that the health benefits from the walking associated with public transport are overstated by a factor of about 10. When we further adjust for the overstatement of the reduction in the number of trips it is appropriate to set the health benefit at zero.

Public transport travel time benefits: $18m

The public transport travel time benefit is an estimate of the value of travel time savings to public transport users because of faster journeys along the Golden Mile. We have used the MRCagney estimate. It is notable that the public travel time benefit, which are a major rationale for the Golden Mile project, is quite small and appears to be driven by improved scheduling rather than by the removal of private vehicles from the Golden Mile. These enhancements could presumably be secured without restricting private vehicle travel and removing car parks.

Public transport reliability benefits: $27 million

The public transport reliability benefit is an estimate of the value of the improved reliability of public transport. The MRCagney estimate assumes that the benefit is a function of the reduced volatlity of travel times but there is no justtification for the calibration of this model. The $27 million benefit looks to be excessive relative to the travel time benefit so we have reduced it to $18 million.

Pedestrian travel time benefits: $25 million

The travel time benefits for pedestrians come from removing signalised crossings on side streets along the corridor. These walking times savings estimates are probably overstated. Currently many pedestrians do not wait for the signal before crossing the lightly trafficked side streets. We have reduced the MRCagney estimate to $20 million.

Pedestrian crash reduction benefit: $37 million

There is no analysis behind the MRGagney crash reduction benefit estimate. They simply assumed that there would be a 70 percent reduction in accidents because cars would be banned from the streets (but not from cross streets). The only reasoning appears to be that this is as much as Waka Kotahi advice would permit.

MRCagney failed to specfically address the risks posed by buses. The bus/pedestrian accident data is readily available but it was systematically ignored in all of the Golden Mile papers.

We looked at Waka Kotahi public[6] Crash Accident System (CAS) accident data [7]for the Victoria to Wllis section of Manners street and the Willis to Mercer Street leg. We found four serious and one fatal accident involving buses and pedestrians. None involved cars. On the whole length of Lambton Quay buses were responsible for three serious pedestrian accidents and cars, one.

The risk from buses could well increase if pedestrians become more inclined to absent mindedly walk in front of buses because there are no cars to remind them that they are on a road. This might have driven the recent spate of Manners Street accidents. And if there are more buses, and they are running faster, then the risks to pedestrians will further increase. Further, if there is a bus accident it is more likely to be severe of fatal. Cars are designed to allow a pedestrian to survive a lower speed collision. Buses are not.

Having regard to the above information we have assumed that accidents reduction benefits are reduced by about 75 percent to $8 million.

Figure 3: MRCagney accident benefit inputs

Table 14 Summary of crash analysis and crash reduction benefit

Crash severity	Estimated total crashes (2011-2020)	Estimated reduced crashes (10 years)	Cost per crash (2020$)	Do Minimum, annual cost of crashes	Option, annual cost of crashes	Annual benefit of crash reduction
Fatal	1	0.3	$4,674,000	$467,400	$140,220	$327,180
Serious	37.5	11.25	$495,900	$1,859,625	$557,888	$1,301,738
Minor	225	67.5	$27,360	$615,600	$184,680	$430,920
Non-injury	31.5	9.45	$1,710	$5,387	$1,616	$3,771
Total	**295**	**88.5**		**$2,948,012**	**$884,403**	**$2,063,608**

Pedestrian realm benefits

The big benefit number is the 'pedestrian realm' benefit with a present value of $247million. Explaining how 'pedestrian realm ' benefits are generated is complicated, but the basic idea is that people value some walking environments more than other. This preference is valued and expressed it in terms of: the change in desirability of the environment; the time walked in that environment; and the value of time. For example, assume that there is an amenity or desirability premium of 20 percent; a 15 minute walk; and the value of time is $20 per hour. The value to

[6] Note that the public CAS site appears to understate the absolute number of accidents. However we have no reason to believe that the under reporting on this site is biased for/or against the reporting of serious bus/pedestrian accidents.

[7] We focused on the deaths and serious injuries because together they dominate the loss data

the walker is $1= (0.20 x.25 x 20). These numbers are aggregated over time and across all walkers, to generate the benefit totals.

While urban amenities such as trees and shrubs are hard to value Waka Kotahi has had an attempt at it and has issued some initial guidance for 16 parameters. MRCagney used three of them. Trees or shrubs were given an amenity value of 0.20; seating .01; and the reduction of adjacent traffic volumes 0.05 per 1000 vehicles per day.

We have reviewed the supporting research paper[8]. The parameter estimates were generated from a review of the overseas literature and are a sample size weighted average of the relevant studies.

