Memorandum

Memorandum

To: Ali Rajaiy **Date:** 14 March 2017

From: Harriet Priddey **Our Ref:** 3124347

Copy: Fariz Rahman, Ahmad Issa

Subject: Northcote Safe Cycle Route - Economic Evaluation

1 Evaluation Framework

The economic evaluation has been undertaken in accordance with the NZ Transport Agency's Economic Evaluation Manual (EEM) using a customised version of the full procedures. The economic analysis for the project has included the following benefits displayed in Table 1.

Table 1: Components of economic benefits and evaluation procedure adopted

Benefit Component	Evaluation Procedure
Cycle routes cycling health and environment benefits	Full procedure
Cycle routes cycling safety benefits	
Cycle journey time benefits	
Road traffic reduction benefits (decongestion)	

The evaluation was peer reviewed by MWH and recommendations incorporated. The peer review response is attached in Appendix A.

2 Assumptions

2.1 General

The following assumptions have been made in the economic analysis:

- Project opening year: 2018
- Construction time of 12 months
- The width available before and after has been estimated at 1.5m and 3.0m respectively
- Total expected cost estimate of $17,587,188
- SkyPath opening year: 2019

The assumptions in the economic benefit components are further described in the following sections.

2.2 Demand

2.2.1 Base

The cycle demand for the Project has been estimated based on the 2015 Auckland Region Manual Cycle monitor *(North Shore Ward)* report and Worksheet A20.1 from the EEM. The catchment area and population inputs to the worksheet have been based on the previous Scheme Assessment

Report (which was peer reviewed). This number is deemed appropriate as the previous numbers were derived based on the 2013 census data, which would still represent the most recent census data available.

The worksheet estimates 255 existing cyclists. However, after reviewing cyclist counts from Taharoto Road/Northcote Road it appears that current cycling numbers are supressed. Therefore existing cyclists have been reduced to 193, based on assumption that half of the Taharoto Road/Northcote Road intersection count would use the route in the project area.

As currently cyclist numbers are suppressed the number of new cyclist will be greater than the 121 calculated from the spreadsheet. Hence an increase of 183 has been chosen in order to match the initial total of 376 (existing plus new) derived from the worksheet.

2.2.2 School Students

Instead of relying on census data only, we have allowed for new school students using the route once improvements are completed. This was done based on the number of students on the roll for each school which has a catchment that overlaps with the catchment for this project. More details are shown in Table 2.

Table 2: Breakdown of School Students Using the Route

School Name	School Roll	Assumed percentage within catchment	Percentage of school students (new) likely to cycle with safe facilities	Number of school cyclists
Northcote College	1076	15%	10.0%	16
Westlake Girls' High School	2181	5%	10.0%	11
Northcote Intermediate	278	75%	5.0%	10
Northcote School (Auckland)	478	75%	2.5%	9
Onepoto School	108	75%	2.5%	2
St Mary's School (Northcote)	424	75%	3.25%	10
Takapuna Normal Intermediate	602	5%	5.0%	2
Rosmini College	1050	10%	7.5%	8
St Joseph's Catholic School (Takapuna)	381	10%	2.5%	1
Northcote College	1076	15%	10.0%	16
Total				69 per 5 days 49 per 7 days

2.2.3 SkyPath

The SkyPath project has recently received resource consent, and as such has been included in the Do Minimum for the economic analysis. SkyPath will bring new cyclists to the project area. These cyclists will also benefit from the proposed Northcote Safe Cycle Route facility improvements.

Based on the estimated numbers from a study by Angus & Associates for Auckland Council, it has been assumed that 40% of the cyclists from SkyPath could go through the Northcote Safe Cycle Route project area.

2.2.4 Growth Rate

For the base cycle demand growth rate, 4.0% has been chosen. This has been derived from historical census trends (+3.8% per annum) last collected in 2013. The SkyPath growth rate has been extrapolated from the study by Angus & Associates.

2.3 Safety Benefits

A full crash-by-crash analysis was not considered applicable due to the significant changes that SkyPath will bring to existing conditions, by increasing the number of cyclists. Instead, the safety benefits have been calculated using the value from the EEM of $0.05 per cyclist km. Safety benefits for lower Queen St were not included in the EEM as only sharrows and speed calming devices were proposed. Therefore the total route length considered was 4.2km.

2.4 Health and Environmental Benefits

2.4.1 Cycling

Health and Environmental benefits for new cycling users have been calculated using the value form the EEM of $1.40 per cyclist km.

