Evaluation of the Samford – Ferny Grove Cycle Link Stage 1

Prepared for Queensland Department of Transport and Main Roads

CDM RESEARCH

Contents

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Executive Summary

The Department of Transport and Main Roads (TMR) commissioned CDM Research to undertake an evaluation of the Samford to Ferny Grove Cycle Link Stage 1, which opened in late 2015. The link consists of two sections of shared path:

- 1.3 km from Lanita Road (Ferny Grove) to Lanita Court (the "forest" section), and
- 0.4 km from McLean Road to Petersen Road (the "horse paddock" section).

The project cost $3.09 m.

Two fieldwork activities were undertaken to obtain input data for the evaluation:

- video-based manual counts classified by mode, direction of travel and time of day over a sequential 7-day period (Saturday 8 October 2016 to Friday 14 October 2016), and
- intercept surveys with bikeway users undertaken over three weekday AM periods and two weekend days.

The data was input into a cost-benefit analysis to estimate the monetary project benefits. The key results of this evaluation were as follows:

- Average daily traffic on the eastern end of the forest section (near Lanita Road) of around 100 bicycle riders and 80 pedestrians between 5 am and 7 pm.
- All pedestrians and almost all bicycle riders use the path for recreation or exercise, rather than for transport.
- The intercept surveys suggested that around 70% of path users would have made their cycling or walking trip irrespective of the presence of the path; this means they would have either used the unsealed trail that previously existed or another route such as Samford Road. A further 10% of bicycle riders and 4% of pedestrians would have used a car for their trip if the path were not present.
- The average cycling trip was 20 kilometres, compared to 7 kilometres for recreation trips.
- Most cycling trips started and finished in Ferny Grove (57%), as did most walking trips (55%).
- Respondents did not report any significant change in their walking or riding duration because of the presence of the path.
- If they could not have ridden 42% of bicycle riders would have ran or jogged, 21% would have walked and 21% would not have travelled at all.
- The cost-benefit analysis suggests the project represents good value for money; the BCR for the central discount rate of 7% was around 2.3, but reducing to around 1.4 if health benefits for those who would otherwise use car are neglected. We suggest the latter BCR is more defensible given the contradictory survey evidence on the possible physical activity benefits.

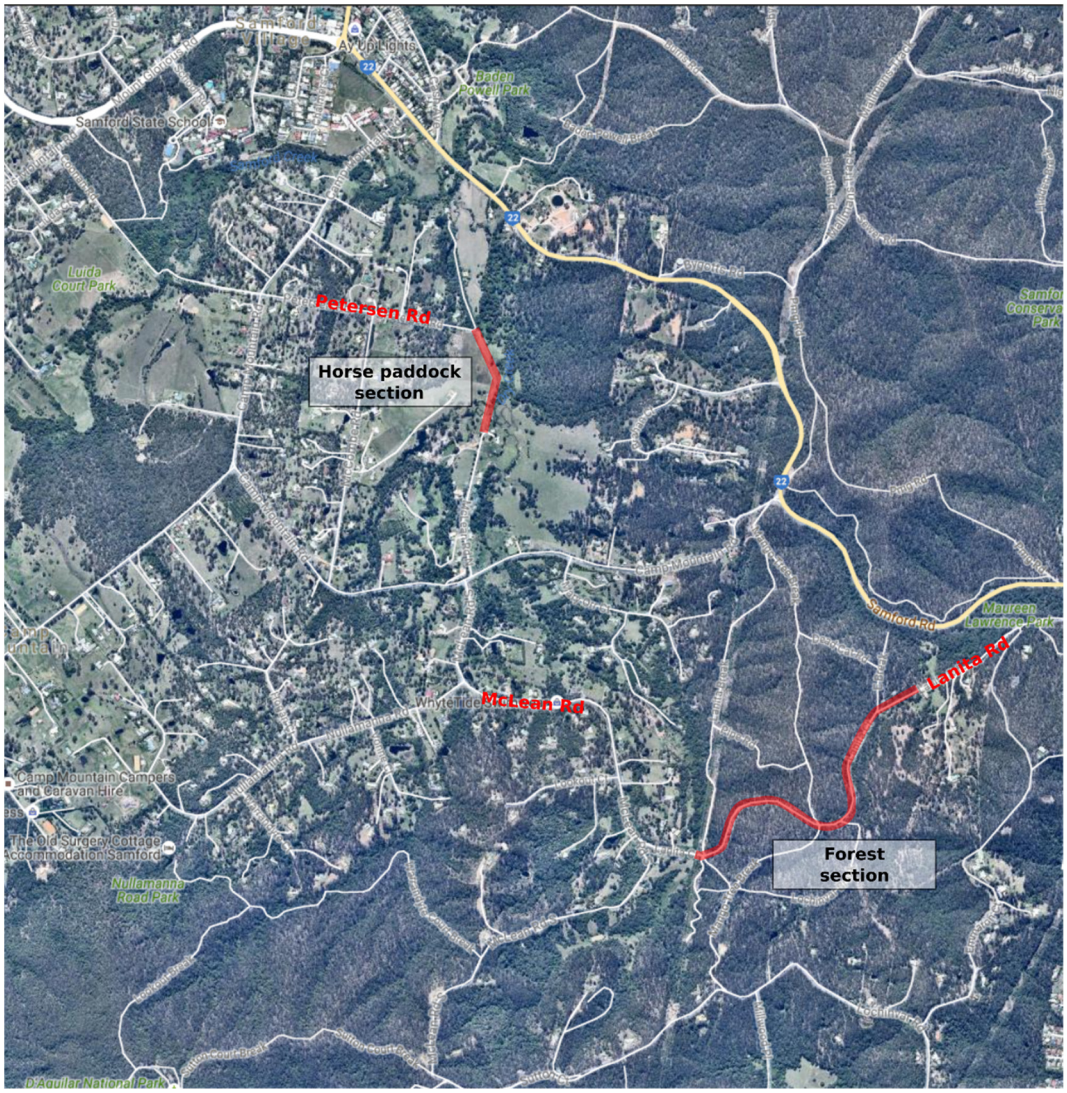
1 Introduction

1.1 Background

CDM Research was commissioned by the Queensland Department of Transport and Main Roads (TMR) to undertake an evaluation of Samford to Ferny Grove Cycle Link Stage 1 which opened in February 2016. Stage 1 consists of two sections of shared path:

- 1.3 km from Lanita Road (Ferny Grove) to Lanita Court (the "forest" section), and
- 0.4 km from McLean Road to Petersen Road (the "horse paddock" section).

The two sections of path are connected by a shared on-road section along McLean Road over a distance of around 2.5 km (Figure 1.1). The project cost $3.09 m.



■ **Figure 1.1: Samford - Ferny Grove Cycle Link Stage 1**

1.2 Methodology

This evaluation adopted a cost-benefit analysis (CBA) methodology as developed previously for TMR (CDM Research 2016). The CBA tool is implemented online[1]. The methodology requires a number of inputs, of which the most important are:

- average daily pedestrian and cyclist counts,
- average distances walked/ridden, and
- diversion rates and induced travel proportions.

The latter refer to the proportion of demand that:

- was already walking/riding before the project, and have changed their route to use the project,
- have diverted from other transport modes (e.g. private car, public transport), and
- all-new trips that would not have otherwise occurred in the absence of the project.

