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New Zealand Transport Agency
29-Jun-2020

Ngauranga to Petone Shared Path

Updated economic evaluation

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Updated economic evaluation

Client: New Zealand Transport Agency

Co No.: N/A

Prepared by

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In association with

s 9(2)(a) Infometrics NZ Ltd

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Quality Information

Document Ngauranga to Petone Shared Path

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Reviewed by s 9(2)(a)

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Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
D	29-June-2020	Client comments incorporated	s 9(2)(a)	

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1.0 Background

The Detailed Business Case for Ngauranga to Petone shared path project was issued in 2018 as an addendum to the 2015 Wellington to Hutt Valley DBC. Since the project has been further progressed towards obtaining resource consents and as part of this the New Zealand Transport Agency has requested that AECOM update the project economics. This report summarises the updated economic evaluation which is has been carried out in accordance with the Agency's Economic Evaluation Manual.

The new BCR has been peer reviewed due to the updated forecast cyclist numbers since the 2015 previously peer reviewed cyclist demand.

2.0 Assumptions

The BCR for the preferred option for N2P section has been updated to reflect the refinements to the recommended option since the DBC Addendum.

The following updated assumptions (i.e. from the DBC 2018 Addendum) were used in the calculations of the updated BCR.

- The demand forecast for Detailed Business Case Addendum used the original forecast carried out in 2015 and it was noted that this was likely to increase due to the uptake of electric bikes. Since 2015 there has been considerable growth in cycling in the Wellington Region and higher growth is expected with the strong uptake of electric bikes. These are particularly well suited to the N2P project which will provide a high-quality cycle link from the Hutt Valley to the Wellington CBD, a distance of some 14km.
- As a result, an updated demand forecast has been carried out by the Waka Kotahi. This draws on cycling demand data from similar projects in New Zealand, overseas and locally in the Wellington region. AECOM supports this revised forecast and has adopted it for the updated economics. The cycling forecast assumes a 100% uplift on existing cyclists based on other similar projects. 1359 cyclists in 2025 are forecast plus 181 transport device riders. The growth rate is forecast to be 10% for 5 years, 5% for next 5 years then 2% for the remainder of the evaluation period. A copy is included in Appendix A. A peer review of the demand forecast was carried out by s 9(2)(a) and is included in Appendix D.
- Pedestrian demand forecasts have also been revised upwards to 267 new pedestrians in 2025. The growth rate is forecast to be 6% for 5 years then as per cyclist growth rates. Only around 50 pedestrians are assumed to walk the whole length of P2N. The remainder have been assumed to walk a distance of 2.4 km or half the 4.8km length of P2N. Due to uncertainty about the pedestrian forecast the average distance walked by most walkers has assumed to be half the length of P2N and a sensitivity test using 50% of the forecast has been done to assess the effect on the BCR should a lower number of pedestrians eventuate.
- Permanent cycle count stations have been installed on SH2 at Petone and at Ngauranga. However unfortunately these only became operational at the end of March 2020 after the COVID-19 lock down had commenced and therefore initial readings are not relevant to the long-term demand. Once cyclist demand has returned to a "new normal" post COVID-19 the cyclist demand forecast should be reviewed to see whether the assumptions about the base cycling demand have changed. Given the popularity of cycling during the COVID-19 lock down it could well turn out that cycling is more popular relative to other modes post COVID-19 than before leading to an increase in the cycling forecast made above.
- The DBC 2018 cost estimate has been updated following design refinements including increases to environmental impact mitigation measures to reduce consenting risk and increases in schedule rates since 2018. A parallel cost estimate peer review by Bond Construction has been carried out and reconciled with this estimate.
- Changes to the project opening date have been made which is now expected to be 2025. A construction period of 3 years is planned, starting in 2022.

- Crash costs have been updated to the latest five year crash history which include a fatal cyclist crash in 2020 at the SH2 BP exit ramp. There is still a high crash rate for cyclists. A total of 1 fatal crash, 2 serious accidents and 3 minor injury accidents were recorded for cyclists on this section from 2015-February 2020.

3.0 Results

3.1 Costs and Benefits

The following tables report the updated expected costs and benefits. Please see Appendix B for more detail:

Table 1: Economic summary table

TIMING				
Earliest implementation start date			1 January 2022 (Section 3 and 4)	
Expected duration of implementation			3 years	
Economic Efficiency				
Time zero			1 July 2022	
Base date for costs and benefits			1 July 2022	
Present value of total project cost of do minimum			$0 m	
Present value net total project cost of recommended option			**$155.8m**	
Present value net benefit of recommended option (exc. Wider Economic Benefits (WEBs))			**$191.3m**	
BCR (exc. WEBs)			**1.2**	
BCR (inc. WEBs)			N/A	
First year rate of return (FYRR)			N/A	
P50 Costs				
			Present Value	
	Do minimum	**Recommended Option**	**Do minimum**	**Recommended Option**
Total implementation cost	$ 0m	$165.0m	$ 0m	$153.4m
Total P50 costs (Median ESTIMATE)	$ 0 m	$165.0m	$ 0m	$153.4m
Benefits				
			Present Value	
			Do min	**Recommended Option**
Commuter cyclists			$ 0m	$ 110.6m
Walkers			$ 0m	$37.9 m
VOC			$0m	$6.1m
Accident cost savings			$ 0m	$ 19.0m
Cycling Tourists			$ 0m	$ 0m
Resilience			$ 0m	$ 16.2m
PV total net benefits			$ 0m	**$ 190.3m**

The cost estimate used is the median estimate between AECOM and the parallel cost estimate reviewer Bond construction.

3.2 Sensitivity analysis

3.2.1 N2P Shared Path Sensitivity

The table below summarises the sensitivity analysis undertaken for P2N and what the impact on the project BCR are. See Appendix B for more detail.

Table 2: Sensitivity Analyses

SENSITIVITY TESTING					
Variable	**Base Case**	**Lower Bound**		**Upper Bound**	
		Value	**BCR**	**Value**	**BCR**
Cost variability	$165.0m				1.2
Construction / implementation 95%ile	$155.8m	$201.3M	0.95	-20%	1.6
Cyclists health	$110.6m	-20%	1.1	+20%	1.4
Walkers health	$37.9 m	-20%	1.2	+20%	1.3
Tourists	$0 m	-20%	1.2	+20%	1.2
Crashes	$19.0 m	-20%	1.2	+20%	1.3
Resilience	$16.2 m	-20%M	1.2	+20%	1.3

3.2.2 Wellington to Hutt Valley Shared Path (W2HV)

Sensitivity testing of the total W2HV Link Programme (expected cost $203.4M, NPV cost $191.9M, expected benefits NPV of $233.9M) has an expected **BCR of 1.2** with a range of 1.0 to 1.5.

3.3 Peer Review by s 9(2)(a) - Infometrics

A peer review has been carried out by s 9(2)(a) This is included in Appendix C

4.0 Conclusions

Overall the updated BCR for N2P following peer review is **1.2** with a range of 0.95 to 1.6.

Appendix A

Demand Forecast – Simon Kennett NZTA memo

WAKA KOTAHI NZ TRANSPORT AGENCY

MEMO

To	Michael Siazon
Cc	Tim Hughes
From	Simon Kennett
Date	28 April 2020
Subject	User Demand Assessment for N2P section of Te Ara Tupua

Introduction

This memo reviews the demand estimate included in Aecom's 'Wellington to Hutt Valley Cycle and Pedestrian Link Detailed Business Case' (2015) and develops a new estimate. Aecom estimated that there would be an average of 730 cyclists and 50 walkers/runners use the new path between Ngauranga and Petone each day, in the year after opening.
https://www.nzta.govt.nz/assets/projects/wellington-to-hutt-valley-walking-and-cycling-link/Part-A-Detailed-Business-Case-Final-V8.pdf

Rather than updating the estimate using Research Report 340 (2007) methodology, the new estimate is based on growth in cycling and walking observed over the last decade along similar paths in Australasia. Experience over the last five years suggests that we should expect far greater uptake of high-quality paths than previously observed, in part due to a surge in the uptake of e-bikes/e-scooters and also due to significant improvements in the quality of 'best practice' shared path design since the launch of the Urban Cycleways Programme in 2015.

This memo includes the following sections:

1 - What has changed since Aecom's 2015 report:
2 - Existing background growth in Active Modes in Greater Wellington
3 - Comparison with growth experienced where similar paths have been constructed
4 - Table of growth experienced in similar projects/environments
5 - Comparison with other demand estimates
6 - Other Cycling Network Developments expected to Grow Demand by 2025
7 - Population growth and Urban Development
8 - Review of Aecom's 2015 Estimate
9 - Revised Estimates of Use
Appendices

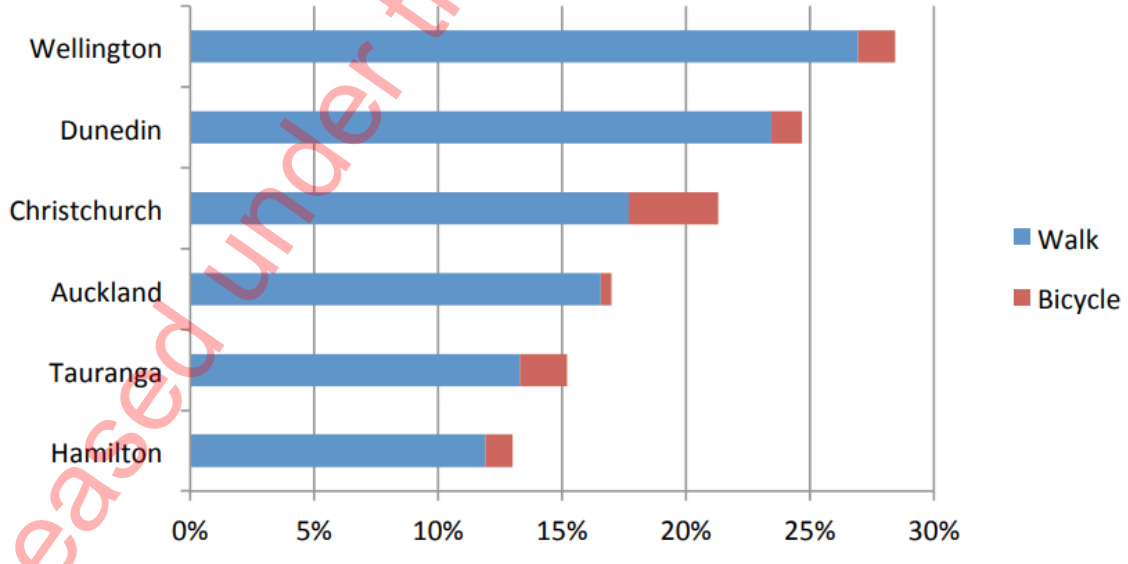
1 - What has changed since Aecom's 2015 report:

- Development of the cycling network, including
  - sealing of the western end of the Petone Esplanade SUP,
  - completion of the Wainuiomata SUP,
  - upgrade of the Hutt Road cycleway between Caltex and Thorndon Quay,
  - installation of cycle lane on Featherston Street (south of Bunny Street),
  - minor safety improvements on SH2 between Belmont and Ngauranga,
  - completion of 500m of cycle path north of Ngauranga,
  - sealing of several kilometres of the Hutt River Trail (north of Avalon)
- Promotion of cycling with 'Ride More – Feel More' campaign and Aotearoa Bike Challenge
- Decline in on-road recreational cycling in favour of cycling away from traffic (e.g. cycle trail and gravel road riding). Note decline of Taupo Cycle Challenge vs surge in popularity of NZCT trails and 'Bike-packing'.
- Designation and promotion of the Remutaka Cycle Trail as a 'Great Ride'
- Surge in e-mobility (due to significant improvements in battery and controller technology, and e-bike affordability).
- Population growth (e.g. 1.3% p.a. in Lower Hutt from 2013 to 2019)
- Experience with development of high-quality cycleways, which demonstrate much higher demand for separated facilities than suggested in Research Report 340 (written in 2007)
- The 2020 COVID-19 pandemic dramatically changed travel behaviour. We have not attempted to predict the long-term impacts of the pandemic but do expect the coming recession to put a dampener on cycle commuter growth between 2020 and 2024 (similar to the effect seen during the global financial crisis between 2009 and 2014).