2.4.2 Pedestrians

There are no any significant benefits for pedestrians as new infrastructure is Copenhagen lanes, and marked cycle lanes. Shared paths which affect pedestrians have been repurposed from existing infrastructure.

2.5 Travel Time Benefits (Cyclists)

2.5.1 Travel Time Cost

A travel time value of $6.42 per hour has been adopted. This has been based on both the $/h values from the 2016 EEM Table 4.1(a) and the trip generation points surrounding the project. The values used to calculate the travel time value are displayed in Table 3**.**

Table 3: Travel Time Value

Travel Purpose	At work	Commuting	Other
Split assumed	5%	50%	40%
Cost ($/h)	$21.70	$6.60	$4.25

2.5.2 Relative Attractiveness

The Relative attractiveness (RA) of 1.915 has been adopted. To obtain this value the project has been broken into 6 similar sections. Each section has been measured and an RA has been calculated based on the type of cycling facility present. To understand the RA for a certain facility information from table A20.2 of the EEM has been used. For a breakdown see Table 4

Table 4: Relative Attractiveness

Section	1	2	3	4	5	6
Length	1.3	0.98	0.67	0.48	0.77	1
RA	2	1.887	1.93	2	1.95	1.7
Comments	All shared path	One marked cycle lane on one direction and a shared path and cycle lane in the other	One shared path and one marked cycle lane with limited parking	All shared path	Cycle lane with no parking off street at some points	Semi-mixed use both directions

Assumptions:

- Queen Street RA of 1.7 assumed as it is a shared space
- Cycling lanes with partial parking along their length, RA of between 1.8 and 1.9 assumed depending on the percentage of parking

2.5.3 Mean Speed

The cycling speed for the current situation was assumed to be 15 km/h to reflect the delays that cyclists face when navigating the current route. The new cycling speed is assumed to be 18 km/h.

The travel time savings doesn't assume benefits for pedestrians as their travel time will not be affected.

2.6 Road Traffic Reduction Benefits

Road traffic reduction (decongestion) benefits have been included for new cyclists who travel during the weekday peak periods i.e. commuters. It is assumed that 50% of new users are commuters. The diversion rate (vehicle km removed from road per new cyclist km) is assumed to be 72.5% and the reduction benefit $1.56 per vehicle km per year, both from the EEM.

3 Economic Analysis Results

The economic analysis results are summarised in Table 5

Table 5: Economic Analysis Results

Item	Cycleway
Health and environment benefits for cycling facility	$15,710,460
Travel time cost savings (cyclists)	$5,856,207
Safety benefits for cycling facility	$1,059,974
Road traffic reduction benefits	$2,941,050
Total Benefits (NPV)	$25,567,691
Total Costs* (NPV)	$16,584,736
BCR	1.5

**including remarking every 10 years at a cost of $100,000*

The economic analysis carried out produces a BCR of 1.5 which would suggest a **low** economic efficiency rating under the NLTP 2015/18.

4 Sensitivity Testing

Several sensitivity tests were carried out to investigate a number of different effects. The results are summarised in a memo responding to Peer Review comments (Northcote Safe Cycle Route – Economic Evaluation Peer Review Response, 08/12/2016). These are attached in Appendix B.

Harriet Priddey
Systems Engineer
Direct Dial: +6493009681
Email: harriet.priddey@beca.com

Appendix A – Peer Review Response

The document "Northcote Safe Cycle Routes Economic Peer Review" (MWH, 16 November 2016) was reviewed and the recommendations considered. Our response to each of the recommendations is shown in the table below.