The MRCagney benefit results were almost entirely driven by the vehicle volume factor. This is apparent in table two, which replicates the MRCagney presentation of the data. For example, walkers on the north side of Courtney Place are supposedly prepared to pay an uplift of 0.86 per hour of their time cost. Of this 0.79 is explained by the reduction in vehicle volumes of 16800. The remainder is presumably due to the odd additional seat and some plants. The 0.86 parameter means that the average walker would be prepared to pay $3 - 4 a week for a carless walking environment on just that section of road.

On the other side of the street the willingness to pay factor is 0.66. It is hard to see why a positive number, let alone such a high one, can be justified. Pedestrians are 'protected' for most of the length of this stretch of pavement by a wide pedestrian plaza and parked cars.

The smallest uplift is for Manners street walkers at 0.05, which is driven by the traffic volume reduction from 2200 to 1100.

Anyone familiar with the streets of Wellington will know that these numbers do not make sense. We doubt if anyone would differentiate between Courtney place and Manners street in assessing the pleasantness of walking down the street. Indeed Courtney Place is the entertainment centre of Wellington and thousands spend many hours sitting outdoor, mostly obvious to the passing traffic. The only annoyance for most are the buses, which will not be removed in the Golden Mile

[8] **Waka Kotahi**
IMPACT ON URBAN AMENITY IN PEDESTRIAN ENVIRONMENTS A technical paper prepared for the Investment DecisionMaking Framework Review 11 MARCH 2020

plan. And the idea that Courtney Place revelers would pay up to $15 per hour for the car traffic to be removed, as this model implies, is fanciful.

The problem is that Waka Kotahi's per 1000 vehcile factor of 0.05 is not robist. Of the contributing studies 60 percent had a positive value and 40 percent a negative value for the traffic reduction parameter. Waka Kotahi also noted:

some studies find that higher traffic volumes are positively valued, which may be due to confounding with other desirable attributes (such as slower speeds or retail main streets).

Obviously traffic speed matters. It is one thing to walk next to traffic travelling at 25kmh., and another when the speed is 70kmh. The type of traffic is another factor . Heavy trucks and buses are much more off putting than cars. Indeed, some people may even get a benefit from looking at the cars. It can the walk more interesting.

What this means is that a number of surrounding circumstances matter. An average figure from a host of foreign studies should not be used without an understanding of what is driving those results and a careful examination of the street scene where the local changes are to be applied. Unfortunately we were unable to examin the literature because Waka Kotahi did not provide the relevant references.

A further issue is that the 0.05 parameter estimate may just be an artifact of Waka Kotahi's data manipulations. The pedestrian environments attribute definitions varied between studies so they had to be put into standard units

For instance, values for traffic volumes were all restated in terms of WTP for a 1000 vehicle reduction in average annual daily traffic

And two studies were cited:

For instance, Sheldon et al (2006) report a value for the benefits pedestrians receive from lower traffic volumes, while Kelly et al (2006) report values for the disbenefits they receive from medium or heavy traffic, relative to low traffic volumes.

How you can get from a result expressed in terms of the difference between higher and lower traffic volumes to a parameter expressed per 1000 vehicles is not at all clear. It seems likely that Waka Kotahi just made the numbers up.

Our conclusion is that Waka Kotahi's advice on the traffic volumes reduction beneft is not fit for purpose and should be withdrawn. We understand that MRCagny felt obliged to use Waka Kotahi ratio because this is a project that Waka Kotahi has a direct involvement in. This means that the economic analysis is not genuinely

independent because the consultants have not exercised their own judgement. This has implications for the robustness of transport cost benefit analysis more generally. Waka Kotahi can manipute outcomes, for essentially political purposes, by imposing its 'advice'.

We have assigned a zero value to the pedestrian realm benefit. This is consistent with our informal survey of pedestrian preferences. We asked eight Wellingtonians what they would pay to have cars removed from the Northern section of Courtney Place. The answers were all zero. This may not be a statistically robust estimate but it is better than Waka Kotahi's effort.

However, we have assumed that the $8 million spent on streetscaping will provide an equivalent environmental value.

Table One: MRCagney Realm benefits and results

Segment	Lambton Q	Lambton Quay S. of Grey	Willis st	Manners	Courtny Plce.N of Tory	Courtny S.of Tory
Current state Tress	Lots of trees but most in the median 80%	Scattered 25%	Free coverge on half the sector 80% 3ast50% west	Street trees though the whole section 100%	Mostly in median 50 %	100%
Option	100%	0	25	25	60	70
Current state Plantings	10%	0	0	25	10	25
Option	60	0	25	25	60	70
Traffic volume	7500	3900	6400	2200	16800	8900
Buses	1100	1100	1100	1100	1100	1100
Willingness to pay for improvements	0.39 E 0.39 W	0.14 E 0.14 W	0.32 E 0.29 W	0.05 E 0.05 W	0.86 E 0.66 W	0.43 E 0.43 W
Traffic Volume impact on WTP	0.37	0.14	0.27	.05	0.79 0.79	0.39
Foot traffic	E 6300 W 9600	E 5600 W 17600	E 11800 W14400	E 3600 W2000	E 5100 W5000	E 6100 W5900