2 - Existing background growth in Active Modes in Greater Wellington

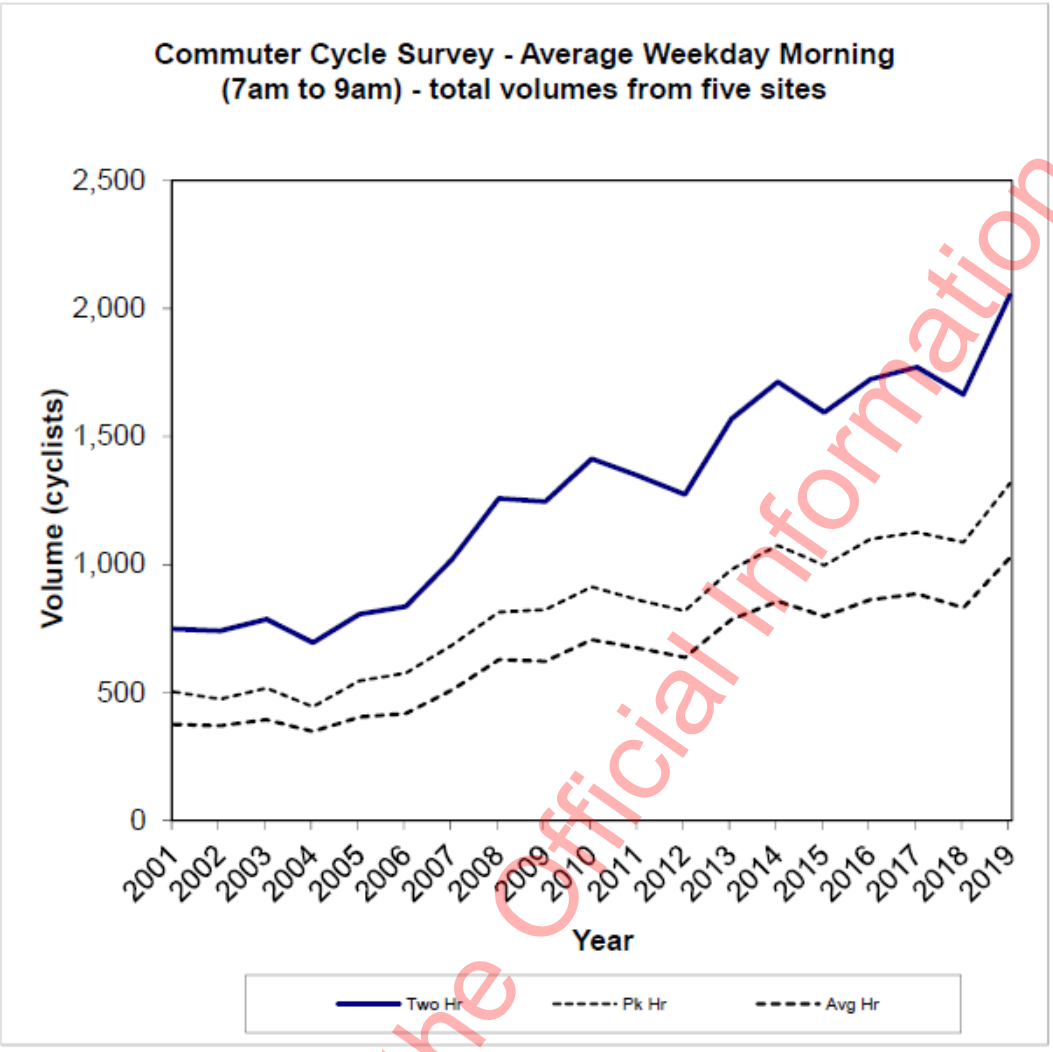
Against the national trend, Wellington saw growth in active travel mode share between 1986 and 2006, albeit starting from a low base. The trend continues and is supported by a well-developed public transport system and the lowest rate of motor vehicle ownership in New Zealand.

Figure 3 Proportion of trips taken by cycling and walking, six cities

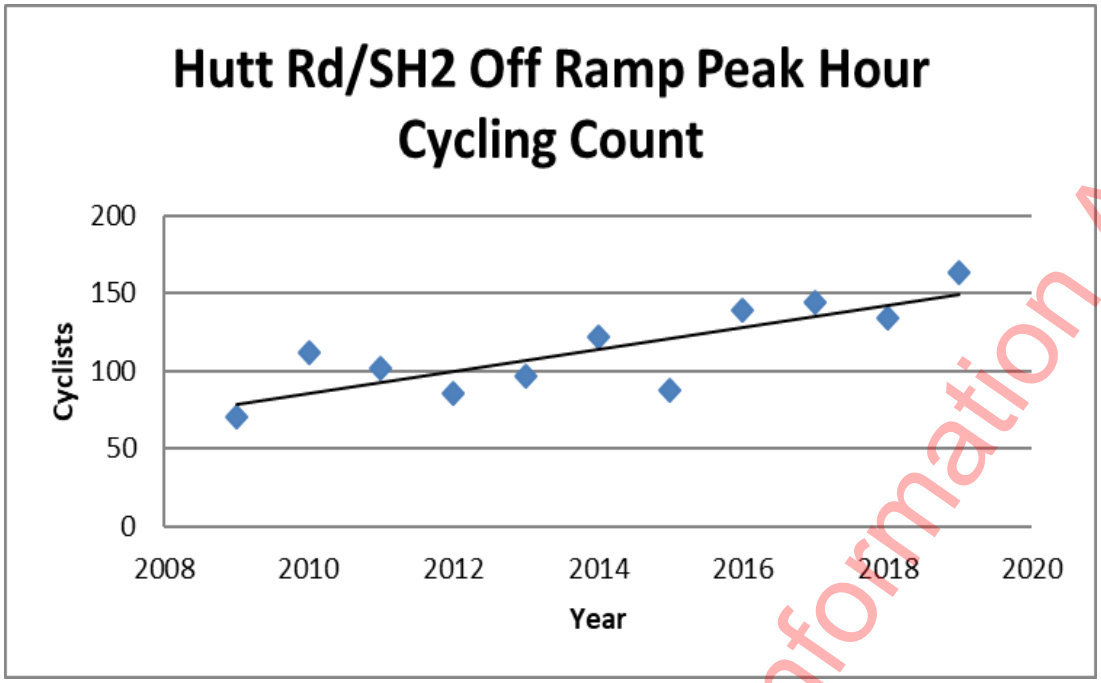


Source: New Zealand Household Travel Survey 2010-2013

Despite little development in Wellington's cycling network up to recent years, there has been strong growth in the WCC Cycle Commuter Survey Count since 2004 (see graph below). This indicates growing enthusiasm for cycling as a transport choice, motivated by a range of benefits and concerns.



The closest historical cycling count to the Te Ara Tupua is at SH2 off-ramp at Jarden Mile, Ngauranga.
A count at this location shows 70 cyclists/peak hour in 2009 climbed 133% to 163/peak hour in 2019 (from WCC data) This equates to an average of 7% growth p.a. since 2009 (considerably higher that Aecom's 2015 estimate of 3%). The growth between 2014 and 2019 is slightly higher, at an average of 8% p.a. (compound growth). This change in growth may be explained in part by the increased availability, quality and affordability of e-bikes. Note the very high growth in e-bike imports shown in Appendix B.



Results of the WCC cycle count at the SH2 off-ramp onto Hutt Road/Jarden Mile, Ngauranga.

A significant factor influencing cycling uptake over the long term has been the cost of cycle commuting between Petone and Wellington relative to the main alternatives of driving or catching the train. The following table illustrates indicative costs for the 13-kilometre return trip between the corner of Richmond and Jackson Streets and the corner of Willis Street and Lambton Quay during the AM and PM peaks.

Table 1 – Cost by mode for a return trip between Petone and Wellington CBD

Mode	Cost	Time
Cycle	$2.60 (at 10c/km)	35 min (incl 4 mins to change clothes)
Train	$8.40 (using 10-trip ticket)	35 min (incl a 10 min walk at each end of the train trip + 3 min wait at station)
Car	$27.80 (at 30c/km plus $20 parking fee)	28 min* (incl 3 min walk from car park)

*Driving times vary significantly depending on traffic conditions

3 - Comparison with growth experienced where similar paths have been constructed

3.1 - Wainuiomata Shared Path

The new, 4m wide Wainuiomata shared path was completed in 2019.

An estimate of road cycling use can be made using Strava data. There were 5,251 attempts recorded on Strava on the Wainuiomata side climb between 2012 and 2020 – this is a moderately high level of use [5251/8 years = 656]. Multiply by 5 to estimate all cycling users p.a. = 3,281 riders p.a. Therefore, approx. 273 road riders/month. Post-construction, the Strava heatmap shows the road riding activity has faded away to almost nothing, therefore we estimate 60 road riders/month.

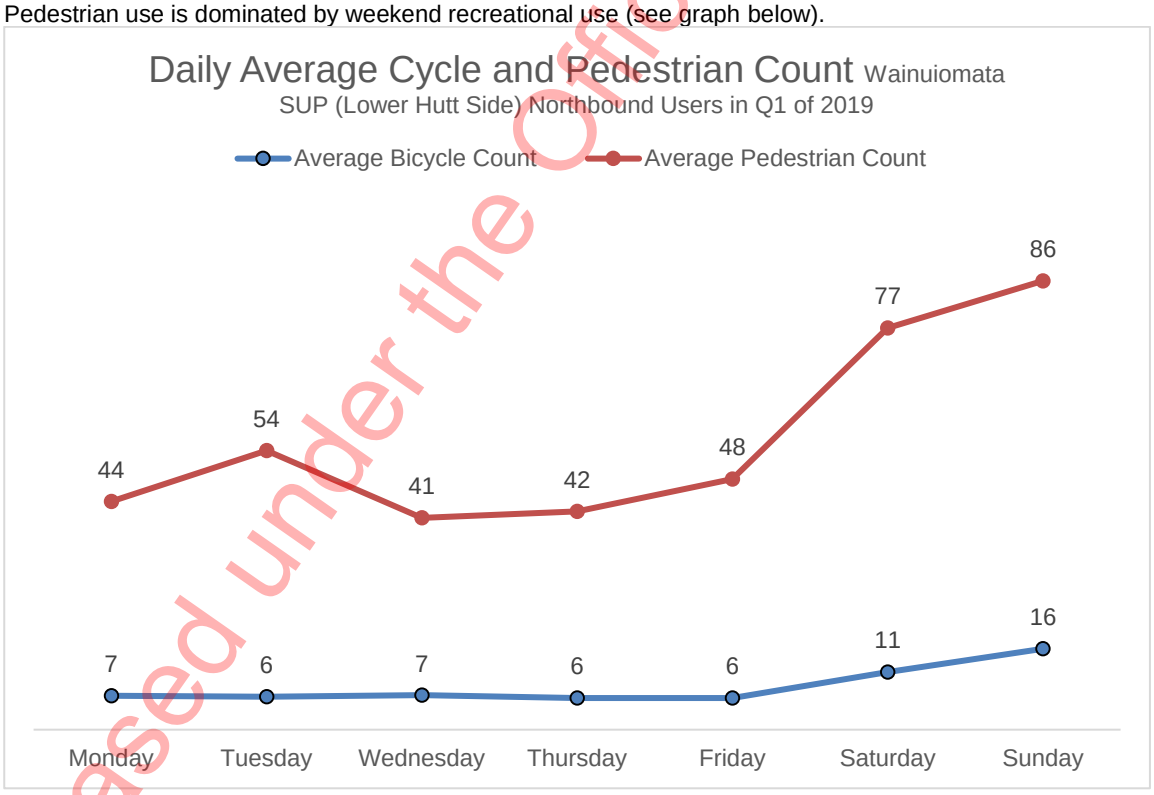
Table 2 – Increases in Walking and Cycling before and after construction of the Wainuiomata Hill Shared Path

Wainuiomata Hill Bicycle and Pedestrian Counter			
Counter Location: Lower Hutt side Direction: Downhill towards Lower Hutt			
	November **2018**	November **2019**	Difference
Pedestrians	1,105	2,783	↑ 152% pedestrians
Cyclists	137 (+273 road cyclists) = 410	594 (+60 road cyclists) = 654	↑ 60% cyclists
Combined	1,515	3,437	↑ 127% active users

Note: The number of cyclists riding up the Wainuiomata SUP is much higher, but that direction is dominated by those riding down one of the mountain bike tracks, so is not comparable with the N2P situation. In the table above, only the number of users heading down the path towards the Hutt Valley are shown (mountain bikers generally use other tracks when descending).

The relatively low number of cyclists compared with pedestrians is understandable given that cyclists are more grade-sensitive and the Wainuiomata Hill is steep and 200m high.

Pedestrian use is dominated by weekend recreational use (see graph below).



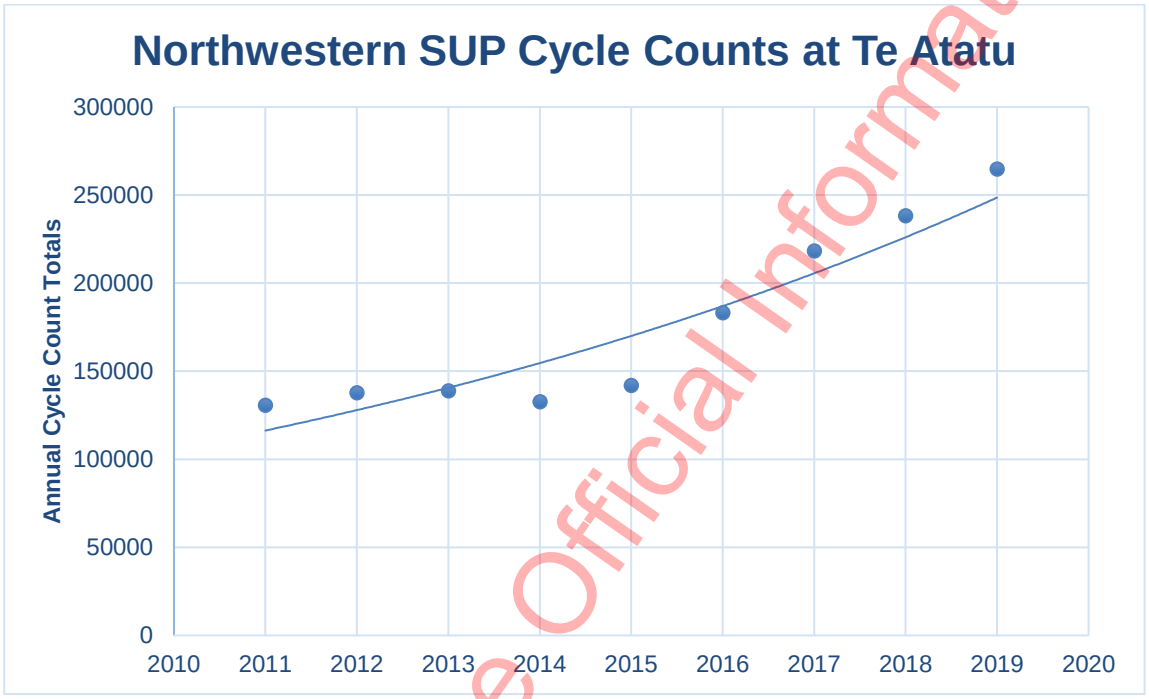
The ratio of typical weekday use to typical weekend day use is 1:1.8 for pedestrians.