In order to obtain these input parameters two fieldwork activities were undertaken:

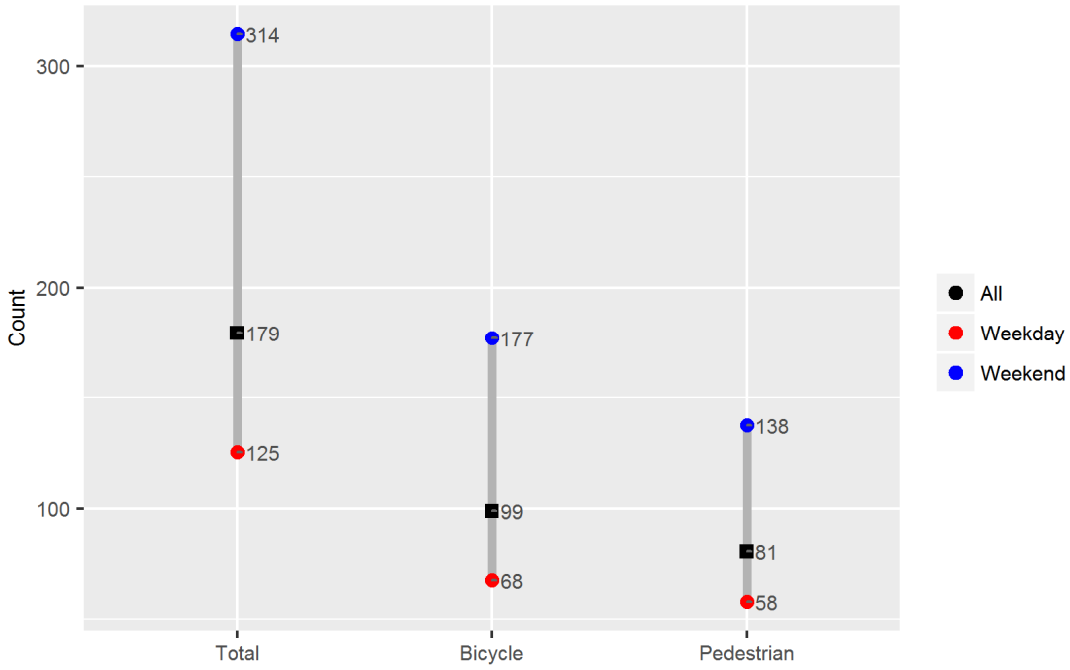
1. video-based manual counts classified by mode, direction of travel and time of day from 5 am to 7 pm between Saturday 8 October 2016 and Friday 14 October 2016 at the Somerset Street crossing, and
2. intercept surveys with bikeway users undertaken between 6 am and 9 am on Wednesday 26 October to Friday 28 October 2016, from 7 am to 10 am on Saturday 29 October and 2:30 pm to 5:30 pm on Sunday 30 October 2016.

This report first presents the summary data obtained from the fieldwork activities before then providing the output of the cost-benefit analysis.

[1] https://cdmresearch.shinyapps.io/ActiveTravelBenefits/

2 Counts

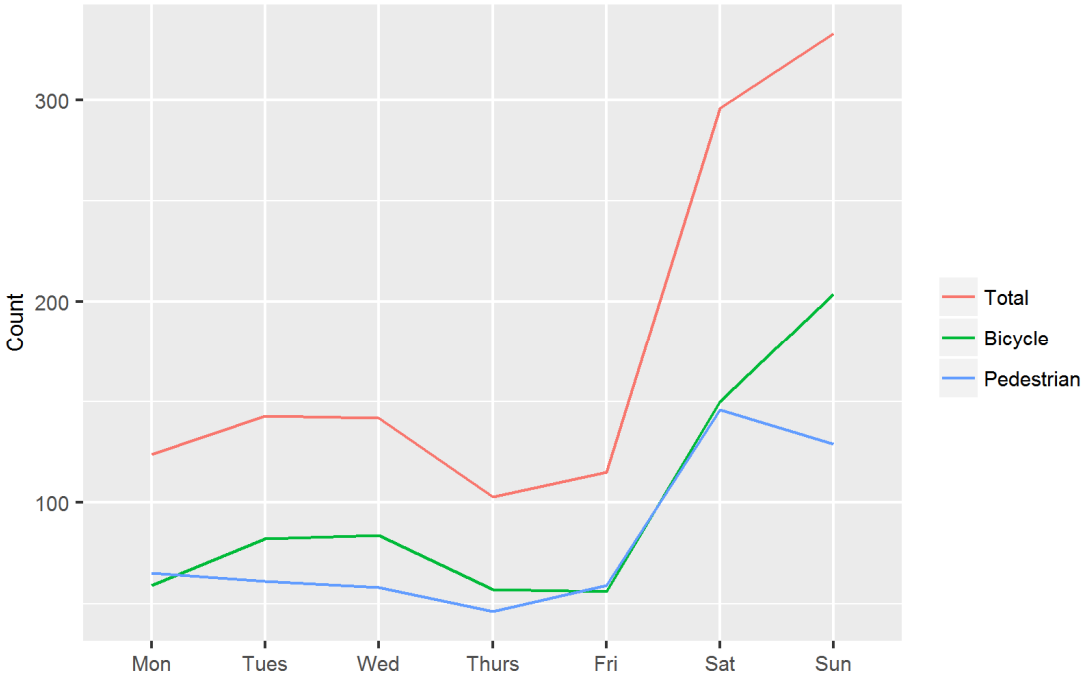
The average daily count at the Lanita Road end of the path over the seven-day count period was 179 users per day[2], of which just over half (55%) were bicycle riders (Figure 2.1). The average count was significantly higher on weekends than weekdays for both bicycle riders and pedestrians.



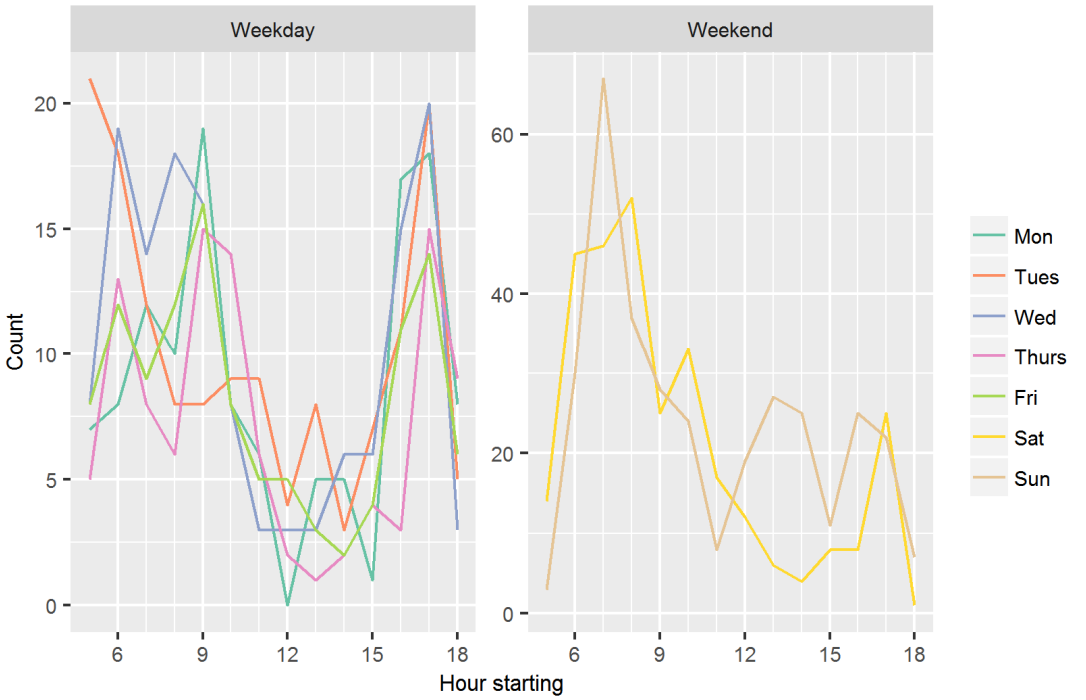
■ **Figure 2.1: Average count by mode and day of week**

The counts by day of week fluctuated markedly, as shown in Figure 2.2. The pedestrian count varied from a low of 46 on the Thursday to a high of 146 on the Saturday. The bicycle rider count was lowest on the Friday (56 riders) and highest on the Sunday (204 riders). The time of day profile suggests demand is strongest in mornings and weekend late afternoons (Figure 2.3). The small overall count results in large count fluctuations by time of day across the days of week (Figure 2.4). However, the much higher cyclist count on weekends is driven primarily by higher demand during mornings.