Description of the cost benefit analysis in the Business Case

The sources of the pedestrian realm benefits were misrepresented in the November 2021 Business Case document. They were presented as follows:

- *People walking to the Golden Mile due to more seating being available*
- *People walking further because they enjoy walking along routes with trees / plantings on or adjacent to the footpath*
- *People walking further because there will be significantly fewer PMVs (Private motor vehicles to avoid on the route, and*
- *People are willing to walk further for improved footpath capacity*

This gives the impression that there were a range of benefits, when as we have seen, they are almost all driven by the fall in vehicle numbers. There were no calculated benefits from increased footpath capacity at all, and the seating and trees/planting benefits were very small.

Lost car parks

We understand that about 150 car parks will be lost. These have an opportunity cost which MRCagny simply ignores. We have assigned a value of $100,000 per park for a total cost of $15 million

Non-monetised benefits

The non-monetised benefits were identified as:

- Benefits to cyclists
- Footpath widening benefit
- Public realm benefits

Benefits to cyclists were assumed to be small.

The discussion on footpath widening benefits admits that based on Waka Kotahi advice, the quantitative evidence is that Golden Mile footpaths are nowhere near being crowded.

However, MRCagney tried to salvage something for footpath widening (which accounts for a major part of the capital cost of the project), even if it didn't make it into the formal cost benefit analysis.

Although the quantitative evidence is unclear (not true the evidence was clear) *as to the extent and scale of footpath crowding, there is clear anecdotal evidence of this along the corridor, particularly when there are huge crowds waiting at bus stops or where there is lots of street furniture reducing the effective width of the footpath. The preferred option for the Golden Mile increases the footpath widths along most of the Golden Mile which will have associated benefits although these are not quantified here. Previous work (in the Economic Assessment of Short List Options for MCA, January 2021) estimated that annual benefits from pedestrian widening could be as great as $600,000- $750,000 with present value benefits potentially reaching $17m.*

We have not been able to find the earlier economic assessment but it appears that the crowding is limited to a few areas of Lambton Quay and Willis Street. There can be some congestion in late night Counrtney place but this is probably a plus. It brings more energy to the area. The reported benefit estimates look dubious.

Public realm benefits

The 'public realm' benefit described in the Business Case document is a 75 percent increase in 'the public realm' space. It is not clear how this 75 percent increase was calculated. This increase generates:

- *Increased composition (e.g. character): side street closures will encourage people to spend more time on Courtenay Place and Lambton Quay*
- *Improved comfort (e.g. habitable areas): there will be opportunities to make greater use of available sun light in public spaces on Courtenay Place and Lambton Quay. Safety perceptions will improve as there will be greater separation from vehicles*
- *Improved connectedness (e.g. ease of access across): access will improve through removal of PMVs and reduced traffic lanes on Lambton Quay, Courtenay Place and Willis Street, and Increased activation space for retailers / hospitality: this space can be utilised for trade on Lambton Quay and Courtenay Place.*

Most of this is just unsupported assertion. Courtney Place already has plenty of outdoor spaces that are not intensively used. There is no evidence from the relevant businesses that they will be attracted to invest into these new spaces or any evidence that businesses were even approached. The sole benefit appears to be that a few bar and restaurant owners will be able to extend further into the Courtney Place payment. The value of this could have been assessed by calculating the rents for what would become private space. And stopping private vehicle access to the Golden Mile streets will obviously not improve access for many people.

Summary of costs and benefits

A summary of our cost and benefit estimates is set out in table two. The benefit/ cost ratio is 0.38, and the net economic loss is $121 million.

This a significant outcome. The Wellington public has been told that this is a high quality project that will deliver a net benefit of over $300 million. But that is simply untrue. MRCagney has delivered this result by basically ignoring possible congestion costs and often relying on the flimest of analyses to pump its benefit numbers.

Given our results LGWM should revisit its decision on the Golden Mile project

Table two: Tailrisk Cost benefit assessments

Costs	**Present value $'m**
Construction costs	95
Maintenance costs	6
Car travel time	80
Loss of car parks	15
Total	**196**
Benefits	
Emission reduction benefit	3
Health Benefit from model shift	0
Public transport travel time	18
Public transport reliability	18
Pedestrian travel time	20
Pedestrian crash reduction benefit	8
Pedestrian realm	8
Total	**75**
Cost benefit ratio	**0.38**
NPV	-121