NZ Transport Agency

Horotiu Cycle Bridge (previously Te Awa Cycleway Horotiu Section)
Revision F - Cost Estimate

	bridge	pathway	comments
client managed costs	160,000	35,000	professional fees, Baird land purchase
	155,000	155,000	shared across both, prior to design and construction
subtotal	315,000	190,000	
contingency 5%	15,000	10,000	
subtotal	330,000	200,000	client managed costs incl. overheads, prof fees, client costs and contingency
construction	2,500,000	1,000,000	separate construction contracts
contingency 5%	250,000	100,000	
subtotal	2,750,000	1,100,000	construction incl. contingency
total	**4,380,000**		total for the completed pathway and bridge

NOTE 1: Cost estimate for Revision F amended according to Jen Palmer email dated 25 May 2017
NOTE 2: Maintenance costs excluded

NZ Transport Agency

Horotiu Cycle Bridge (previously Te Awa Cycleway Horotiu Section)
Revision F - Benefit Cost Analysis

benefit source	amount ($)	DF	UF	NPV	assumptions
travel time	151,692	17.50	1.45	3,849,185	affected 150 existing cyclists per day riding 5kph faster
health & environmental peds	199,564	17.50	1.17	4,086,068	75 new peds per day
health & environmental cyclists	103,478	17.50	1.17	2,118,702	75 new cyclists per day
accident reduction	8,321	11.54	1.03	98,920	1 minor injury and one non-injury, both reduced by 90%
tourist spending	1,199,025	17.50	1.00	20,982,938	10% of 93 daily cyclists are tourists spending $146 each
Total benefits				31,135,811	
option cost (capital & maintenance)				4,380,000	
Do Minimum cost				566,038	
Total costs				3,813,962	
		BCR		8.2	

NOTE 1: Analysis (except for tourist spending) done in SP11 (figures shown in bold)
NOTE 2: Tourist spending based on the avarage for other trails, assumed that 10% of the daily cyclists are tourists.

existing cyclists on the route	150	
new cyclists	75	
existing walkers on the route	150	
new walkers	75	
new route length (km)	2.7	
cycling benefit ($/cycle-km)	1.40	SP11 value
walking benefit ($/ped-km)	2.70	SP11 value
days/year	365	
assumed proportion of tourists	10%	
average tourist spending ($)	146	
annual growth rate	1.5%	

NZ Transport Agency

Horotiu Cycle Bridge (previously Te Awa Cycleway Horotiu Section)
Revision E - Sensitivity Analysis

BCR 8.2

variable	base case value	lower bound value	lower bound BCR	upper bound value	upper bound BCR
capital cost	3,813,962	-20%	9.8	20%	6.5
new cyclists/pedestrians	75	50	7.6	100	8.7
new cycling speed	20	15	8.0	25	8.3
tourist spending	20,982,938	-20%	7.1	20%	9.3
discount rate	6%	4%	10.8	8%	6.4

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 1 - Evaluation summary

Worksheet 1 provides a summary of the general data used for the evaluation as well as the results of the analysis. The information required is a subset of the information required for assessment in terms of the NZTA's *Planning and Investment Knowledge Base* .