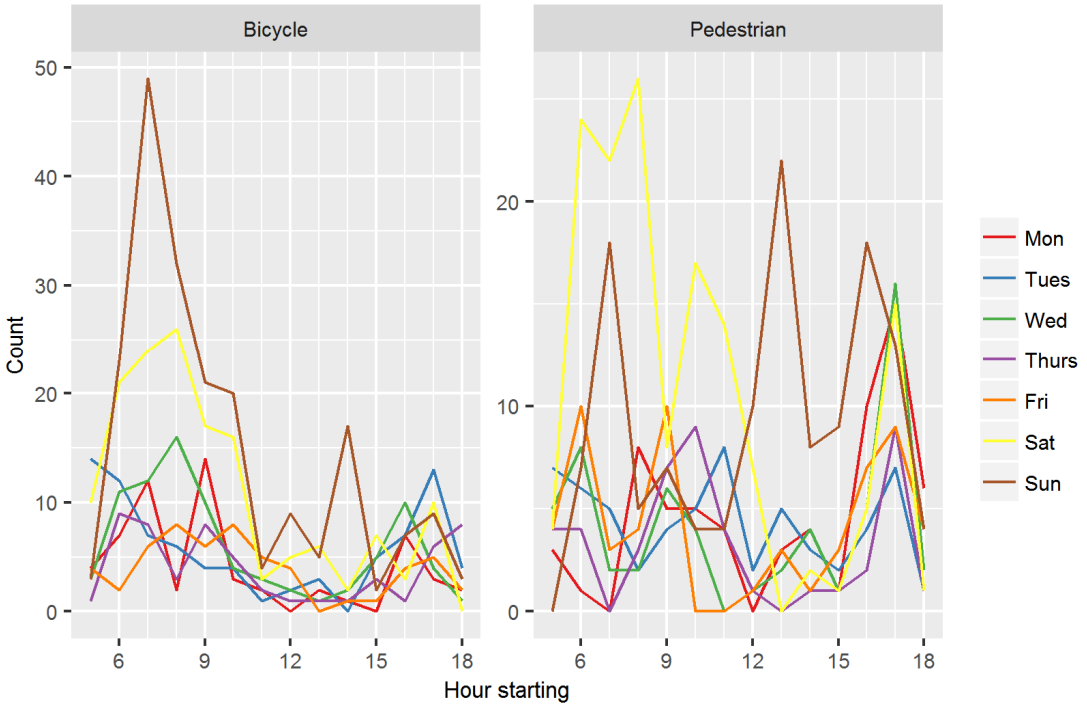
[2] Note the counts were from 5 am to 7 pm, or 14 hours such that they do not correspond to a 24-hour day. Full 24-hour counts may be of the order of 10% higher.



■ **Figure 2.2: Day of week by mode**



■ **Figure 2.3: Time of day by day of week (hourly bins) for all modes**

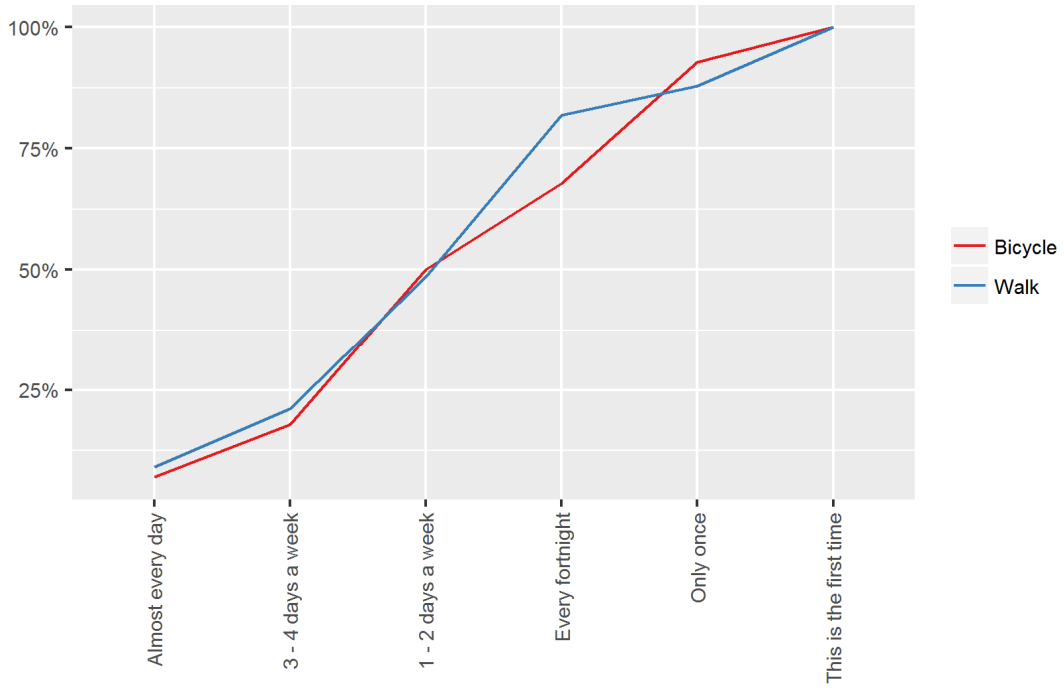


■ **Figure 2.4: Time of day by day of week and mode (hourly bins)**

3 Intercept surveys

Intercept surveys were conducted with path users near Lanita Road between Wednesday 26 October and Sunday 30 October 2016. A total of 61 complete interviews were obtained, of which 33 (54%) were pedestrians and the remainder were bicycle riders. Bicycle riders were asked whether they were also using the horse paddock section during their trip; 61% indicated they would be doing so.

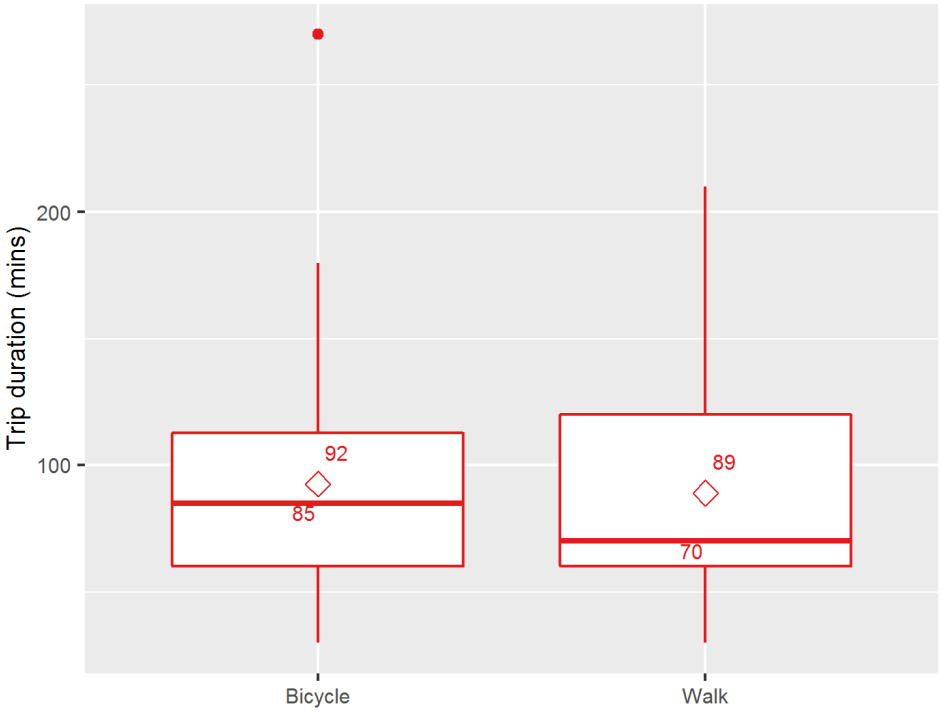
Path users are less frequent visitors than at some other paths in Brisbane; around half of both bicycle riders and pedestrians use the path at least once a week, with the remainder visiting less often (Figure 3.1). All bicycle riders and all but one pedestrian (97%) were aware the path was new. Inner city commuter oriented paths tend towards frequent users, which in turn is suggestive of more regular physical activity and hence greater health benefits.