3.2 – Northwestern SUP

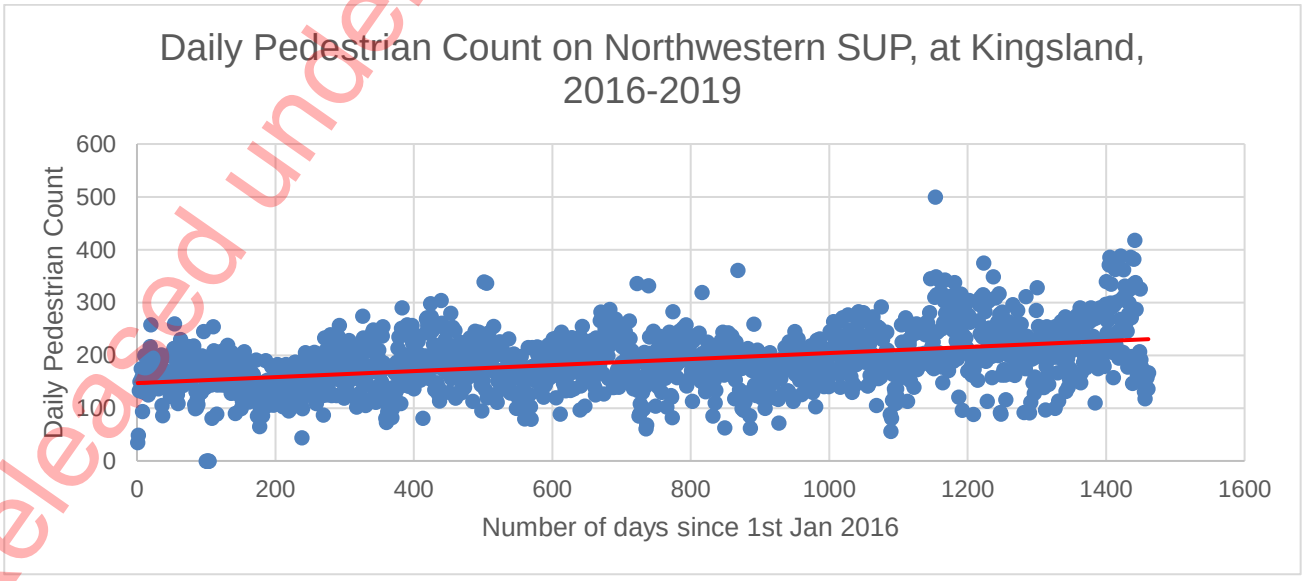
The 3m wide Northwestern cycleway is over 11 km long and runs generally parallel with SH16 from Massey into the Auckland CBD. A cycling counter at Te Atatu (11km from the CBD) has been collecting data since late 2010. Since then, cycling use has been growing by an average of 9% p.a. This growth has been supported by cycling network developments in the Auckland CBD and cycling promotion.

The higher, 17% p.a. growth rate over the last five years is consistent with the high growth of e-bike and e-scooter imports to New Zealand (see Appendix B). In *Electric City: E-bikes and the future of cycling in New Zealand* (Wild and Woodward 2018) it was noted that e-bikes had made longer commutes and trip-chaining significantly easier, making cycling more realistic for women. While women made up only 27% of cyclists on the Northwestern SUP, they made up 41% of e-cyclists.

This SUP is not a particularly scenic route, however it is one of the longest 'safe', sealed cycling routes in Auckland, and recreational use is high. The ratio of average weekday use to average weekend use in January 2020 is 1:1.05.

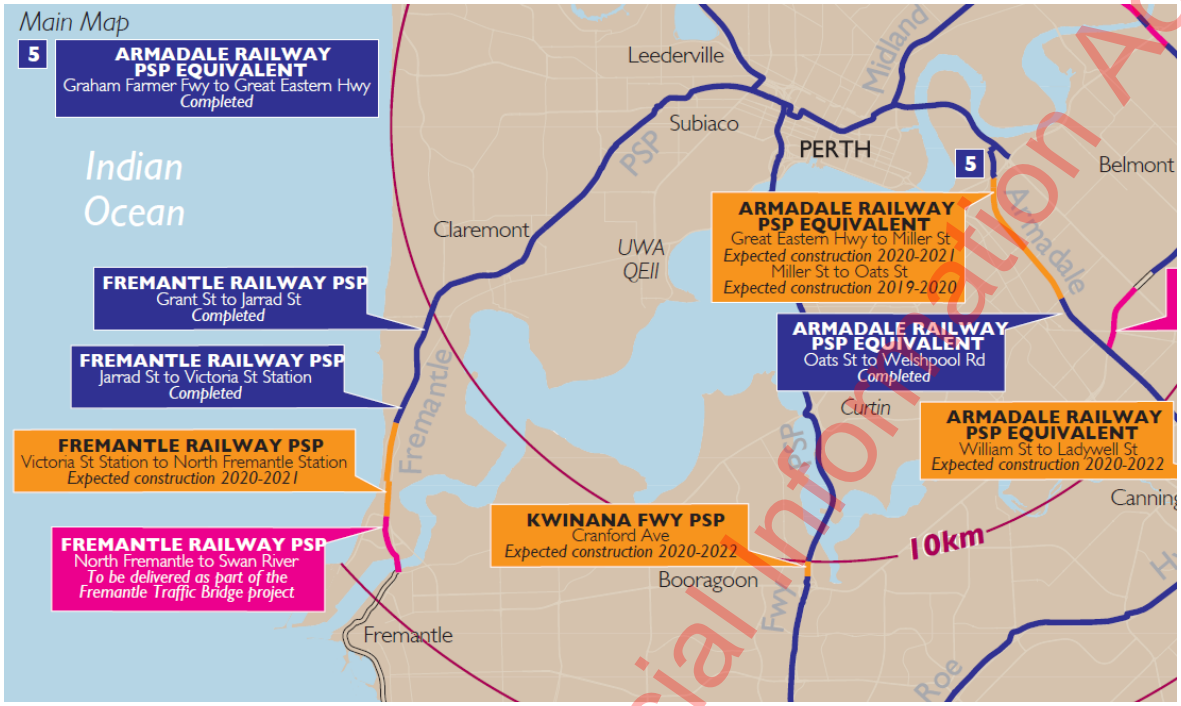


The next table shows daily pedestrian counts on the Northwestern SUP at Kingsland (the only location with a pedestrian counter). The trendline suggests average daily pedestrian numbers have increased from approximately 150 to 230. This equates to growth of around 10% p.a. Note that seasonal variation has increased over time.



3.3 – Perth to Freemantle Principal Shared Path (PSP)

Completion of a 3km section of Freemantle Railway PSP (the southern end of the blue line near the coast) in August 2019, combined with a vigorous promotion, saw a 94% increase in cycling numbers on the 20 km Freemantle Railway PSP (despite several kilometres yet to be completed).



The Perth-Fremantle Railway Line PSP at Grant Street experienced an almost doubling of demand compared to the same quarter in the 2018-19. This can be explained by the extension of the PSP to the south which opened in August 2019 and resulted in an immediate increase in cyclist crossing the counter of around twice that of the same time in 2018 (Figure 4.2).

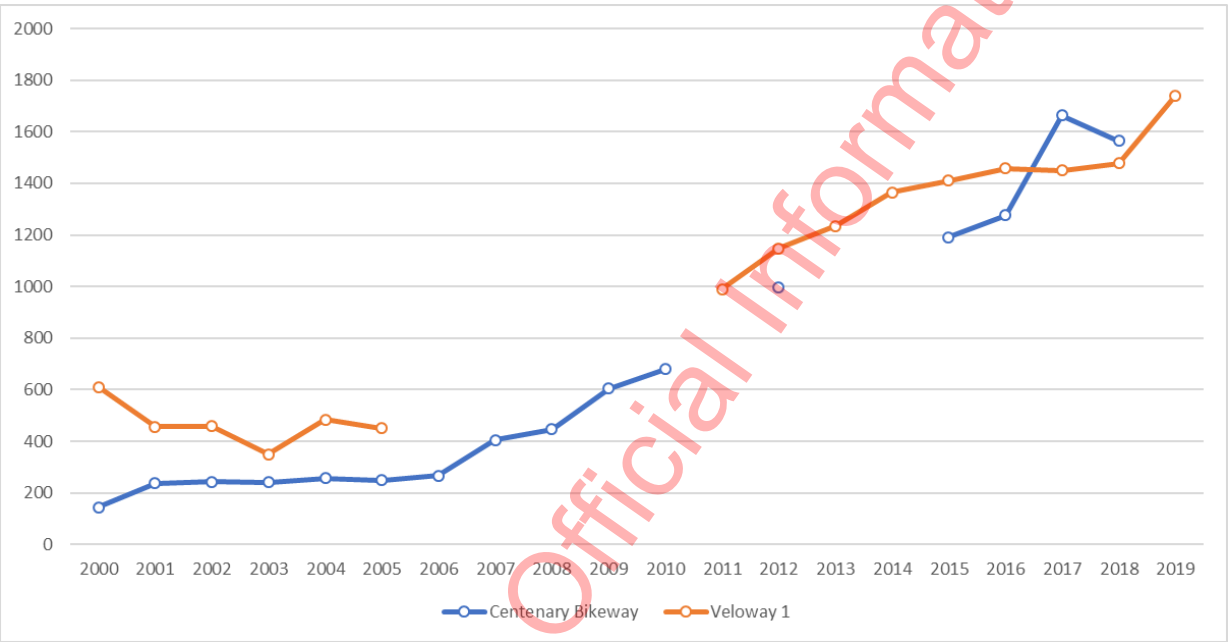
Figure 4.2: Daily demand at Perth-Fremantle Railway Line PSP (Grant Street)

Note that this growth occurred as a result of completing 3km of path from Grant St to Victoria St Station, just over 10 km from the Perth CBD. This section of path runs between houses and the railway line, and is not particularly scenic. The path from Victoria St Station to Freemantle remains incomplete.

3.4 – Brisbane Principal Cycleways.

Brisbane has a similar population density and transport culture to Wellington. Their cycleway network includes long-distance, high quality cycle paths and shared paths. Between 2000 and 2018, use of their key Velo 1 and Centenary Bikeways have grown by 400%.

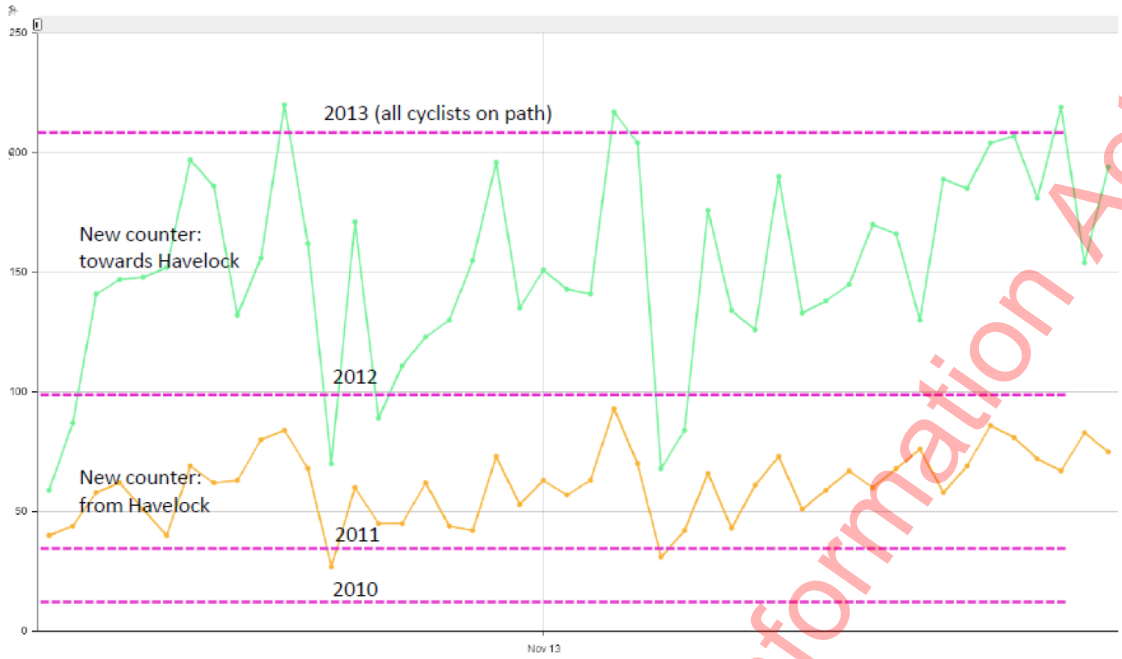
Note: E-bike use in Australia is limited to bikes with motor output of 250W and a top speed of 25 kph (compared with fast e-bikes capable of up to 45 kph available in NZ). This is limiting their appeal for long distance cycle commuting.



Average daily cycling use on Brisbane's two principal cycleways

3.5 – Hastings to Havelock North SUP

Thanks to cycle lane and recreational path construction in Hastings (as part of the Model Community project) cycling was growing steadily on Havelock Road from 2010 and 2011, prior to the completion of the Havelock North Road SUP. Hastings to Havelock North is a distance of 4 km, and the road linking the two was busy with fast-moving traffic. In 2011, the road had cycle lanes, but no paths. In 2012 a SUP was constructed. This (along with iWay promotion and wider network development) contributed to a step-change in cycling of over 300% along this SUP between 2011 and 2013. The green and orange lines in the chart below show the directional cycle volumes recorded by a newly installed permanent counter in late 2013 (Note that more people use the path when riding towards Havelock, as it is on the left side of the road when travelling in that direction). The pink lines represent average daily cycle volumes obtained from ATC (Automatic Trail Counter) data.