1	Evaluator(s)	[redacted]				
	Reviewer(s)					
2	Activity details					
	Approved organisation name	NZ Transport Agency				
	Activity name	Horotiu Cycle Bridge Revision F				
	Your reference	Project Number 6050 8651				
	Activity description	Proposed cycle route from Ngaruawahia to Horotiu				
	Describe the issues to be addressed	Lack of cycle facilities				
3	Location					
	Brief description of location	Between Horotiu Bridge Road to Amani Lane				
4	Alternatives and options					
	Describe the do-minimum	Due to lack of facilities cyclists ride in Great South Road traffic				
	Summarise the options assessed	Walking/cycling off road path with pedestrian bridge (Rev F)				
5	Timing					
	Time zero (assumed construction start date)	1 July	2016			
	Expected duration of construction (months)		12			
	Period of analysis		40			
6	Economic efficiency					
	Date economic evaluation completed (mm/yyyy)		May-17			
	Base date for costs and benefits	1 July	2016			
	Land designation required		yes			
7	Data (only fill the applicable data)					
	Existing pedestrian/cycling volumes		150	AADT in year	2016	
	Estimated new pedestrian/cyclist volume	(from WS SP11-7)	75	AADT		
	Estimated motor vehicle volumes			AADT		
	Estimated motor vehicle speed			km/h		
	Pedestrian/cyclist growth rate		1.50	%		
	Width available for walking/cycling before		0.00	m		
	Width available for walking/cycling after		3.00	m		
	Length walked/cycled after works		2.70	km		
	Length walked/cycled before works		2.80	km		
	Expected reduction in private vehicle travel			km per year		

8	PV cost of do-minimum						$ 566,038	**A**
9	PV cost of the preferred option						$ 4,225,204	**B**
10	Benefit values from worksheet 4, 5, 6							
	PV travel time cost savings	$ 2,654,902	**C** x Update factor ^{TTC}	1.45	= $	3,849,608	**X**	
	PV facility benefits	$ 5,303,815	**D** x Update factor ^{WCB}	1.17	= $	6,205,463	**Y**	
	PV crash cost savings	$ 96,034	**E** x Update factor ^{AC}	1.03	= $	98,915	**Z**	

11 BCR_N = PV net benefits / PV economic costs = **X + Y + Z** / **B - A** = 10,153,985 / 3,659,167 = **2.77**

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 2 - Cost of do-minimum

Worksheet 2 is used for calculating the PV cost of the do-minimum. The do-minimum is the minimum level of expenditure necessary to keep a facility open and generally consists of maintenance work.

1 Historic maintenance cost data (indicate whether assessed or actual)

Maintenance costs for the site over last three years

Year 1	2013		$
Year 2	2014		$
Year 3	2015		$
Maintenance costs for the site this year	2016		$
Future annual maintenance costs			$

2 PV of annual maintenance and inspection costs following the work

Annual cost = $ x 15.49 = $ 0 **(a)**

3 PV of periodic maintenance costs (including any capital work)

Time zero 1st July in the year 2016

Periodic maintenance will be required in the following years:

Year	Type of maintenance	Amount $	SPPWF	Present value
1	immediate construction	600,000	0.94	566,038

Sum of PV of periodic maintenance $ 566,038 **(b)**

4 PV of annual operating costs

Annual cost = $ x 15.49 = $ 0 **(c)**

5 PV cost of the do-minimum

(a) + (b) + (C) = $ 566,038 **A**

Transfer the PV cost of do minimum **A**, to **A** on worksheet 1

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 3 - Cost of the option(s)

Worksheet 3 is used for calculating the PV cost of the walking or cycling facility.

1 PV of estimated cost of proposed work (as per attached estimate sheet)

$ 4,380,000 x 0.94 = $ 4,117,200

2 PV of maintenance in year 1 $ 5,000

3 PV of annual maintenance costs following the work

(years 2 to 40 inclusive) $ 5,000 x 14.52 = $ 72,600

4 PV of periodic maintenance costs

Time zero 1st July in the year 2016

Periodic maintenance will be required in the following years:

Year	Type of maintenance	Amount $	SPPWF	Present Value
8	general	20,000	0.63	12,548
16	general	20,000	0.39	7,873
24	general	20,000	0.25	4,940
32	general	20,000	0.15	3,099
40	general	20,000	0.10	1,944

Sum of PV of periodic maintenance costs = $ 30,404

5 PV cost of additional annual maintenance

$ x 14.52 = $ 0

6 PV of total cost of option

PV total costs (a) + (b) + (c) + (d) + (e) = $ 4,225,204

Transfer the PV total cost for the preferred option B, to B on worksheet 1

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 4 - Travel time cost savings

Worksheet 4 is used for calculating pedestrian and cyclist travel time cost savings.