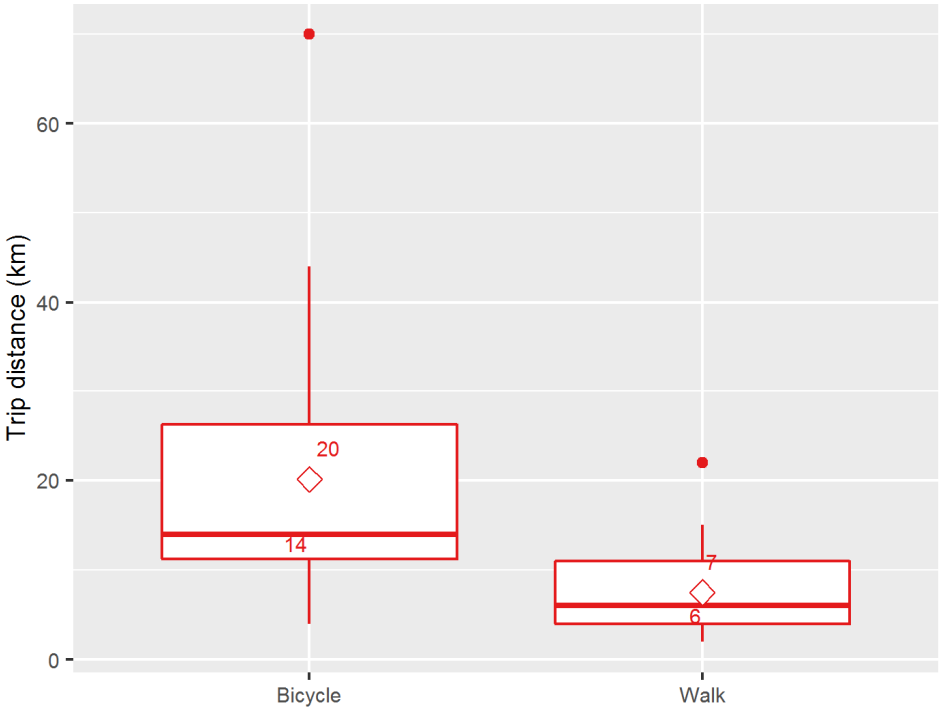
■ **Figure 3.1: Frequency of use by mode**

All pedestrians subject to the interview were walking for recreation or exercise. All except for one bicycle rider (96%) were similarly riding for recreation or exercise; this rider was commuting to work.

The average bicycle trip had a duration of 92 minutes (Figure 3.2) over 20 kilometres (Figure 3.3). Walking trips for recreation lasted on average 89 minutes over 7 kilometres. The implied average speeds of travel, particularly for bicycle riders, are significantly lower than is generally observed on paths in inner Brisbane.

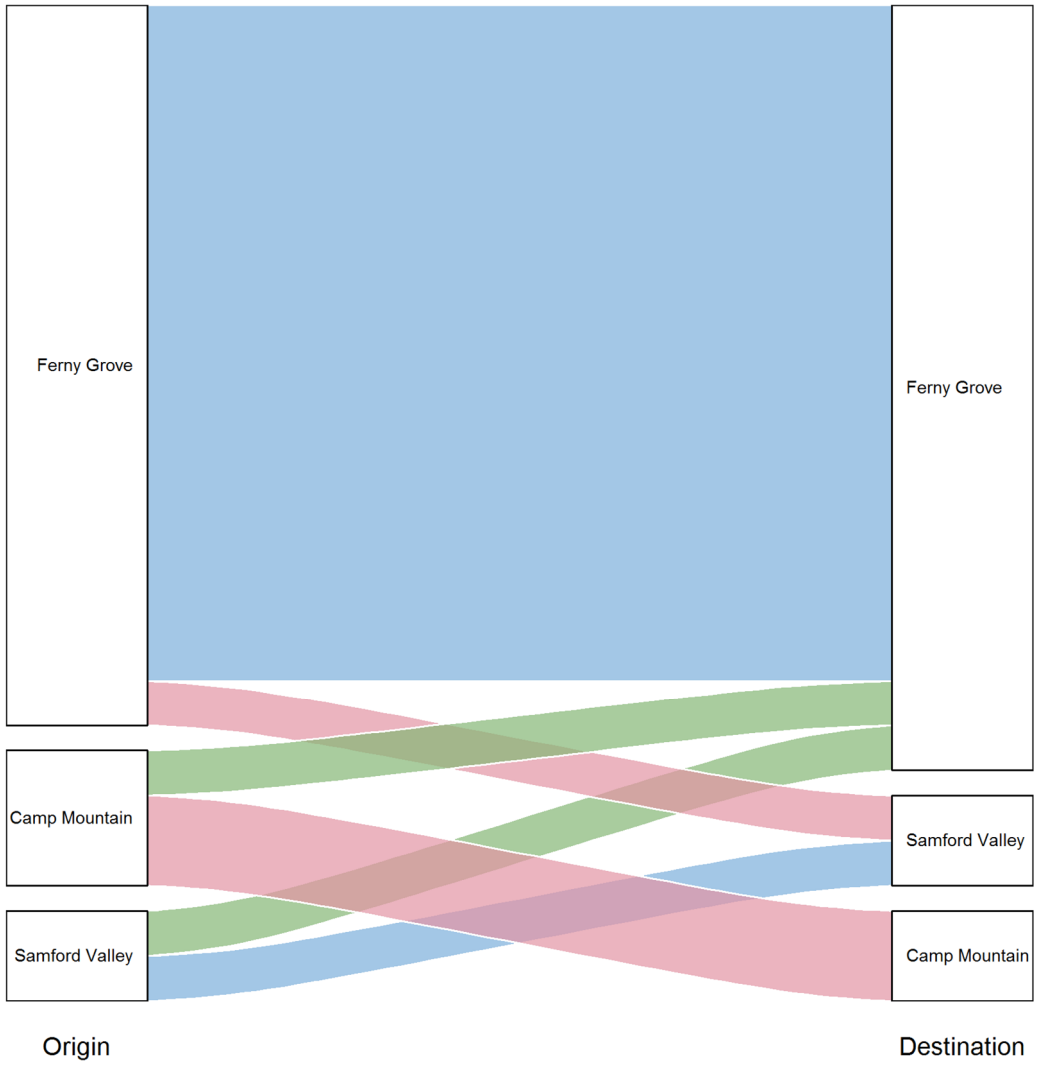


■ **Figure 3.2: Trip duration by mode and purpose (diamonds are means, lines are medians)**