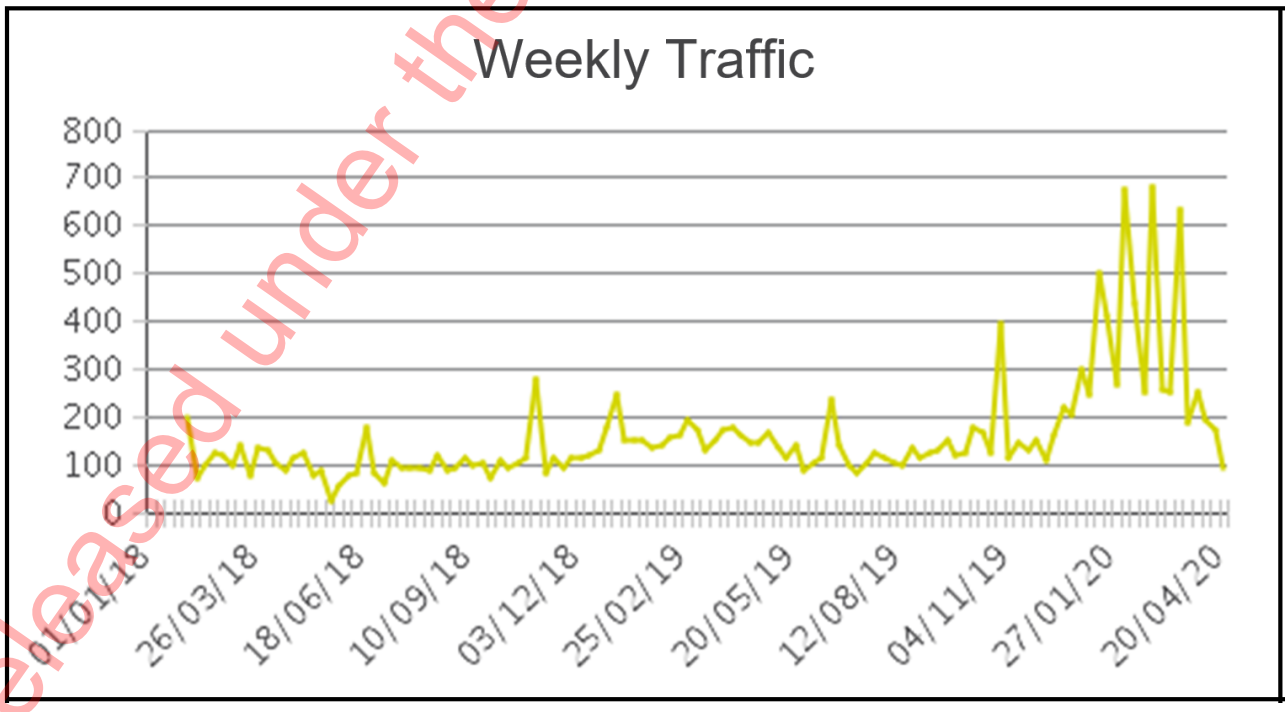


Source: s 9(2)(a)

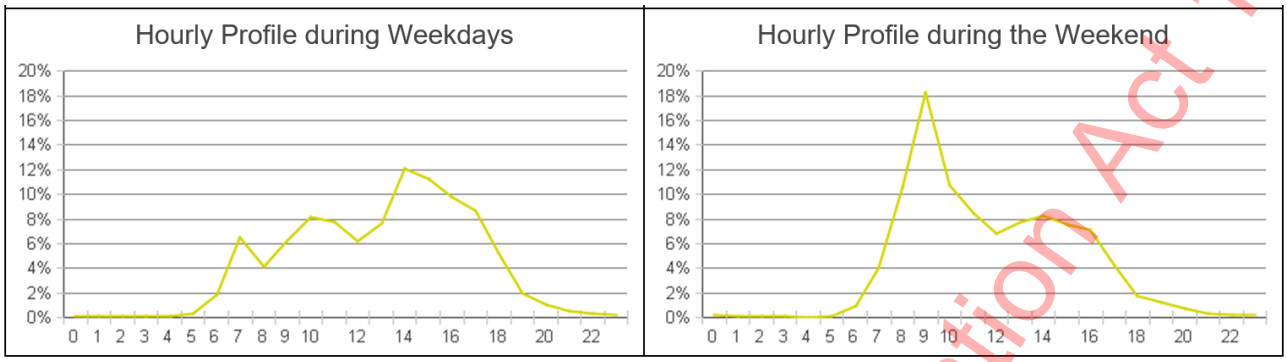
3.6 – Great Taste Trail, Richmond

Nelson's Great Taste Trail is a NZ Cycle Trail 'Great Ride', as the Ngauranga to Petone SUP will be. It varies widely in quality. The following data comes from an EcoCounter counter on the northern outskirts of Richmond, where the trail runs between SH6 and the foreshore. At 1.5-2.0m in width, this is a substandard SUP attracting relatively few walkers (i.e. a one-way count of around 60 per day). Nevertheless, the growth in walking/running use and the distribution in use throughout the day offers some interesting insights.

The first graph below shows weekly pedestrian traffic trending upwards between summer 2018 and summer 2020, at a rate around 50% p.a. (prior to the spikes in activity experienced during the COVID-19 Level 4 lockdown which commenced on 25/03/20).



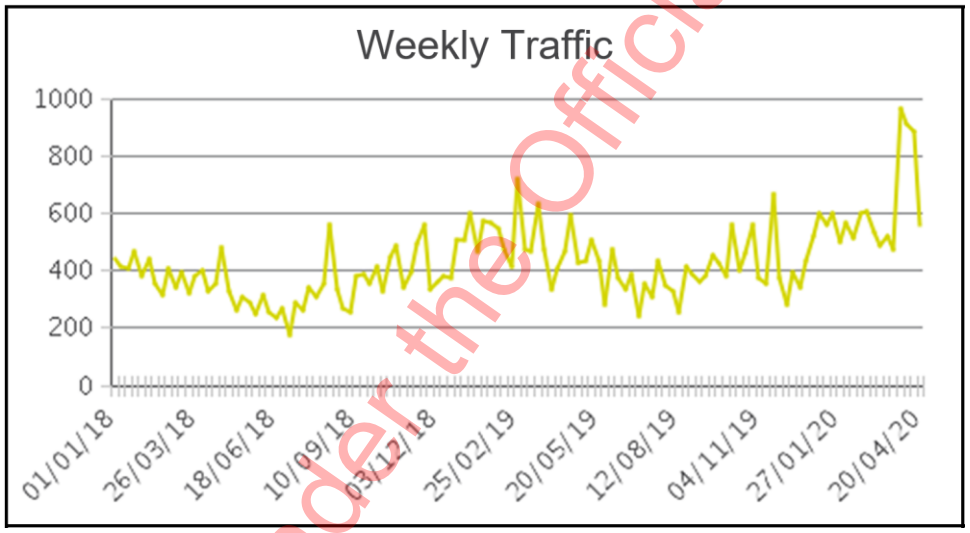
The following graphs illustrate the hourly distribution of pedestrian use during weekdays and weekend days.



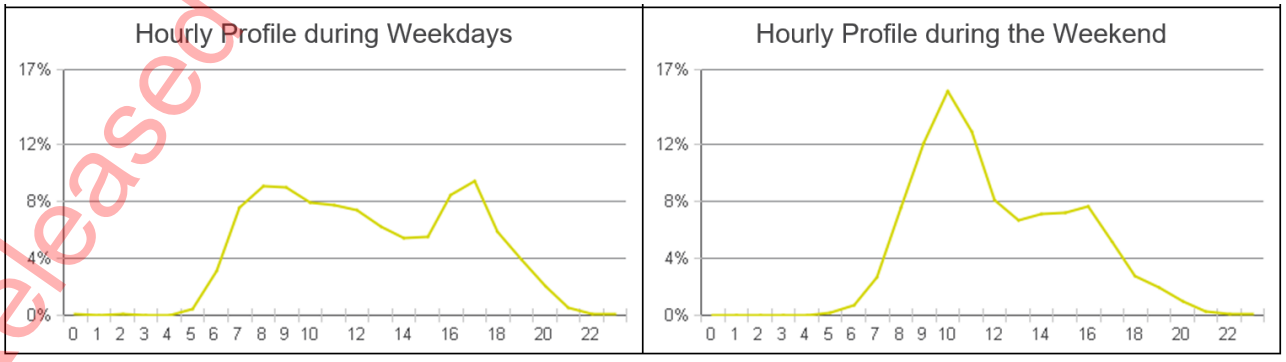
3.7 – Hutt River Trail, Lower Hutt

Similar to the Great Taste Trail, this data comes from an EcoCounter pedestrian counter on a NZ Cycle Trail 'Great Ride'. This counter is situated north of Lower Hutt on the Remutaka Cycle Trail. The path is 2.2m wide with room to step aside if a group of cyclists approach. Weekday and weekend day average counts since 1 Jan 2018 have been 53 and 83 respectively (one-way 'OUT').

The first graph below shows weekly pedestrian traffic trending upwards between summer 2018 and summer 2020, at a rate around 20% p.a. (prior to the spike in activity experienced during the COVID-19 Level 4 lockdown which commenced on 25/03/20).



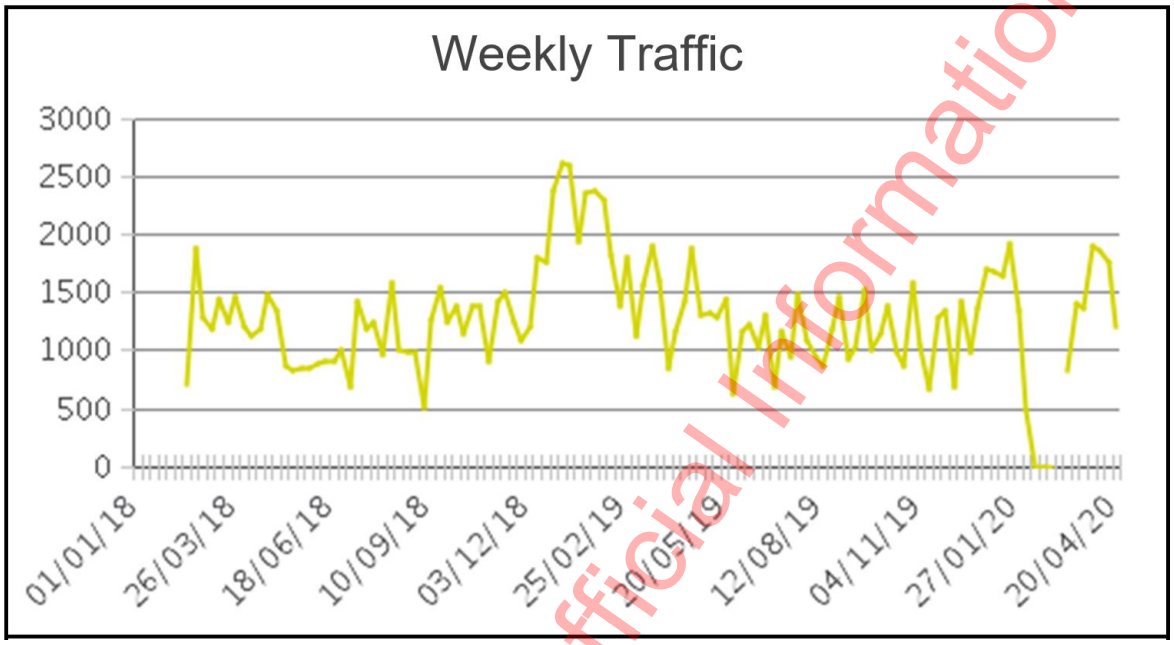
The following graphs illustrate the hourly distribution of pedestrian use during weekdays and weekend days.



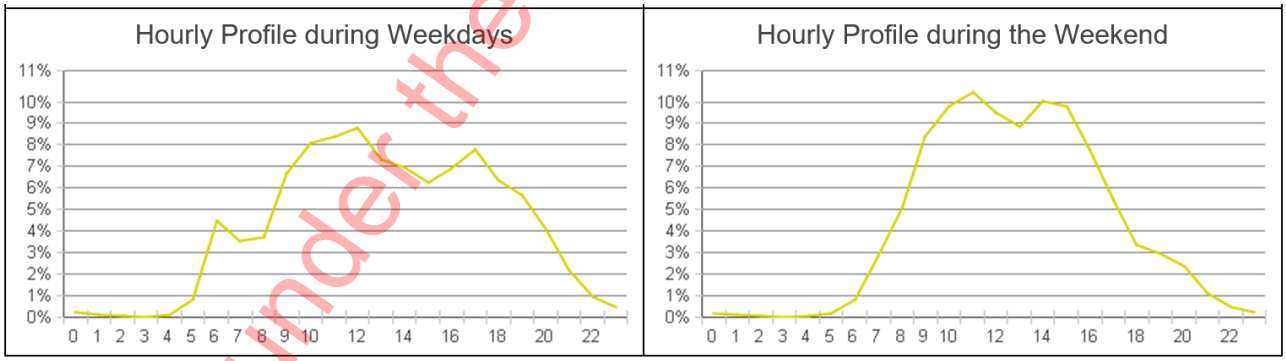
3.8 – The Esplanade SUP, Petone

Similar to the Great Taste Trail, this data comes from an EcoCounter pedestrian counter on a NZ Cycle Trail 'Great Ride'. This counter is situated on the Esplanade SUP, near William Street, on the Remutaka Cycle Trail. The path is only 2m wide, with no room to step to the side – many cyclists prefer to ride on the road and many walkers prefer to walk on the beach. Weekday and weekend day average counts since 1 Jan 2018 have been 160 and 253 respectively (one-way).