1 Road category (Select) — Urban arterial

2 Travel time data

Walkers and/or cyclists average annual daily traffic current (AADT) (or volumes affected by the improvement)					150
Walking or Cycling growth rate (per annum)					1.50%
Travel time cost (TTC)	(Table 4.1b)			$	23.25

	Do-minimum		Option	
Length of route (km)	L^{dm}	2.80	L^{opt}	2.70
Mean speed	VS^{dm}	15.00	VS^{opt}	20.00
Relative attractiveness	(Table SP11.1)			2.00

3 Annual TTC for the do-minimum

$$\frac{AADT \times 365 \times L^{dm} \times TTC}{VS^{dm}} = \$ \quad 237{,}615 \quad \textbf{(a)}$$

4 Annual TTC for the option

$$\frac{AADT \times 365 \times L^{opt} \times TTC}{VS^{opt} \times RA} = \$ \quad 85{,}923 \quad \textbf{(b)}$$

5 Value of annual TTC savings **(a) - (b)** = $ 151,692 **(c)**

6 PV of travel time cost savings DF 17.50 **(c)** x DF = $ 2,654,902 **C**

Transfer the PV of travel time cost savings for the preferred option **C**, to **C** on worksheet 1

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 5 - Benefits for walking and cycling facilities

Worksheet 5 is used to calculate the walking and cycling facility benefits for the various options. Only one category for walking and one category for cycling may be used in an evaluation of a proposal. If an activity contains more categories, they must be submitted as separate evaluations.

Activities that combine walking and cycling may claim benefits for both modes but safety issues arising from pedestrian/cycle conflicts must be addressed, and if there are additional crash costs these must be accounted for in worksheet 6. Make sure the estimates of the new number of pedestrians and/or cyclists generated by the facility are realistic.

Required information:

L Length of new facility in kilometres
NPD Number of additional pedestrians per day
NTD Number of additional cycle trips per day
NSD Number of additional and existing cycle trips per day
DF Discount factor. The discount factor may differ by mode depending on the growth rate

Health and environment benefits for walking facility

Pedestrian growth rate (per annum) 1.50%

1 Health and environment benefits for footpaths and other pedestrian facilities

Benefit = number of additional pedestrians/day x length of new facility in km x 365 x $2.70

L	2.70	x NPD	75	x 365 x $2.70 x DF	17.50	= $	3,492,756	**(a)**

2 Health and environment benefits from improvements at hazardous sites (provision of overbridges, underpasses, bridge widening or intersection improvements for pedestrians)

Benefit = number of additional pedestrians/day x 365 x $2.70

NPD	0	x 365 x $2.70 x DF	17.50	= $	0	**(b)**

Transfer total **(a)** or **(b)** to **D** on worksheet 1.

Health and environment benefits for cycling facility

Cyclist growth rate (per annum) 1.50%

3 Health and environment benefits for cycle lanes, cycleways or increased road shoulder widths

Benefit = number of additional cycle trips/day x length of new facility in km x 365 x $1.40

L	2.70	x NTD	75	x 365 x $1.40 x DF	17.50	= $	1,811,059	**(c)**

4 Health and environment benefits from improvements at hazardous sites (provision of overbridges, underpasses, bridge widening or intersection improvements for cyclists)

Benefit = number of additional cycle trips/day x 365 x $4.20

NTD		x 365 x $4.20 x DF	17.50	= $	0	**(d)**

Transfer total **(c)** or **(d)** to **D** on worksheet 1.