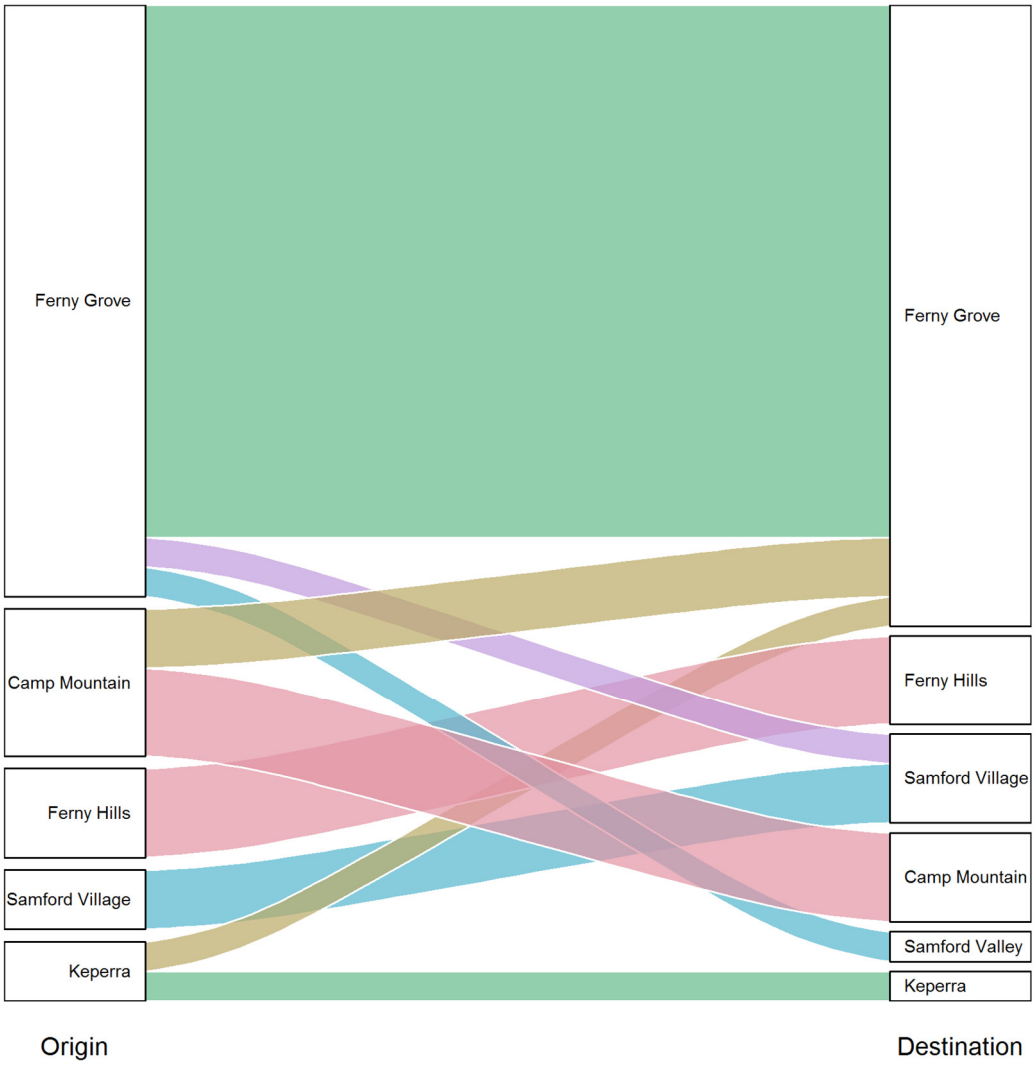


■ **Figure 3.3: Trip distance by mode and purpose (diamonds are means, lines are medians)**

The trip origin and destination suburbs by mode of travel and purpose are illustrated in Figure 3.4 for cycling trips and Figure 3.5 for recreation trips. Most trips started and finished in Ferny Grove; 57% of cycling trips and 55% of walking trips were from Ferny Grove.

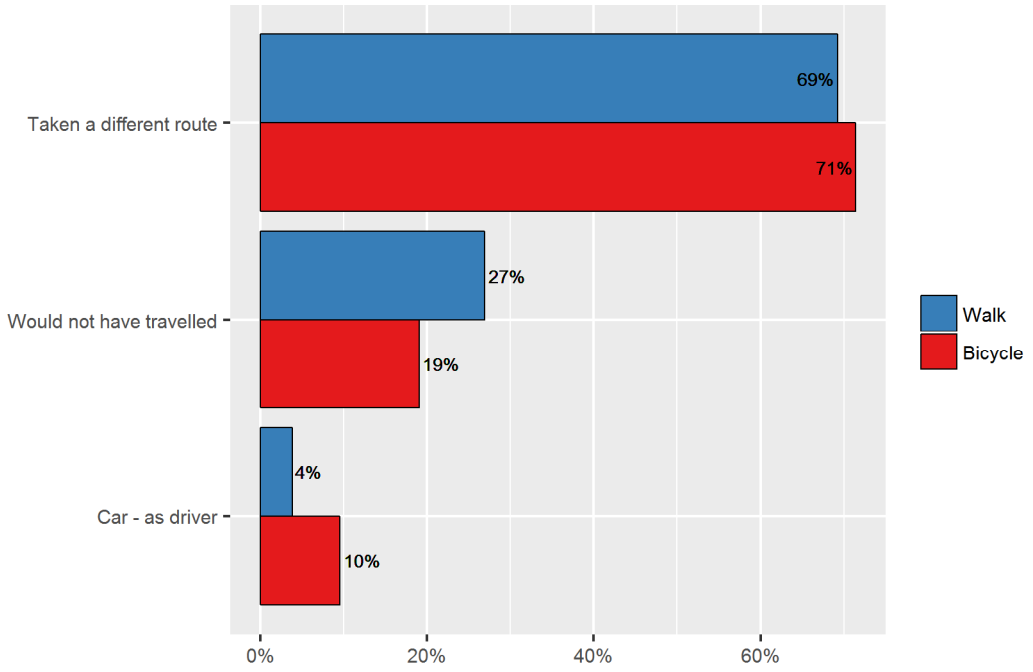


■ **Figure 3.4: Origins and destinations of cycling trips for recreation (n=26)**



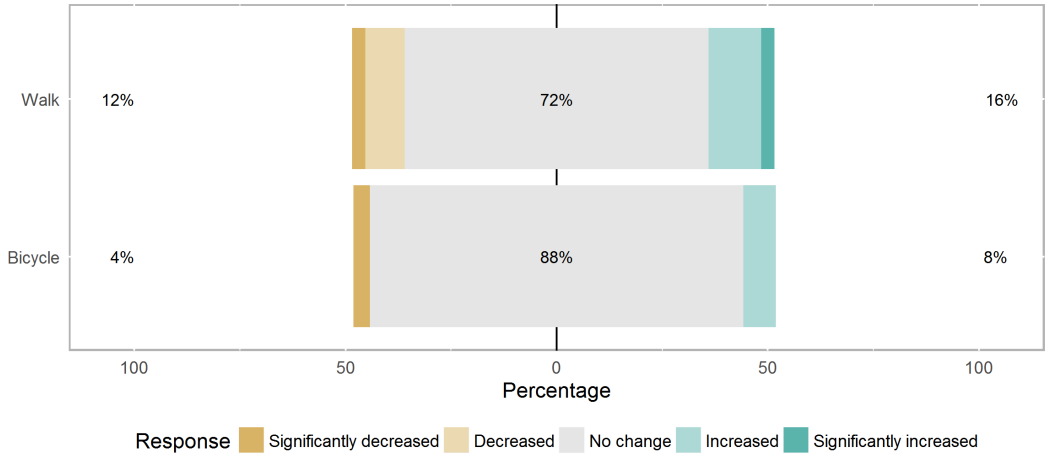
■ **Figure 3.5: Origins and destinations of walking trips for recreation (n=33)**

Respondents were asked what they would have done for their trip if the path were not present. In most cases the respondents indicated they would have taken an alternative route (Figure 3.6). A further 27% of pedestrians and 19% of bicycle riders travelling for recreation indicated they would not have made their trip in the absence of the path. This is suggestive of beneficial physical activity for these respondents. A smaller, but non-negligible proportion of respondents also indicated they would otherwise have driven a car. Given that these journeys are for recreation we assume that, in most cases, respondents are indicating here that they would drive to a location then walk or ride. If true, this has implications for the cost-benefit analysis as it suggests those diverting from car may already be achieving at least some physical activity.