The first graph below shows weekly pedestrian traffic increasing dramatically in summer 2019. However, in summer 2020 a counter failure has occurred. There is no spike in activity experienced during the COVID-19 Level 4 lockdown, probably because the path is too busy and narrow to allow for the recommended 2m social distancing.



The following graphs illustrate the hourly distribution of pedestrian use during weekdays and weekend days.



This is the closest counter to the proposed SUP, but it has a far more urban setting. While it's two-way pedestrian use averages of 320/weekday and 503/weekend day would reasonably be expected to be much higher than the SUP between Ngauranga and Petone, this counter does undercount total pedestrian activity as it does not include those walking or running on the beach (or on the other side of the Esplanade).

Its use is constrained by it's minimal, 2m width.

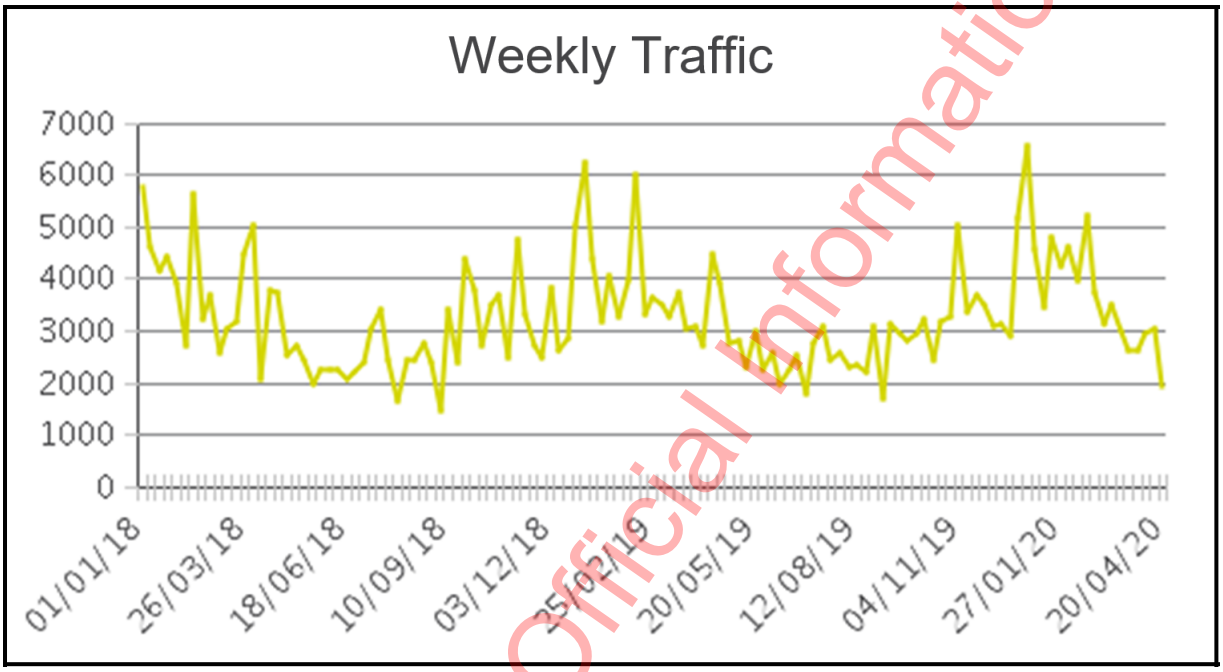
Overall, it gives some indication of the scale of pedestrian use that can reasonably be expected at the northern end of the proposed Ngauranga to Petone SUP.

The ratio of weekday to weekend day use is 1:1.6, compared with 1:1.8 on the Wainuiomata Hill SUP. The later, more rural example is closer to what is expected for pedestrian use on the Ngauranga to Petone SUP.

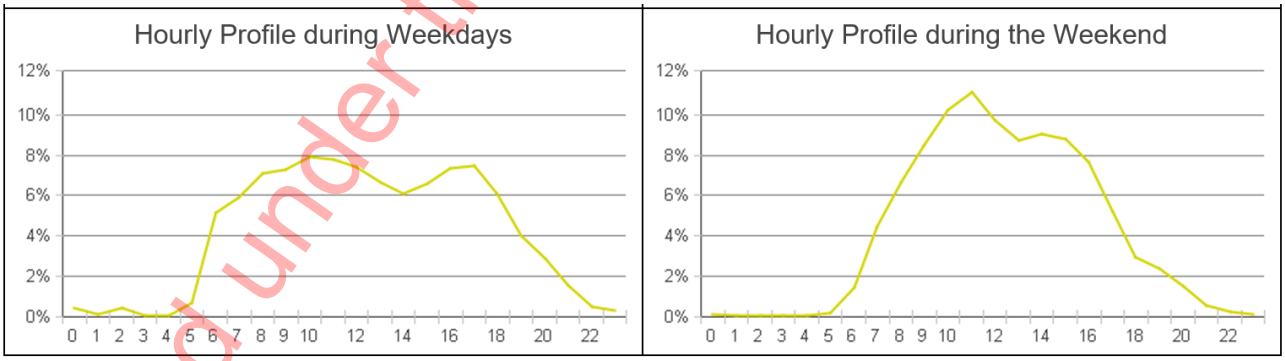
3.8 – Marine Parade SUP, Napier

Similar to the Great Taste Trail, this data comes from an EcoCounter pedestrian counter on a NZ Cycle Trail 'Great Ride'. This counter is situated on the Marine Parade SUP, adjacent to the National Marine Centre, 1 km south of the centre if the Napier CBD. The path is about 3m wide, with plenty of room to step to the side. There is also an on-road cycle lane available on Marine Parade, and footpaths. Weekday and weekend day average pedestrian counts on this SUP since 1 Jan 2018 have been 428 and 573 respectively.

The first graph below shows weekly pedestrian traffic varying hugely on a seasonal basis. However no overall trend is evident. This path is almost a decade old. Tourism plays a large role in its popularity, hence the dip in March 2020, during the COVID-19 pandemic.



The following graphs illustrate the hourly distribution of pedestrian use during weekdays and weekend days.



4 - Table of growth experienced in similar projects/environments

Table 3 – Typical Growth in Use of Shared Use Paths and NZCT Cycle Trails

Project	Step change	Ongoing growth
Wainuiomata SUP	+127% in active modes in 12 months	
Northwestern SUP		Cycling - 9% p.a. since 2011 and 17% since 2015 Pedestrians – 10% p.a since 1st Jan 2016
Perth-Freemantle PSP	+94% in cyclists in three months	
Havelock SUP	+300% in 24 months	
Promotion of cycling in Wellington region		Approx 7-8% p.a. growth at Hutt Road SH2 off-ramp since 2009
Great Taste Trail, Richmond		Pedestrians – Approx. 50% p.a.
Hutt River Trail, Lower Hutt		Pedestrians – Approx. 20% p.a.
Marine Parade SUP, Napier		Pedestrians – Approx. 0% p.a.
Typical growth	**Approx +100-150% in first year***	**Cycling approx. 8-17% p.a. since 2015** **Pedestrian approx. 10-20% p.a. since 2012**

Note: * Assumes path promotion and wider network development

5 - Comparison with other demand estimates

5.1 – Cycling Demand Analysis (Dodge, et al, WCC 2014)

This report details the modelling and analysis of a large Wellington cycling survey to estimate the potential demand for a variety of cycle facility types proposed for the Island Bay to city cycleway.

The authors' analysis concluded:
"If an ideal route is chosen between Island Bay and the Wellington CBD, cycling numbers nearly triple. Even more growth is possible if just a few of the people who don't own bikes were to buy or be provided with one." By 'ideal', the authors mean a direct, separated cycleway. This work suggests a much higher preference for separated cycleways over on-road cycle lanes than indicated in Research Report 340 or the EEM. This view is supported by the widely used work of Roger Geller and Jennifer Gill of Portland into the potential and typology of people who do (or might) cycle for transportation. https://www.portlandoregon.gov/transportation/article/264746 In the local context, their work is supported by GWRC's Transport Perception Surveys and State of Cycling Report 2001-2013, which have consistently found cycle safety concerns to be the highest or second highest barrier to cycling uptake in the Wellington region. https://www.gw.govt.nz/assets/Transport/Regional-transport/Regional-Transport-Analysis/Transport-Perceptions-survey-report-August-2019-FINAL.pdf

Peter Nunns (at WCC) is currently rebuilding the 2014 Wellington Cycle Model and expanding it to cover the entire Wellington city. His findings on willingness to pay for separated cycleways in an urban setting are in stark contrast to the EEM, but mirror the experience of very high uptake of cycling on separated cycleways in recent years (particularly where these facilities separate riders from a high volume of high speed traffic). The numbers in the table below represent the relative willingness to pay based on how much extra time users are willing to expend when choosing a facility.

Table 4 – Wellington Cycle Model Willingness to Pay estimates

Facility type	WCC Estimate range	Current EEM value
Painted lanes next to parking	0.8-0.9	0.8
Painted lanes without parking	1.3-2.0	0.9
Barrier protected cycle lanes	1.6-2.5	1.0
Separated cycleways	2.4-3.5	1.0

Draft, by P Nunns, WCC.

5.2 - Northern Pathway Walking and Cycling Forecasts

The proposed Northern Pathway between Takapuna and Auckland CBD has a number of similarities with the proposed Te Ara Tupua path. Section 1 of the Northern Pathway and associated paths to Queen St are just over 7km long, although the rolling terrain and climb over the Auckland Harbour Bridge will require more effort than the flat terrain adjacent to Wellington harbour. The route follows a busy state highway, with little urban development alongside a significant portion of it. The route connects a sizeable residential area with a major CBD. The Northern Pathway, section 1, will be a high quality facility between 4 and 5m wide.

One notable difference is that the route between the Hutt Valley and Wellington CBD already has a surprisingly high number of commuter cyclists, given the low LOS provided for most of its length, while cycling numbers between Takapuna and Auckland CBD are negligible

A second notable difference is that the Auckland Harbour Bridge is a major icon and likely to attract a high number of tourists.

Forecasts of average annual daily trips across the Auckland Harbour Bridge SUP are shown in the excerpts from the Flow Transportation Specialists Ltd demand forecast (updated in 2020) below:

TableES1: Summary of Forecast Daily Trips on Northern Pathway

Section	2028			2038		
	Pedestrians	Cyclists	Total Trips	Pedestrians	Cyclists	Total Trips
Westhaven to Princes St	1,760	2,690	**4,450**	2,060	3,190	**5,250**
Princes St to Sulphur Beach	410	1,220	**1,630**	490	1,530	**2,020**
Sulphur Beach to Stafford Rd	250	1,200	**1,450**	280	1,560	**1,850**
Stafford Rd to Onewa Rd	180	1,180	**1,360**	210	1,540	**1,740**
Onewa Rd to Akoranga Dr	175	1,215	**1,390**	195	1,520	**1,720**

Table 13: Estimated peak hour walking demands on Northern Pathway

Northern Pathway section (north to south)	2028				2038			
	Weekday		Weekend		Weekday		Weekend	
	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile
Westhaven to Princes St	250	370	210	300	300	430	250	350
Princes St to Sulphur Beach	60	90	50	70	70	100	60	85
Sulphur Beach to Stafford Rd	35	50	30	40	40	60	35	50
Stafford Rd to Onewa Rd	25	35	20	30	30	45	25	35
Onewa Rd to Akoranga Dr	25	35	20	30	30	40	25	35

Table 14: Estimated peak hour cycling demands on Northern Pathway

Northern Pathway section (north to south)	2028				2038			
	Weekday		Weekend		Weekday		Weekend	
	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile	Average	95th Percentile
Westhaven to Princes St	390	560	330	460	460	660	390	550
Princes St to Sulphur Beach	170	250	150	210	220	320	190	260
Sulphur Beach to Stafford Rd	170	250	150	250	220	320	190	270
Stafford Rd to Onewa Rd	170	250	140	200	220	320	190	260
Onewa Rd to Akoranga Dr	170	250	150	210	220	320	180	260

5.3 – Tauranga Cycle Model

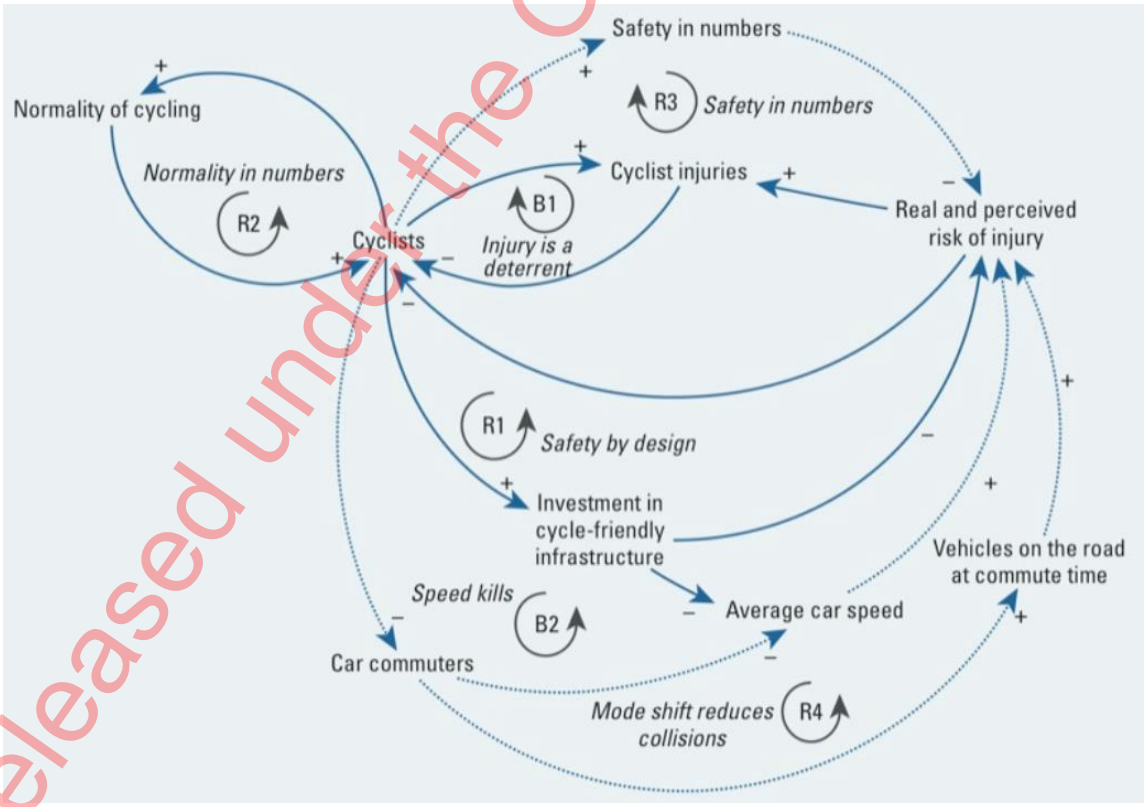
Flow Transportation Specialists Ltd have developed a cycle model for Tauranga. Tim Hughes (Principal Engineer, Transport Services, NZTA) has tested the Tauranga cycle model against existing cycling mode share in a number of Christchurch, Auckland and Wellington suburbs with a range of cycling infrastructure. The model significantly underestimates cycling mode share from the lower Hutt Valley, probably because congestion and parking costs are much higher in Wellington than Tauranga (factors which also contribute to very high public transport mode share). Based on an increase in the route's relative attractiveness index value from 10 to 15, the Tauranga Model suggests that cycling numbers on the Ngauranga to Petone route could triple once a high-quality shared path is completed all the way from Petone to Wellington CBD.