Table 6: Recommendation Responses

	Reviewer's Recommendations	Response
C1	Provide Designs and Cost estimates for review	A parallel estimate has been undertaken by an external party (Stellar Projects). There parallel estimate was generally aligned with our estimate, this is considered sufficient review.
C2	Provide basis for maintenance costs	At this stage maintenance costs are assumptions. However they are small in comparison to the other costs and benefits. This also has minimal impact on the overall BCR, when compared to other factors that are also raised by the peer reviewer. A further sensitivity test has been carried out to demonstrate that this has negligible effect on the overall BCR.
C3	Confirm analysis duration. Confirm construction timeframes and consider preparing a WS1.1.	Analysis duration has been extended from 2056 to 2057, which increases the total benefit by 1.5%. We agree that midpoint of construction should technically be year 0.5, however as noted effect is modest as error applies to both costs and benefits, so no changes has been made to the evaluation.
C4	Provide evidence supporting increase in school cycling above calculated generation.	Recently there has been a strong focus on cycling, prompted by the Ministry of Transport's Urban Cycleway Fund. In Auckland, the Council has committed $125m over three years towards cycling and walking. Auckland Transport is delivering a comprehensive programme of behaviour change activities. This included training over 10,000 children and 1,000 adults in 2015. In this context it is not unreasonable to assume that school cycling will increase. In addition, the actual numbers in the evaluation are fairly conservative, ranging from 1 to 16 extra students cycling per school.
C5	Consider factoring school cyclists by 3/5.2, or, consider sensitivity test with no cyclists.	We agree and hence have carried out sensitivity test with no school cyclists.
C6	Provide evidence of claimed extra SkyPath-generated 800 cyclists per day	We agree that the SkyPath numbers provided could be overly optimistic. We have revised them based on the review comments. We have applied 30% as the number of SkyPath users who will walk or cycle to access it. The review suggests 20%, however we note this is based on unconstrained parking, which is unlikely to be the case. We have applied 75% of all walk/cycle users to be cyclists. This is based on cycling having a catchment area approximately 3x larger than walking. This has resulted in 165 cyclist trips per day along the Northcote route from SkyPath, on the opening year.
C7	Confirm effect of SeaPath	The SeaPath project is currently at the Investigation stage and has not been granted consent. This has not been included in our economic

	Reviewer's Recommendations	Response
		assessment, but we have applied some conservatism in the analysis with applying 40% of the 412 SkyPath cyclists going through the project area. A sensitivity test has been carried out with only 25% of the cyclists using the route, as may happen if the SeaPath alternative is built.
C8	Provide evidence of sustained growth relevant to Northcote, or sensitivity test at a lower growth rate.	Cycling counts across Auckland have recently been increasing. The most recent results of Auckland Transport's monthly cycling numbers show 1.67 million cycle trips were recorded for the year of November 2015 to October 2016, an increase of 8.9% on the previous 12 months. In addition, there is potential significant development in the area. The Northcote Strategic area was designated as a SHA in May 2014, with potential development of approximately 700 new sites and dwellings. In light of this, it is not considered unreasonable to use the 4% growth rate form the survey given the lack of better data. However, a sensitivity test at a lower growth rate has been included below.
C9	Justify 3kph speed increase	The speed increase is a high-level assumption. A sensitivity test has been provided below showing that this has no material impact on BCR.
C10	Explain 10% work-related cycling component	With little evidence, we have applied the assumption based on light vehicle composition on urban roads. However, we appreciate that this could be slightly optimistic. With increasing drive from employers to increase their sustainability input, there could be increasing work related trips on bicycles. The Northcote route connects directly to the Smales Farm employment precinct. Regardless, we have reduced this work related composition trips to 5%. This changes the overall value of time to $6.42/hour
C11	Consider $TT testing with no work related component.	Further sensitivity test included.
C12	Use correct health and environment rate $1.40	Agree and amended in our evaluation.
C13	Consider method A modifications, including growth modelling as per the compendium.	Refer response on C15.
C14	Consider applying method C.	Refer response on C15.
C15	Consider reducing simplified safety benefits length.	Agree. As per the Detailed Design Report, the cycleway can be split into five sections. Four of these (1, 2, 3, 4a) have facilities expected to provide the safety benefits through shared paths, Copenhagen cycle lanes or regular cycle lanes. The last section (4b) will have speed calming devices and "sharrow" markings, which may be less effective. This section measures 1km, so the length of safety benefits has been reduced to 4.2km.
C16	Consider halving the claimed	The evaluator agreed that this is a valid comment. However as noted by the reviewer, the net result does not change the BCR and hence

	Reviewer's Recommendations	Response
	benefit for "decongestion" and removing the $0.10 Environment rate component. Increase commuter component %	evaluation has been left as is.

Appendix B – Peer Review Sensitivity Tests

Several sensitivity tests were carried out to investigate the effect of travel time values and cycling demand on the BCR. The results are summarised below. The BCR remains within the **low** economic efficiency rating range.

Note that these tests were carried out as part of the Peer Review response when the cost estimate was slightly different to the current estimate. So the exact BCRs may have changed slightly however this provides a reasonable indication of the potential BCR range.

Table 7: Sensitivity Test Results

Sensitivity Test	BCR
Decrease travel time value from $6.42 to $5.54 by excluding work trips	1.5
Exclude the new school cyclists	1.4
Decrease cycle trips growth rate from 4% to 2%	1.3
Average speed to remain at 15kph rather than increase to 18kph	1.5
Option maintenance costs increase by 50% to $150,000 every 10 years	1.6
Only 25% of SkyPath cyclists use Northcote Route	1.5