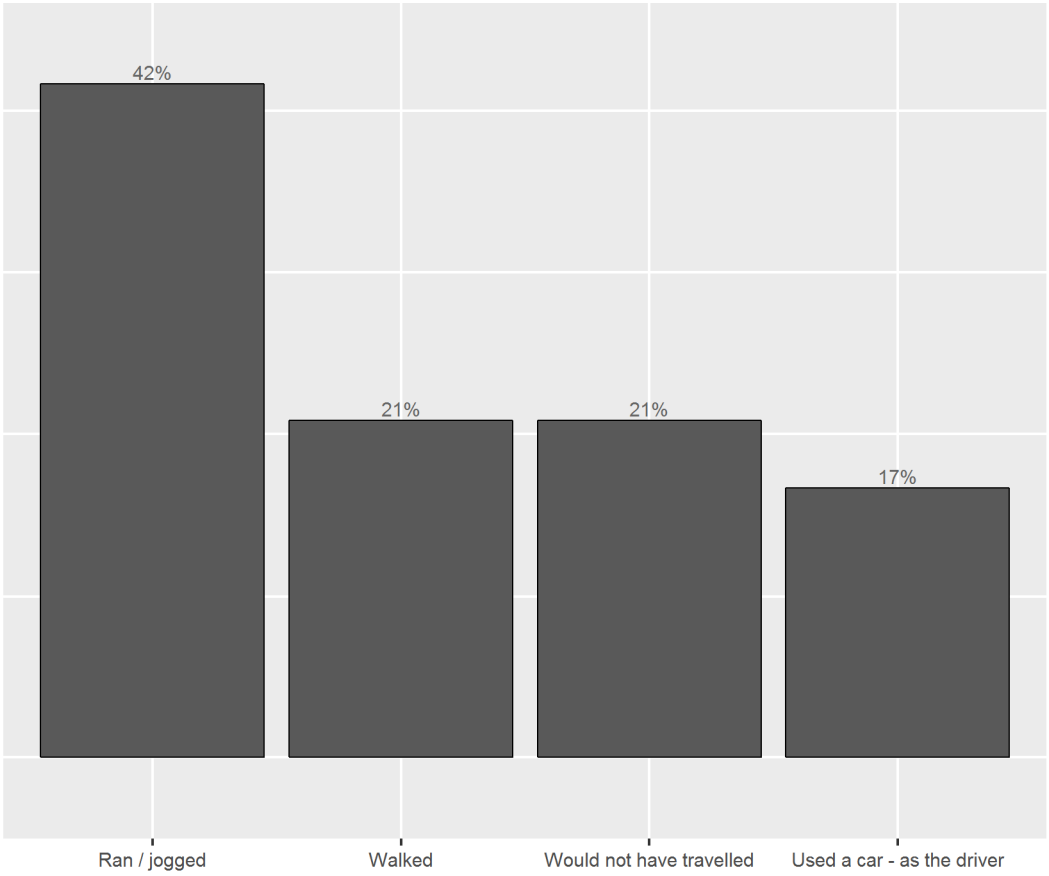
■ **Figure 3.6: What would you have done if this bikeway was not here?**

Most respondents indicated the path had not significantly altered the amount of walking or riding they'd done over the preceding month (Figure 3.7). Small minorities of respondents (12% of pedestrians and 4% of bicycle riders) indicated they had been doing less walking or riding. It is not altogether clear how one should interpret the path having contributed to a decline in walking or riding activity. Given the path existed previously as an unsealed trail it was accessible to pedestrians and those with mountain bikes. However, it is conceivable the combination of surface type and topography may have marginally reduced the travel time for bicycle riders at least, or that respondents are considering their wider physical activity behaviour beyond those attributable just to the path.



■ **Figure 3.7: Has the path changed the amount of time you've spent walking or riding over the past month?**

Bicycle riders were asked what they would have done if they could not have used their bicycle for their trip. The most frequent response was that they would have ran (42%) (Figure 3.8). A fifth would not have travelled and 17% would have used a car[3]. If bicycle riders were to substitute riding for running over the same duration they would achieve substantially higher physical activity given the greater intensity of running. However, it seems likely that respondents would substitute a long ride for a short run, thereby achieving similar levels of physical activity. Regardless, this speculation was not explored in the survey.



■ **Figure 3.8: What would you have done if your bicycle was not available for this trip?**

[3] It is not entirely clear what respondents meant here given that they were taking a recreation cycling trip.

Respondents were invited to offer any other thoughts at the completion of the survey. There were varying views on the path; 76% of bicycle riders and 69% of pedestrians were supportive of the path, while the remainder preferred the unsealed path or felt the expenditure was unjustified. Other comments concerned the mixing of pedestrians and bicycle riders, and particularly at path corners where sightlines are limited. The comments are provided in Appendix B.

4 Cost-benefit analysis

The cost-benefit analysis framework as described in CDM Research (2016) was used to estimate the monetary benefits against the costs of the project. The key elements of this framework are:

- broad consistency with the current national guidelines (Transport and Infrastructure Council 2016),
- 30-year economic life with no residual value at the end of the appraisal period,
- estimates mortality and morbidity health benefits using a willingness to pay methodology for valuing statistical life,
- no safety in numbers effect,
- 80% of bicycle travel in the area occurs on-road without provision, 5% on-road with bicycle lanes, 10% on off-road shared paths and 5% on footpaths,
- relative risks for bicycle lanes of 0.5, off-road shared paths of 0.3 and footpaths of 1.8 (all relative to on-road with no provision),
- cumulative annual demand growth of 3%,
- rule-of-half applies to the willingness-to-pay component of health costs, vehicle operating and parking costs, PT fares for all users and travel time savings for new users only,
- Monte Carlo simulation to represent parameter uncertainty,
- capital and operating cost estimates to +/-10% at 95% confidence level, and
- demand estimates to +/-20% at 95% confidence level.

The input assumptions to the cost-benefit analysis are summarised in Table 4.1, and are based wherever possible on the survey data.

■ **Table 4.1: Economic assumptions**

Parameter	Assumption	Source
General assumptions		
Economic life	30 years	
Discount rate	3%, 7%, 10%	
Health benefit ramp-up period	5 years (linear)	Genter et al. (2009)
Effective average motorist speed	30 km/h	Estimate
Effective average cyclist speed	20 km/h	Estimate
Effective average walking speed	6 km/h	Estimate
Effective average PT speed	15 km/h	Estimate
Bicycle riders		
Opening year demand (AADT)	99	Video counts
Average trip distance	20 km	Intercept surveys
Diversion: car	10%	Intercept surveys
Diversion: PT	0%	Intercept surveys
Diversion: walk	0%	Intercept surveys
Diversion: reassign	71%	Intercept surveys
Diversion: induced	19%	Intercept surveys
Transport purpose split	9%	Intercept survey
Change in trip distances	0 km	Assume no change
Pedestrians		
Opening year demand (AADT)	81	Video counts
Average trip distance	7 km	Intercept surveys
Diversion: car	4%	Intercept surveys
Diversion: PT	0%	Intercept surveys
Diversion: reassign	69%	Intercept surveys
Diversion: induced	27%	Intercept surveys
Transport purpose split	0%	Intercept survey
Change in trip distances	0 km	Assume no change
Facility		
Length	1.3 km	New path (forest section only)
Type	Off-road path	

Parameter	Assumption	Source
Diverted motor vehicle travel time by period	Busy: 10% Medium: 30% Light: 60%	Guesstimate
Investment		
Capital cost	2016: $3.09 m	TMR
Operating cost	$10,000 p.a.	Guesstimate

The results of the cost-benefit analysis are summarised in Table 4.2. For the central discount rate of 7% the BCR is 2.3, indicating good value for money. However, we suggest this BCR is unduly optimistic and cannot be supported by the survey evidence, as discussed in Section 5.