6 - Other Cycling Network Developments expected to grow demand

In addition to the pieces of cycling network recently completed or upgraded (outlined in section 1) the following pieces are likely to be completed in the next five to ten years:

- Safer speeds programme in Wellington CBD
- Evans Bay portion of Great Harbour Way
- Petone to Melling Cycleway
- Beltway Cycleway
- Manor Park-Silverstream Bridge shared path
- LCLR upgrades to the Hutt River Trail (west side) between Manor Park and Melling
- Upgrade of SUP from Ngauranga to Caltex, Hutt Road
- Eastbourne Bays shared path
- Wainuiomata Heartland Ride
- River Link under development
- Let's Get Wellington Moving's 'City Streets Package' (fully complete by 2029)

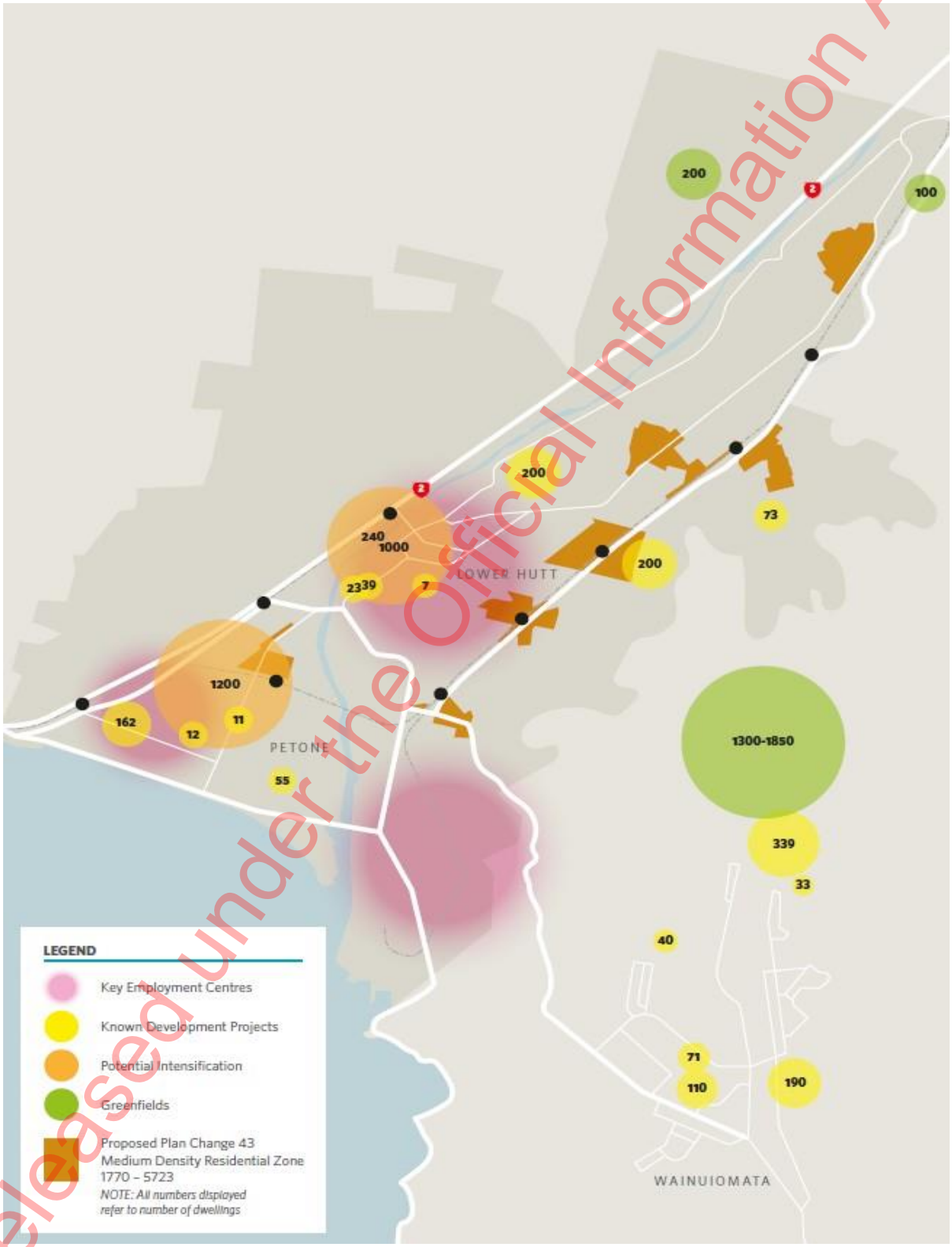
Along with the Ngauranga to Petone section of Te Ara Tupua, these projects will contribute to an overall increase in cycling that is enhanced by the 'network effect'. That is, based on a number of positive feedback loops, each additional link in the network will support growth in the others, as illustrated by Macmillan et al (2014) in the diagram below.



https://ehp.niehs.nih.gov/doi/10.1289/ehp.1307250https://ehp.niehs.nih.gov/doi/10.1289/ehp.1307250

7 - Population growth and urban development

Population growth in Hutt City is forecast to continue at around 1% p.a. Approximately 80% of new dwellings are expected to be provided through residential intensification in Lower Hutt central city, Petone (within easy cycling distance of Te Ara Tupua) and other locations along the public transport corridor (which will be serviced by the Beltway Cycleway). [Ref – 'Lower Hutt Growth Story', 2018]



8 - Review of Aecom's 2015 Estimate

Aecom's methodology was sound in 2015. With the benefit of hindsight, their estimate can be adjusted to take into account lessons learned around:

1 – The proportion of riders likely to stay on a highway after a high-quality SUP is constructed. (note: 2.7% of southbound Hutt Rd cyclists are staying on the road. Despite separation from pedestrians on the upgraded cycle path, faster riders remain nervous about driveway conflicts and conflicts with oncoming riders).

2 – The step-change in use experienced on other projects when a popular cycling route is upgraded from LOS D/E (i.e. on-road shoulders next to a high volume of traffic) to LOS A/B (fully separated shared use path with ample width).

3 – The high background growth in cycling in Wellington that is driven primarily by a desire to be healthy and save money, and environmental concerns (particularly amongst young adults). (https://www.gw.govt.nz/assets/Transport/Walking-and-Cycling/StateofCyclingReport2001-2012.pdf)

4 - Improvements in e-bike performance and affordability, which have significantly increased the appeal of cycle commutes over 5 km in length. Research in seven European cities (by A Castro et al, 2019) found that the average e-bike trip was 9.4km compared with an average trip length of 4.8km on conventional bikes.

An additional factor to be updated is the 'network effect' – an increase in the use of this path as a result of the upgrade or construction of other parts of the cycling network that feed into it. The network has seen some significant development since 2016, and design and construction are well underway on further parts of the network (to be completed prior to the completion of Te Ara Tupua or soon after).

The assumption that the completion of the path would lead to 100% of existing riders switching from the road to the path is optimistic. Even given the recent fatality on SH2 by the BP service station, it is likely a small percentage will ride on the highway shoulder because they can travel slightly faster there. Based on the level of road riding on the Kapiti Expressway and former SH1, it is reasonable to assume that approximately 5-10% of the current riders will stick to the highway after the path is completed (with 5% based on a path width of 5m, vs 10% based on a path width of 3m).

Based on recent experience with similar projects, Aecom's step change estimate of 62% is conservative. A step change of 100% or more in cycling numbers in the first year now appears realistic, assuming significant promotion, completion of the Petone to Melling cycleway, and an upgrade in cycling Level of Service along Thorndon Quay.

On top of the growth in cycling between Petone and Ngauranga, the step change increase in recreational walking/running and transport device (e.g. e-scooters, e-skateboards, etc) use is likely to be very high. The highest growth experienced on the Wainuiomata Hill SUP was in walking. While walkers greatly outnumber cyclists on the Wainuiomata SUP, this is partly due to this route being very hilly (Note: cyclists are much more grade-sensitive that walkers).

This contrasts with use of the much longer and more utilitarian Northwestern SUP, where pedestrians make up only around 17% of users (and cyclists 83%). Pedestrian mode share of 17% is also predicted by FLOW's mode, for the section of Northern Pathway between Sulphur Beach and Stafford Road.

Transport devices users (i.e. e-scooter riders) grew from virtually zero to 5% mode share at the Kingsland end of the Northwestern SUP between 2015 and 2019. Based on improving technology and the enabling rules proposed in the Accessible Streets package, growth in transport device mode share is likely to remain strong. However, existing shared e-scooters are not inexpensive to hire and are of the stand-up variety, so are better suited to short trips. We have estimated that transport device users will make up 10% of total path users on weekdays in 2025. A large portion of transport device trips are likely to be recreational in nature.

In 2020, with the benefit of several more years of cycle count data, it is looking likely that the post-construction annual growth in cycle commuting between Hutt Valley and Wellington will exceed Aecom's 2015 estimate of 6% p.a. for the first ten years, followed by 3% p.a. The background growth of cycling at the SH2 off-ramp on Hutt Road has been approximately 8% p.a. since 2015.

9 - Revised Estimates of Use on Ngauranga to Petone section of Te Ara Tupua

The following revised estimate is based on the following assumptions.

Assumption 1: The 2015 estimate of 450 cyclists per day is valid, and the growth experienced at the Hutt Road/SH2 Off ramp (of approx. 8% p.a. since 2015) will have been experienced between Petone and Ngauranga since 2015, but a lower level of growth is expected following the death of a person cycling on this section of highway in early 2020. Also, with the COVID-19 pandemic likely to lead to a recession, commuting numbers may stagnate for a number of years (as seen during the Global Financial Crisis). For these reasons we have conservatively predicted 2% growth in cycling from 2020 to 2024.

Therefore, base use in 2024, prior to the path opening, is expected to be approximately 715 cyclists plus 5 pedestrians per day. One e-scooter rider has been seen using the road shoulder regularly in 2020.

Assumption 2: 95% of current cyclists will shift to the path once it is open (based on a path width of 5m) and there will be a step-change increase of 60-150% within the first 12 months. For the purpose of this exercise, a step change of 100% will be used. This assumes extensive development of the wider cycling network (as outlined above) and vigorous promotion of Te Ara Tupua around the time of the path opening

Assumption 3: Walkers/runners will make up approximately 15% of total weekday users, as they do on the Northwestern SUP near Kingsland. The majority of these users will walk or run only a portion of the path, mostly starting and finishing at the Petone end.

Assumption 4: Transport device users will make up approximately 10% of total weekday users (based on a doubling of their current proportion of users of Northwestern SUP). Higher mode share is possible but would largely be at the expense of walking and cycling mode share, so will not affect overall numbers greatly.

Assumption 5: Based on the strong growth in cycling along this corridor, and on the Northwestern SUP where growth in cycling has averaged 17% p.a. since 2015, we believe 10% p.a. growth in cycling and transport device use for the first five years after the initial step-change, followed by 5% p.a. for the second five years, and 2% p.a. from 2035-2050, is realistic. Without the boost given by the e-bike and transport device boom, or the cycling 'network effect', pedestrian use is expected to grow at 60% of this rate in the first five years (i.e. similar to the ratio of pedestrian vs cycling growth seen on the Northwestern SUP over the last four years).

Assumption 6: Based on the Northwestern SUP use, we expect the 95th percentile user of numbers will be close to 50% higher than the mean. If the path begins to feel too crowded, some recreational users will choose to go elsewhere.

Table 5 - Estimated average weekday use

Mode	**Weekday** Both ways, Base use 2024	Users by 2025 after path opening step change	Users by 2030 (based on growth of 10% p.a. (and 6% for peds) for 2025-2030)	Users by 2035 (based on growth of 5% p.a. for 2030-2035)	Users by 2050 (based on 2% p.a. growth after 2035)
Cyclists	715	1,359	2,189	2,794	3,760
Walkers/runners	5	272*	364	465	626
Transport device riders	1	181	292	372	501
Total mean use	**721**	**1812**	**2,845**	**3,631**	**4,887**
95th percentile	1,081	2,718	4,268	5,447	7,331

Note * - We expect that only around 50 of these walkers/runners will travel the full length of the path.