Safety benefits for cycling facility

5 Safety benefit for cycle lanes, cycleways or increased road shoulder widths in the absence of a specific crash analysis

Benefit = number of new and existing cycle trips/day x length of new facility in km x 365 x $0.05

L	2.70	x NSD		x 365 x $0.05 x DF	17.50	= $	0	**(e)**

6 Safety benefit from improvements at hazardous sites in the absence of a specific crash analysis (provision of overbridges, underpasses, bridge widening or intersection improvements for cyclists)

Benefit = number of new and existing cycle trips/day x 365 x $0.15

NSD		x 365 x $0.15 x DF	17.50	= $	0	**(f)**

Transfer total **(e)** or **(f)** to **E** on worksheet 1.

SP11 Walking and cycling facilities

Spreadsheet v 5 (1-Jan-16)

Worksheet 6 - Crash cost savings

These simplified procedures are suitable only for **crash–by–crash analysis** (method A in appendix A6). There must be 5 years or more crash data for the site and the number and types of crashes must meet the specifications set out in appendix A6.1 and A6.2. If not, either the crash rate analysis or weighted crash procedure described in appendix A6.2 should be used. The annual crash cost savings determined from such an evaluation are multiplied by the appropriate discount factor and entered in worksheet 1 as total E. Evidence to support alternative analysis must be attached.

	Movement category	All movements		Vehicle involvement	Push cycle
1	Do-minimum mean speed	50		Road category	Urban arterial
	Posted speed limit	50		Traffic growth rate	1.50%
2	Option mean speed	50			

	Do-minimum	Severity				
		Fatal	Serious	Minor	Non- injury	
3	Number of years of typical crash rate records	5				
4	Number of reported crashes over period	0	0	1	1	
5	Fatal/serious severity ratio (tables A6.19(a) to (c))	0.08	0.92	1	1	
6	Number of reported crashes adjusted by severity **(4)** x **(5)**	0	0	1	1	
7	Crashes per year = **(6)/(3)**	0.00	0.00	0.20	0.20	
8	Adjustment factor for crash trend (table A6.1(a))	0.86				
9	Adjusted crashes per year = **(7)** x **(8)**	0.000	0.000	0.172	0.172	
10	Under-reporting factors (tables A6.20(a) to (b))	1	1.5	2.75	7	
11	Total estimated crashes per year = **(9)** x **(10)**	0.000	0.000	0.473	1.204	
12	Crash cost, 100km/h limit (tables A6.21(e) to (h))	3,100,000	330,000	18,000	1,200	
13	Crash cost, 50km/h limit (tables A6.21(a) to (d))	3,100,000	325,000	17,000	1,000	
14	Mean speed adjustment = **(1)** - 50)/50	0				
15	Cost per crash = **(13)** + **(14)** x [**(12)** - **(13)**]	3,100,000	325,000	17,000	1,000	
16	Crash cost per year = **(11)** x **(15)**	-	-	8,041	1,204	
17	Total cost of crashes per year (sum of columns in row **(16)** fatal + serious + minor + non-injury)	$9,245				
	Option					
18	Percentage crash reduction	0	0	90	90	
19	Percentage of crashes 'remaining' [100 - **(18)**]	100	100	10	10	
20	Predicted crashes per year **(11)** x **(19)**	0.00	0.00	0.05	0.12	
21	Crash cost, 100km/h limit (tables A6.21(e) to (h))	3,100,000	330,000	18,000	1,200	
22	Crash cost, 50km/h limit (tables A6.21(a) to (d))	3,100,000	325,000	17,000	1,000	
23	Mean speed adjustment = **(2)** - 50)/50	0				
24	Cost per crash = **(22)** + **(23)** x [**(21)** - **(22)**]	3,100,000	325,000	17,000	1,000	
25	Crash cost per year = **(20)** x **(24)**	-	-	804	120	
26	Total cost of crashes per year (sum of columns in row **(25)** fatal + serious + minor + non-injury	$925				
27	Annual crash cost savings = **(17)** - **(26)**	$8,321				
28	PV crash cost savings = **(27)** x DF	$96,034				**E**

Transfer PV of crash cost savings, E for the preferred option to E on worksheet 1

Worksheet 1 - Evaluation Summary and TIO Upload

Upload V1.0 (1Oct13)

This spreadsheet can be automatically uploaded into Transport Investment Online. To enable automatic upload please do not adjust the columns or rows.