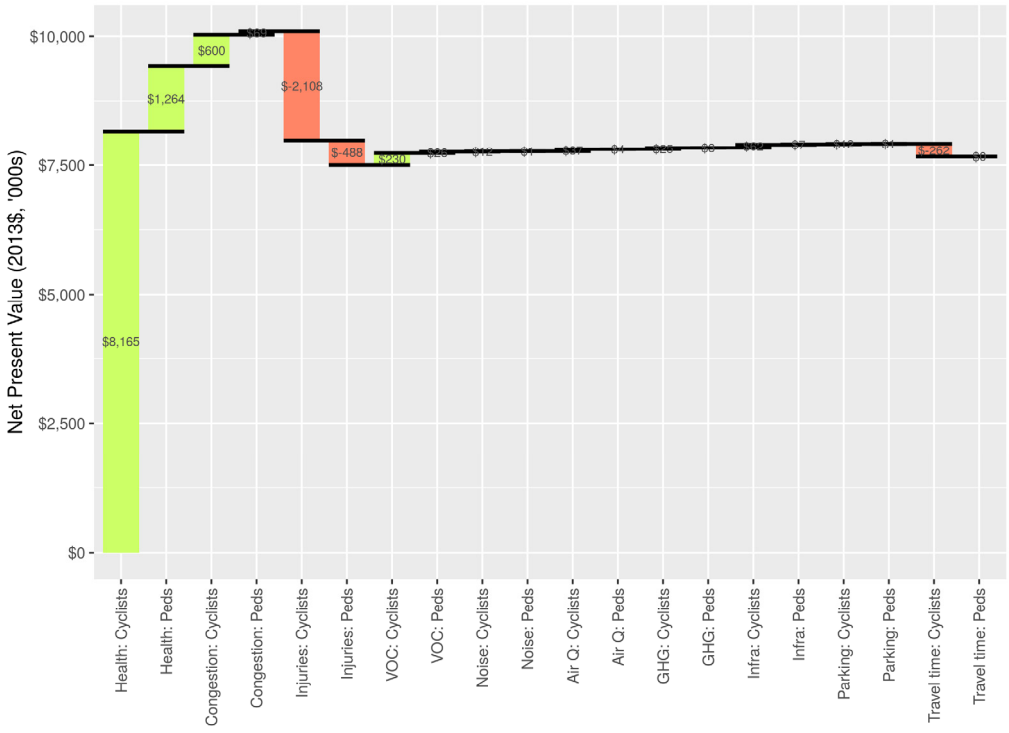
Table 4.2: Economic assessment

	Discount rate		
Parameter	**4%**	**7%**	**10%**
Benefit-Cost Ratio (BCR)	3.5	2.3	1.5
Likelihood BCR < 1.0	0%	0%	0%
Net Present Value (NPV)	$8.54 m	$4.28 m	$1.86 m
Present Value of Benefits (PVB)	$11.92 m	$7.66 m	$5.25 m
Present Value of Costs (PVC)	$3.38 m	$3.38 m	$3.38 m

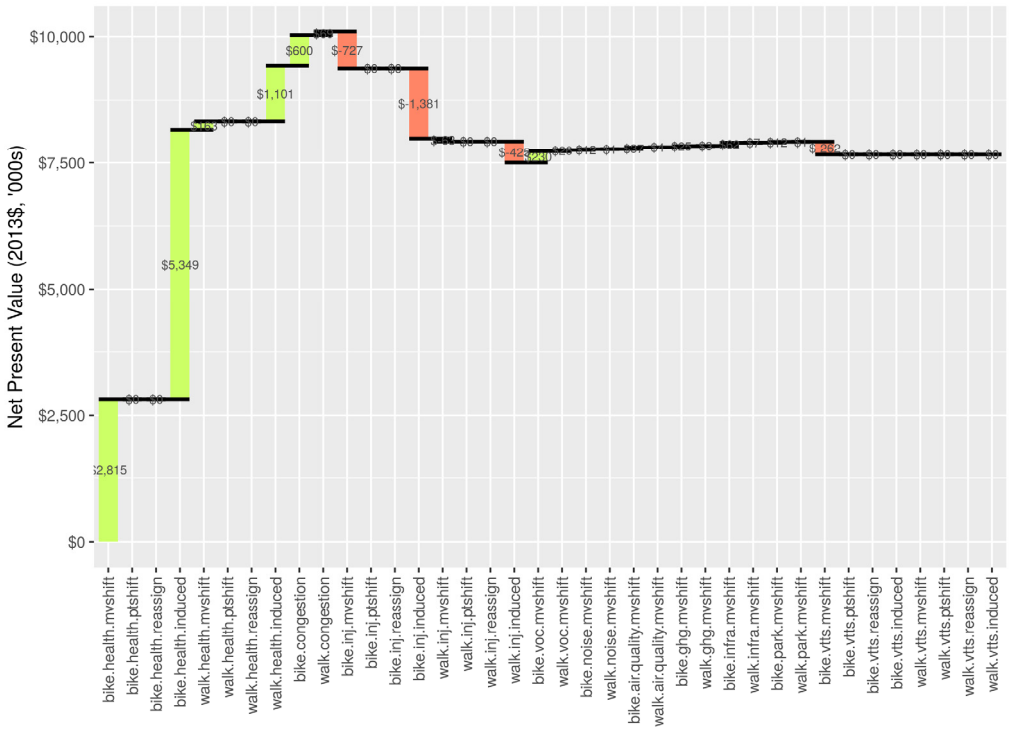
All values are 2013 prices and values.

The breakdown of the NPV for the central discount rate is shown in Figure 4.1. Almost all benefits accrue from health benefits to cyclists and pedestrians. Around half of these benefits are attributable to induced (i.e. all new) cycling trips followed by riding trips that would otherwise have occurred by motor vehicle and induced walking trips (Figure 4.2). Most disbenefits are associated with an increased injury burden. We would expect there to be additional cycling injuries due to the additional induced travel, and in shifting from motor vehicle to cycling[4]. Much of the additional cycling exposure will not occur on the path itself but rather on paths and roads leading to and from the path. As many of these roads lack dedicated cyclist provision we may reasonably expect an increased injury burden because of crashes involving motorists and bicycle riders. However, as illustrated in these figures, the health benefits very significantly outweigh the injury disbenefits.

[4] The model assumes, based on the limited crash and exposure data available, that the injury risk associated with riding is greater per distance travelled than driving a motor vehicle.



■ **Figure 4.1: Summary breakdown of net present value**



■ **Figure 4.2: Detailed breakdown of net present value**

5 Discussion

Stage 1 of the Samford – Ferny Grove Cycle Link serves a primarily recreational function for both bicycle riders and pedestrians. While demand is modest by comparison to many paths in inner Brisbane a significant minority of path users indicated that they would not have undertaken their trip in the absence of the path (Figure 3.6). This implies these users are undertaking additional physical activity, which is likely to have commensurate health benefits. It is this tendency to encourage more active travel, along with the relatively long reported average trip distances (20 km for bicycle riders and 7 km for pedestrians) that explains the favourable BCR of around 2.3.