Assumption 6: The weekday AM Peak Hour use will be 20% of the daily total for cyclists, 8% of the daily total for walkers/runners, and 15% of the daily total for transport device riders

Table 6 - Estimated average AM Peak Hour use

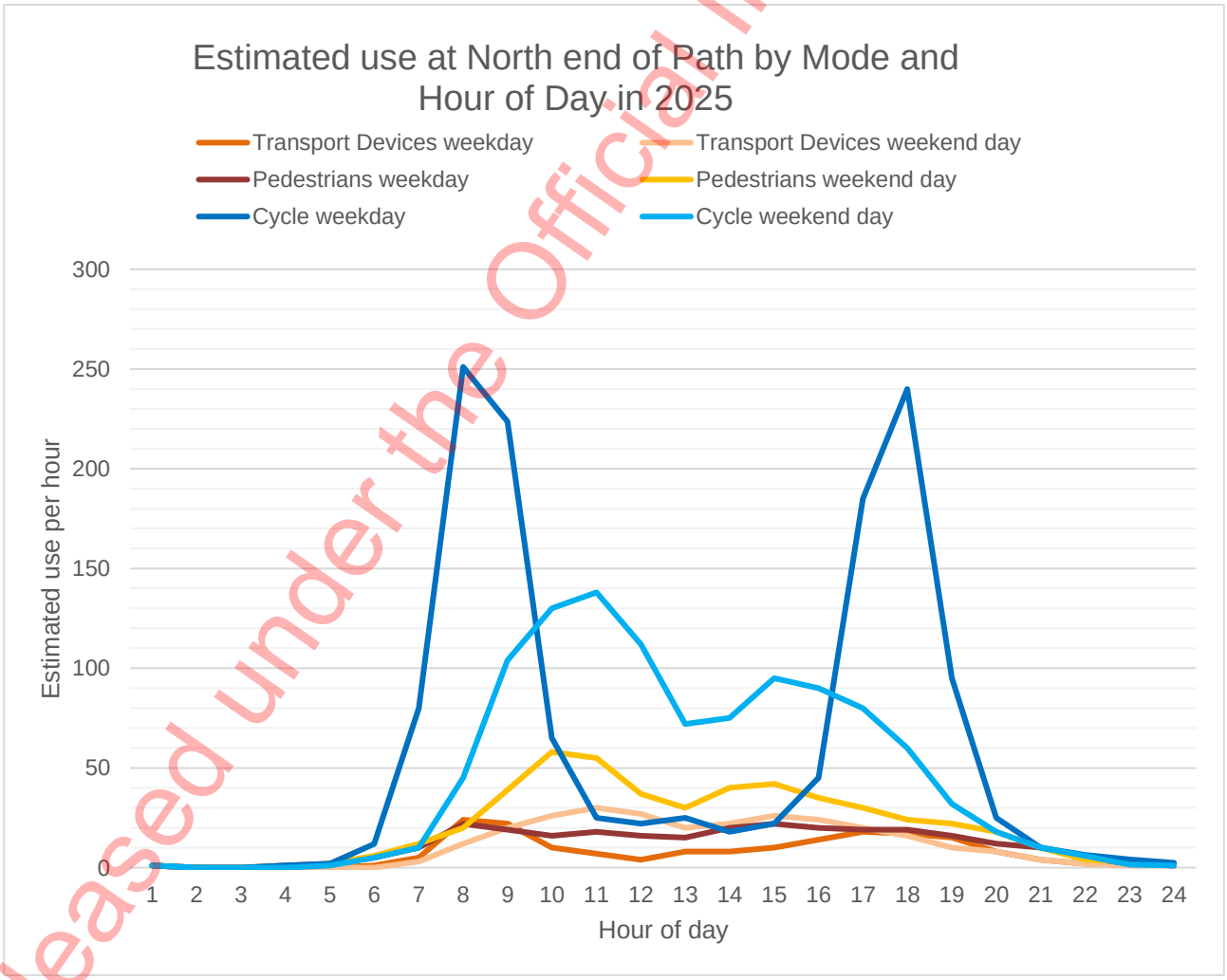
Weekday AM **Peak Hour** Users	2025	2030	2035	2050
Cyclists	271	438	559	752
Walkers/runners	22	29	37	50
Transport device riders	27	44	56	75
Total	**320**	**511**	**652**	**877**
95th percentile	480	767	978	1,316

Table 7, below, estimates weekend use based on the Weekday table above and the weekday/weekend-day split for pedestrians observed on the Wainuiomata Hill SUP (1:1.8) and an approximation of the weekday/weekend-day split for cyclists on the Northern SUP near Te Atatu (i.e. 1:1.05 where cycling is prohibited on the adjacent highway, and off-road cycling options are less common, so 1:0.8 here). Based on the assumption that transport device use will be largely recreational, we have estimated that the ratio of weekday to weekend day use for that mode will be around 1:1.5.

Table 7 - Estimated average weekend day use

Weekend-day Both ways	Users by 2025 after path opening step change	Users by 2030 (based on 10% p.a. growth after 2025)	Users by 2035 (based on 5% p.a. growth after 2030)	Users by 2050 (based on 2% p.a. growth after 2035)
Cyclists	1,087	1,751	2,235	3,008
Walkers/runners	490	655	837	1,127
Transport device riders	272	438	558	751
Total	**1,849**	**2,844**	**3,630**	**4,886**
95th percentile	2,774	4,266	5,445	7,329

While these weekend daily use estimates are higher than the weekday estimates, the peaks will be less pronounced. For an idea of how path use might be distributed between the weekday versus weekend days in 2025, see the graph below. This model of hourly use is inspired by observed pedestrian use of the Wainuiomata Shared Path and cycling use of the Hutt Road shared path.



Appendix A

Gender Split of Ngauranga Cycle Commuters

A highly disproportionate gender split is typical of stressful cycling environments which appeal only to 'Strong and Fearless' (2% of public) and 'Enthused and Confident' (8% of public) people. When high quality, safe cycling networks are provided, these appeal to the 'Interested but concerned' market (approx 60% of the public) and a much more even gender split and wide range of ages of users is seen.

Classification of transportation cyclists, adaptation of Geller (2009), based on values for the City of Portland from Dill and McNeil (2012)

https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/cycle-network-and-route-planning-guide/principles/people-who-cycle/

On the Northwestern SUP, women make up 27% of cyclists, compared with only 17% at Ngauranga (where mixing with high speed traffic is a part of cycling trips).

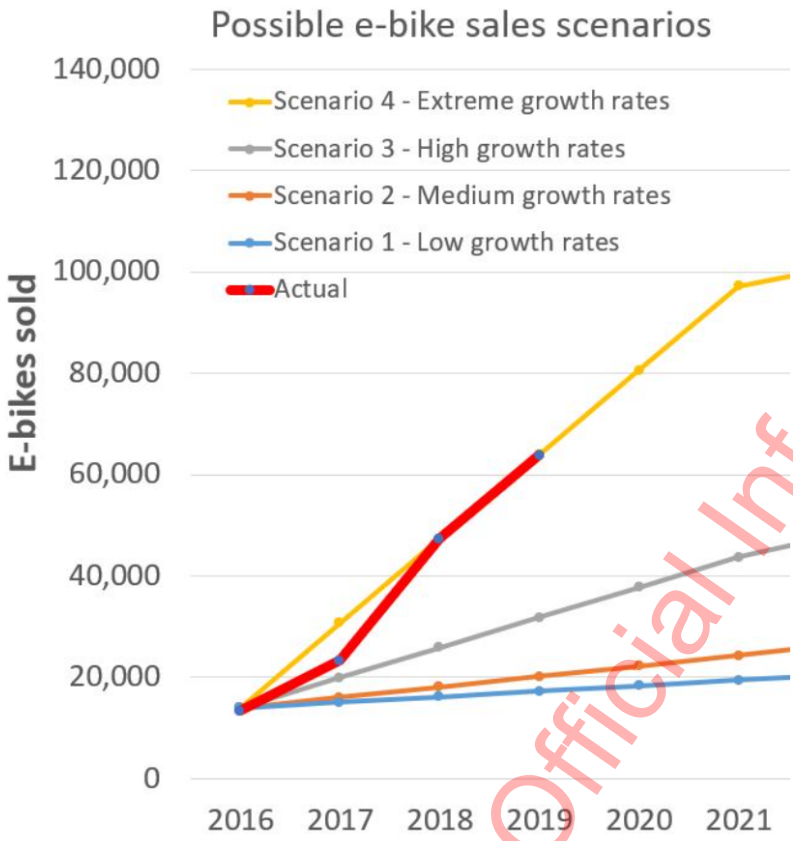
Table 8-14: Ngauranga Cycle Commuter Gender Percentage Share

Year	Weekday Total		Weekday Average	
	Female	Male	Female	Male
Two Hourly Total Volumes				
November 2015	16%	84%	16%	84%
March 2018	20%	80%	20%	80%
March 2019	17%	83%	17%	83%
Peak Hourly Volumes				
November 2015	16%	84%	16%	84%
March 2018	20%	80%	20%	80%
March 2019	18%	82%	18%	82%
Average Hourly volumes				
November 2015	16%	84%	16%	84%
March 2018	20%	80%	20%	80%
March 2019	17%	83%	17%	83%

Appendix B

NZ E-mobility Imports

Note: E-scooter shared schemes start in New Zealand in 2018. Prior to that, e-scooter imports were minimal. Based on import figures for January 2020, approximately 40% of imports represented in this graph are now e-scooters.



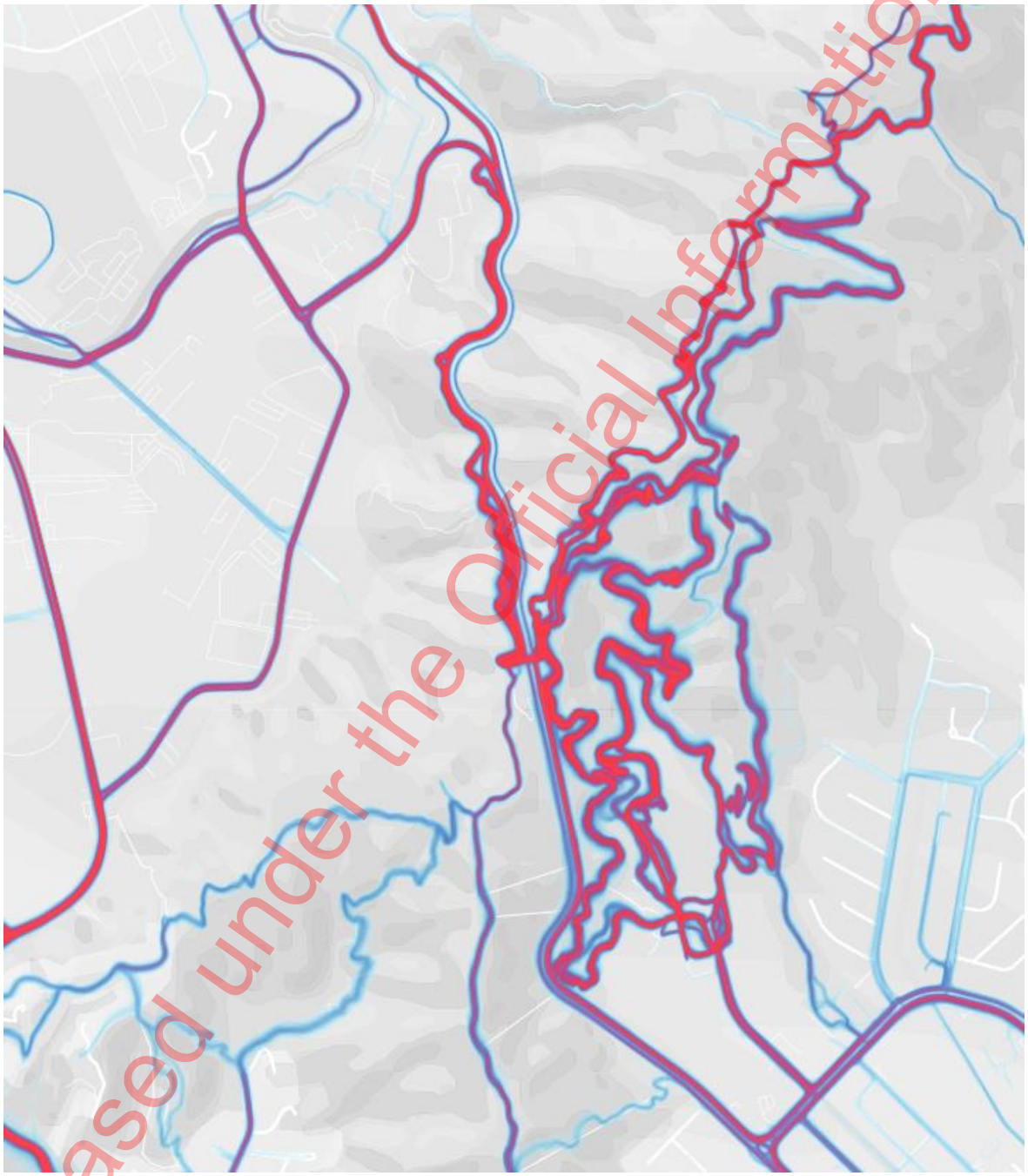
Source: ViaStrada and Stats NZ.