Activity name		Horotiu Cycle Bridge Revision F
Reference		Project Number 6050 8651
Evaluator(s)	- name, organisation	[redacted]
Reviewer(s)	- name, organisation	0
Date of evaluation	mm/yyyy	05-2017
Time zero / implementation start date	1 July yyyy	2016
Construction duration	Months	12
Base date of costs and benefits	1 July yyyy	2016
Location		Between Horotiu Bridge Road to Amani Lane
Problem definition		Lack of cycle facilities
Do minimum description		Due to lack of facilities cyclists ride in Great South Road traffic
Alternatives considered (or page references to relevant)		
Options considered (or page references to relevant)		Walking/cycling off road path with pedestrian bridge (Rev F)
Preferred option description		Proposed cycle route from Ngaruawahia to Horotiu

Statistics		Base rate	Growth rate (%)	New users/transfer
Road traffic - Annual Average Daily Traffic (AADT)	AADT	0	0.00	
Pedestrians - Annual Average Daily	Count	150	0.02	75
Cyclists - Annual Average Daily	Count	150	0.02	75
Annual Patronage - Total	Count	0	0.00	0
Annual Patronage - Peak Period	Count	0	0.00	
Freight volume	tonnes	0	0.00	0
Heavy Vehicles Volume	AADT	0	0.00	
Heavy Vehicles Volume	%	0.00		
Road Category		Urban arterial		

		Before	After
Roughness	IRI/NAASRA	0	0
Posted speed	km/h	50	0
Average traffic speed	km/h	50	50
Length of road / route	km	2.80	2.70
Road width	metres	0.00	0.00
Travel time on route	minutes	0	0

		Period start am	Period stop am	Period start pm	Period stop pm
Peak Period					
Peak Period Traffic flow	Vehicles/hr	0			
Period of crash analysis	yyyy - yyyy				

	Fatal	Serious	Minor	Non Injury
Recorded crashes in period (row 4 crash analysis)	0.0	0.0	1.0	1.0
Total estimated crashes per year - do minimum (row 11)	0.0	0.0	0.5	1.2
Predicted crashes per year - preferred option (row 20)	0.0	0.0	0.0	0.1

Heavy Vehicle Trips Saved (average per year)	count	0
Vehicle Operating Cost Savings (per annum)	$/vehicle	0
Travel time savings (per day)	minutes	0

Costs		Do minimum	Preferred option
Construction / implementation	$	0	4 380 000
Present Value Construction / implementation	$	0	4,117,200
Present Value Maintenance, renewal and operating costs	$	0	108,004
Present Value Total costs (whole of life)	$	566,038	4,225,204

Present Value Cost savings	$	0
Present Value Funding assistance	$	0

Benefits (Present Value)		
Travel time cost savings	$	3 849 608
Vehicle operating cost savings	$	0
Crash cost savings	$	98,915
Seal extension benefits	$	0
Driver frustration reduction benefits	$	0
Risk reduction benefits	$	0
Vehicle emission reduction benefits	$	0
Other external benefits (noise, visual, impact etc)	$	0
Mode change benefits	$	0
Walking and cycling health benefits	$	0
Service or facility user benefits	$	6 205 463
Parking user cost savings	$	0
Dis-benefits during implementation/construction	$	0
Road Traffic reduction benefits	$	0
National strategic benefits	$	0
Agglomeration benefits (WEB)	$	0
Increased Labour Supply (WEB)	$	0
Imperfect Competition (WEB)	$	0
Total Benefits Present Value	$	10153985.17

Non monetised benefits or national strategic factors	
Benefit Cost Ratio (BCRn) National	2.77
Benefit Cost Ratio (BCRg) Government	0.00
First Year Rate of Return (FYRR)	0.13

Sensitivity Analysis - BCR range	0.00	0.00