However, it should be noted that:

1. most respondents did not report that they had increased their walking or riding because of the presence of the path (Figure 3.7),
2. the average cycling trip distance among those who stated they would not otherwise have travelled is somewhat lower (17 km) than pre-existing riders (20 km), and
3. it is not clear what recreational riders and walkers meant by indicating they would otherwise have driven a car in the absence of the path.

The first of these cannot be easily reconciled with the stated tendency to have not travelled without the path. The effect of shorter trip distances has the effect of reducing the BCR marginally from 2.3 to 2.0. However, the conclusion remains the same that the project represents good value for money.

The third issue, of diversion from car travel, is difficult to reconcile given that the purpose of recreational walking and cycling cannot, presumably, be readily substituted by car travel – given that the intrinsic reason for such recreational travel is to be outside and obtain exercise. One interpretation may be that respondents would otherwise have driven somewhere, parked and then undertaken their walking and riding. If correct, this interpretation implies there would be no change in physical activity if instead the respondent could walk or ride directly from their home along the path. We suggest this is a plausible outcome. Neglecting the health benefits to this group reduces the BCR to around 1.4. In our view this is a more defensible BCR insofar as it is more consistent with the survey data.

Finally, it is noted that the capital costs assumed in the evaluation included both the forest and horse paddock sections, but the counts and intercept surveys were conducted only on the forest section. Given the separation between the two sections (around 2.3 km along a road with no footpath) it seems reasonable to argue there will be few, if any, pedestrians walking on both sections during a trip. However, around 61% of bicycle riders indicated they were using both sections. It is not feasible to separate out the effect of each section individually for these riders; that is, we cannot determine whether these riders would still have travelled on one section if the other had been removed. As such, a conservative approach was taken which effectively assumed all costs and benefits were associated with the forest section. This is likely to marginally understate the project BCR.

References

CDM Research. 2016. 'Measuring the Benefits of Active Travel'. Prepared for Queensland Department of Transport and Main Roads.

Genter, J. A., S. Donovan, B. Petrenas, and H. Badland. 2009. 'Valuing the Health Benefits of Active Transport Modes'. Research Report 359. Wellington, N.Z.: NZ Transport Agency.

Transport and Infrastructure Council. 2016. 'Australian Transport Assessment and Planning Guidelines: M4 Active Travel'. http://atap.gov.au/mode-specific-guidance/active-travel/files/m4_active_travel.pdf.

Appendix A: Intercept survey script

We're completing a quick survey on the path. Could you help us?

1. INTERVIEWER enter mode of travel
    a. Bicycle rider
    b. Pedestrian
2. In what suburb did you start your trip, and where will you finish your trip?
    a. Start: _____
    b. Finish: _____
3. How long will the trip take?
    a. Hours: _____
    b. Minutes ____
4. How far is the trip?
    ____ km
5. What is the purpose of your trip?
    a. Commuting to or from work
    b. Fitness, recreation or sport
    c. Shopping
    d. School, university or other education activity
    e. Other: _____
6. How often have you walked/ridden here in the past month?
    a. Almost every day
    b. Every weekday
    c. 3 – 4 days a week
    d. 1 – 2 days a week
    e. Every fortnight
    f. Only once
    g. This is the first time
7. This bikeway has only recently been built. Are you aware that it's new?
    a. Yes
    b. No
8. How would you have made this trip if this bikeway wasn't here?
    a. Taken a different route (incl. used the road)
    b. Would not have travelled

c. Car – as driver
d. Car – as passenger
e. Motorcycle
f. Train
g. Bus
h. Ferry
i. Taxi
j. Don't know
k. Other: _____

9. What change, if any, would you say the construction of the bikeway has had on the amount of time you've spent walking/riding over the past month?
    a. Significantly decreased (by at least an hour a week)
    b. Decreased (by less than an hour a week)
    c. No change
    d. Increased (by less than an hour a week)
    e. Significantly increased (by at least an hour a week)
10. IF BICYCLE RIDER: What would you have done if you couldn't ride your bike for this trip?
    a. Would not have travelled
    b. Used a car – as the driver
    c. Used a car – as the passenger
    d. Motorcycle
    e. Train
    f. Bus
    g. Ferry
    h. Taxi
    i. Walked
    j. Ran / jogged
    k. Don't know
    l. Other: _____
11. IF TRANSPORT PURPOSE: Which of the following best describe how easily you could have used a car for this trip?
    a. I had a car available and could easily have got access to it
    b. I could have got a car from another person where I started my trip (e.g. another household member)
    c. I did not have ready access to a car to make this trip
    d. I do not have a drivers licence
    e. Other: _____

12. IF COULD HAVE USED CAR: Would it have taken more or less time to reach your destination by car?
    a. More time
    b. Same time
    c. Less time
13. IF TRANSPORT PURPOSE: Which of the following best describes how easily you could have made this trip by public transport?
    a. I had a convenient public transport alternative
    b. I had a public transport alternative but it would have taken longer
    c. I did not have a viable public transport alternative
    d. Other: _____
14. IF COULD HAVE USED PUBLIC TRANSPORT: Would it have taken more or less time to reach your destination by public transport?
    a. More time
    b. Same time
    c. Less time
15. INTERVIEWER enter any other comments: _____

Appendix B: Verbatim comments

Bicycle riders:

It is awesome.
This path is very safe, like to send more time on these.
It is splendid, ideal for people like me who are fitness freak.
Great path. Taxpayers money is being spent in the right manner.
Find a resolution with the property owners to extend this path to Samford. Explore going over the edges of the properties and built bridges, if need be.
Good path.
Extend it further.
This is an enormous waste of funds, the old track was serving the purpose.
Nice path, serves the purpose.
Good path.
The previous dirt path was better, had some character to it, this is cement and tar, very hot during day time, loved the old path.
This is an excellent path, good job.
The path is great
Pretty good path.
It is incredibly dangerous at junction at camp mountain where cycle path cross the road, it is an accident prone site.
It is a wonderful path, great initiative.
This path was just not needed. It is a waste of money.
Nice path but not needed.
A waste of money and efforts.
Have more of these tracks.
More cycle sign needed. A water fountain would be great.
Good tracks. Need some benches and restrooms.

Pedestrians:

Great path, love it.
Very nice path after renovation, good to use it.
Well done, difficult to use previously.
Much safer now.
The usage has increased, there needs to be separate paths for the joggers/walkers and for the cyclists.
Good track.
Pretty good path.
Good path but at blind turns it is a bit dangerous - chances of the cyclists hitting us (pedestrians)
Nice path.
The separation is not there for the cyclists and walkers.
Looks good. Will get my bike here next time.

Old pathway was better.
It is good, easy to run on. Bitumen is better than concrete.
Liked the old pathway. Lot of money spent unnecessarily.
The path is good but needs better sign boards, some maps and some benches to rest on.
It is great, fantastic path.
Good track but loved the old dirt tracks.
Good path, very well constructed.
It is a lovely path to walk on.
Good path.
Nice tracks but a lot of money has been put in this which was unnecessary.
Bad planning, the old dirt tracks were better.
Can't take horses on this tar tracks. Sheer waste of funds.
Lovely path, good job, extend it.
It is possibly over engineered, good and smooth tracks. I suggest make fire trails, do alcohol checks. Am pleased that they have put thus on Google - street view. Bikes should not use this track when wet as more accidents occur.
Fine job done.
The path is many a times covered with leaves and broken branches of trees, so regular sweeping of the tracks is needed.
Good path but a lot of money is spent on it.
The older path was much better and more preferred.
Toilets needed.