E-bike sales grew dramatically in the Netherlands and Belgium from 2012 to 2016, and have continued to grow strongly since then, now making up 50% of adult bicycle sales (compared with 33% in Switzerland and 40% in France). Dramatic grow in e-bike sales in New Zealand started a few years later, in 2015-2017. By 2019, e-bike sales still only made up approximately 20% of total bicycle sales (of around 200,000 p.a.) in New Zealand. It appears that we are several years away from reaching peak e-bike sales, and then market saturation. However, market saturation will occur, and we expect the growth in cycle commuting to fall back closer to levels experienced prior to the e-bike boom, in the next decade. What is much less clear is how electronic Transport Devices such as e-scooters (shared or privately owned) will grow in popularity and attract new path users (especially those with no interest in cycling or walking). Recent experience with Lime and several other operators suggests the private sector will commit considerable resources into growing the shared e-mobility market.

Appendix C

Strava Heatmap for Wainuiomata Hill

Strava is a voluntary exercise tracking app, typically used by around 10% of cyclists. While it has a bias towards sports cyclists, it does appear to be particularly popular amongst Wellington cycle commuters. A comparison of Strava attempts and the WCC Hutt Road Cycleway counter on Tuesday the 3rd March 2020 found that Strava captured approximately 19% of the actual total number of riders travelling along Hutt Road.
In the Strava heatmap below, the faint blue line shows very low use of the roadway for cycling. The thicker red lines show high-use on the new SUP and adjacent mountain bike tracks.



Appendix B

Economic Sensitivity Analysis s 9(2)(a)

[redacted]

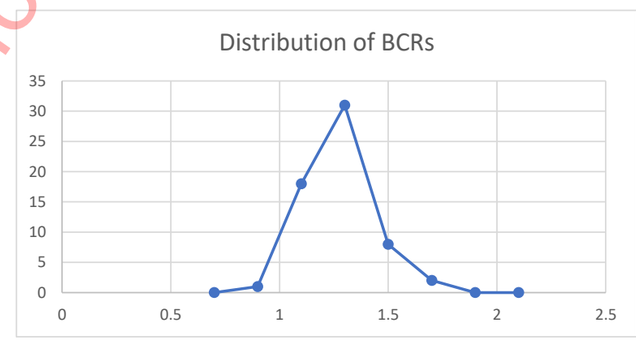
Version 8, 6 May 2020

Central scenario using Simon Kennet Demand forecast

		1. Base case, all growth compounding	**2. Exclude non-benefits**	3. 50% lower pedestrian count	4. TTC included	5. Lower growth
		Combined				
Travel time costs		$0.000	**$0.000**	$0.000	-$4.578	$0.000
VO benefits		$6.116	**$6.116**	$6.116	$6.116	$5.723
Accident costs		$20.151	**$20.151**	$20.151	$20.151	$19.044
Cycling health benefits		$110.619	**$110.619**	$110.619	$110.619	$103.516
Walking health benefits		$37.945	**$37.945**	$18.973	$18.973	$35.556
Tourism		$4.206	**$0.000**	$0.000	$0.000	$0.000
Resilience		$16.211	**$16.211**	$16.211	$16.211	$16.211
CO_2		$0.306	**$0.306**	$0.306	$0.306	$0.286
Total		$195.553	**$191.347**	$172.375	$167.797	$180.336
Cost		$153.363	**$153.363**	$153.363	$153.363	$153.363
BCR		1.28	**1.25**	1.12	1.09	1.18
GVA additions						
Tourism			**$3.025**	$3.025	$3.025	$3.025
Resilience		$10.529	**$10.529**	$10.529	$10.529	$10.529
Sensitivity Tests						
As above		1.28	**1.25**	1.12	1.09	1.18
95th percentile capital costs	$190.115	1.03	**1.01**	0.91	0.88	0.95
Capital costs	20%	1.06	**1.04**	0.94	0.91	0.98
Cyclists	-20%	1.13	**1.10**	0.98	0.95	1.04
Pedestrians	-20%	1.23	**1.20**	1.10	1.07	1.13
Tourist cyclists	-20%	na	**na**	na	na	na
Accidents	-20%	1.25	**1.22**	1.10	1.07	1.15
Resilience	-20%	1.25	**1.23**	1.10	1.07	1.15
Capital costs	-20%	1.59	**1.56**	1.40	1.37	1.47
Cyclists	20%	1.42	**1.39**	1.27	1.24	1.31
Pedestrians	20%	1.32	**1.30**	1.15	1.12	1.22
Tourist cyclists	20%	na	**na**	na	na	na
Accidents	20%	1.30	**1.27**	1.15	1.12	1.20
Resilience	20%	1.30	**1.27**	1.15	1.12	1.20

Notes

Scenario 2 is a variation on Scenario 1
Scenario 3 is an additional variation on Scenario 1
Scenario 4 is a further variation on Scenario 1
Scenario 5 is a variation on Scenario 2. It has the following changes:
Growth after 2035 reduced from 2.0% pa to 1.0% pa.
Accident growth after 2035 reduced from 1.5% pa to 0.6% pa.



Mean BCR	1.17
Min BCR	0.88
Max BCR	1.59
Median BCR	1.15

0.7	0	0
0.9	1	1
1.1	19	18
1.3	50	31
1.5	58	8
1.7	60	2
1.9	60	0
2.1	60	0

Appendix C

s 9(2)(a)

Peer Reviewer's Memo

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7 May 2020

s 9(2)(a)

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Comments on:

CBA for Petone to Ngauranga Cycleway (Sections 3 & 4)

The qualitative comments herein mostly repeat those of my previous note of 27 March, but the numbers have been updated on the basis of new information on the projected number of cyclists and pedestrians provided by Simon Kennett, and a discussion between parties on 5 May 2020.

I have run a number of scenarios that explore variations in some key assumptions and address some methodological issues.

Scenarios

1. Base case: as per AECOM's analysis in *Economic Analysis P2N section 3&4 Combined V5.xlsx.*

   This now includes my earlier adjustment of the resilience benefit to exclude the non-welfare components. As before, there is no allowance for damage from earthquakes as the proposed cycleway is unlikely to provide any additional resilience benefits in this regard. However, it is possible that the cycleway could act as a (very) limited emergency road for access to the railway if it is blocked by subsidence of the hillside. This benefit has not been quantified.

   Also, as previously, all growth rates are compounding, notwithstanding the EEM's advice on when arithmetic growth rates should be used.[1]

[1] An argument used to defend adopting arithmetic growth rates is that compound growth rates can lead to unrealistically high values towards the end of long time periods. While mathematically true, a better approach would be to use variable compound growth rates (as has now been done for P2N) or switch to some other type of growth curve such as a logistic function.

2. Health benefits to foreign tourists are removed as such benefits do not belong in a CBA that deals with the welfare of New Zealanders.

   However, an estimate for the value added attributable to foreign tourists is provided as a Gross Value Added (GVA) benefit. It is based on average value added per tourist of $91[2] and 10% of the numbers assumed in the Base case (10% of 14,000, 19,000, and 24,000, followed by a 2% increase per annum), as it expected that very few of these tourists are likely to be international tourists.[3]

3. P2N is (and will continue to be) a path that is very exposed to the weather. Few people would walk or run it on a regular basis as it is nearly 5km long (over both sections), and any regular commuting would require additional walking (or other transport) at one or both ends. Furthermore, some pedestrians may simply be transferring to P2N from other walking areas. Thus the starting values provided by Simon Kennett are reduced by an arbitrary 50%.

4. Brings the travel time disbenefit into analysis, after an earlier decision to remove it. As for VOC, it is assumed to apply only to weekday cyclists, not weekend cyclists who are likely to be mostly recreational cyclists for whom travel time is irrelevant.

5. Reduces the long run rate of growth (from 2035) in cycling and walking from 2.0 pa to 1% pa, which is much closer to estimates of population growth. The accident growth rate is reduced from 1.5% pa to 0.6% pa.

Note that Scenarios 1-4 are cumulative, while Scenario 5 is a variation on Scenario 2. Table 1 summarises the results. Further detail and a range of sensitivity tests as used by AECOM are provided in the accompanying file *Sensitivity Analysis8.xlsx*.

Table 1: Summary of BCRs

Scenario	BCR
1. Base case	1.3
2. Remove non-CBA benefits	1.2
3. 50% fewer pedestrians	1.1
4. TTC included	1.1
5. Lower growth	1.2
Mean BCR over all tests	1.2
Maximum BCR over all tests	1.6
Minimum BCR over all tests	0.8

The Base case yields a BCR of 1.3. There is also another $10.5m of GVA resilience benefits, but that amount should not be added to the CBA benefits as it represents an increase in the New Zealand's GDP, which is not a welfare measure.

[2] See NZTA, *Estimating Economic Benefits from Increased International Tourist Activity*, A technical paper prepared for the Investment Decision-Making Framework Review, 27 November 2019

[3] See AECOM Wellington to Hutt Valley Cycle and Pedestrian Link, OIA 2351 Appendices Part 1.

Excluding the tourism non-welfare benefits in Scenario 2 reduces the ratio to 1.2, but there is also $3m of GVA benefits as discussed above. There do not seem to be any other Wider Economic Benefits for P2N that should be included.

Halving the number of pedestrians in Scenario 3 reduces the BCR to 1.1. It is unchanged in Scenario 4 in which the negative travel time benefit is re-introduced. Although including it is correct in principle, it is unknown whether the average cyclist will travel faster or slower than the average car.

In fact a similar point concerns accident benefits, some of which accrue to new cyclists, when in the counterfactual the injury risk of these new riders is probably lower if they travel by car or public transport. Thus for this group of people the savings should be negative. The health benefits they accrue from cycling are captured in the analysis and must be at least equal to the disbenefit of higher accident risk (and longer travel times) or the option to cycle would not be chosen.

Scenario 5 is a variation on Scenario 2. It has lower growth from 2035 in the number of cyclists and pedestrians, reflecting slower population growth. The BCR is 1.2, only just below the 1.3 in Scenario 2.

Across all of the sensitivity tests the mean BCR is 1.2, with minimum and maximum values of 0.8 and 1.6 respectively. The low BCRs relate mostly to changes in capital costs, so large increases in this regard could undermine the project's viability.

Conclusion

Further sensitivity tests may be worthwhile, particularly if a number of adverse events occur simultaneously. The number of pedestrians is a priority for more research, along with the projected growth rate in the number of cyclists. Capital costs also have a major effect on the BCRs.

At the other end of the scale, some components have only a minor effect on the BCR, for example the value of emissions savings. A quick calculation using a carbon price of $100/tonne CO_2e confirms that the 4% of VOC used in the analysis is reasonable. The major uncertainty here is the extent of electric vehicle penetration into the vehicle fleet in the coming decades.

Fundamentally, however, the key issue with the P2N project is that the proposed cycleway sits on top of an expensive seawall, lowering its stand-alone BCR. Arguably then the CBA for the cycleway should take the seawall as given, as the seawall is mainly to protect the railway and road corridors, so should be assessed in that context.

Under a standalone CBA for the cycleway there may be merit in undertaking some Monte Carlo sensitivity analysis provided we can propose some reasonably plausible probability distributions for the key parameters.

I am happy to accept corrected if I have omitted anything or misinterpreted something.

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Summary

My analysis addresses three key points:

1. Removal of non-CBA welfare benefits related to foreign tourism and resilience, but allowing for corresponding Gross Value Added components.
2. Testing scenarios with fewer pedestrians (as the base number seems implausibly high), a lower underlying rate of population growth, and incorporating negative travel effects for cyclists.
3. Subjecting each of the above scenarios to AECOM's suite of sensitivity tests.

The resultant BCRs range from 0.8 to 1.6, with a mean of 1.2. This is only just below the 1.3 in AECOM's base case. The low BCRs relate mostly to sensitivity tests with higher capital costs.

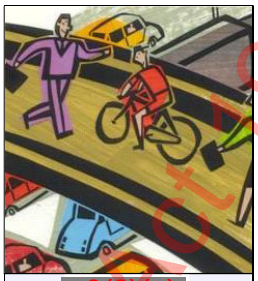
Table 2: P2N, Scenarios ($m)

	1. Base case, all growth compounding	2. Exclude non-benefits	3. 50% lower pedestrian count	4. TTC included	5. Lower population growth
Travel time costs	$0.000	**$0.000**	$0.000	-$4.578	$0.000
VO benefits	$6.116	**$6.116**	$6.116	$6.116	$5.723
Accident costs	$20.151	**$20.151**	$20.151	$20.151	$19.044
Cycling health benefits	$110.619	**$110.619**	$110.619	$110.619	$103.516
Walking health benefits	$37.945	**$37.945**	$18.973	$18.973	$35.556
Tourism	$4.206	**$0.000**	$0.000	$0.000	$0.000
Resilience	$16.211	**$16.211**	$16.211	$16.211	$16.211
CO_2	$0.306	**$0.306**	$0.306	$0.306	$0.286
Total	$195.553	**$191.347**	$172.375	$167.797	$180.336
Cost	$153.363	**$153.363**	$153.363	$153.363	$153.363
BCR	1.28	**1.25**	1.12	1.09	1.18
GVA additions					
Tourism		**$3.025**	$3.025	$3.025	$3.025
Resilience	$10.529	**$10.529**	$10.529	$10.529	$10.529

Appendix D

Walking and cycling Demand Forecast Peer Review by [redacted]

20 May 2020



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Michael

Te Ara Tupua, Ngauranga – Petone Path
Review of User Demand Assessment

Background

Simon Kennett has prepared estimates of user demand for the proposed Te Ara Tupua shared cycle / pedestrian path between Ngauranga and Petone (**N2P**).

As the request of the NZ Transport Agency (**NZTA**), a review has been undertaken of these estimates.

Information Available to the Review

The information available to this review includes:

- Memo from Simon Kennett to Michael Siazon (NZTA) dated 28 April 2020.

Review Process & Scope

The review has been undertaken by reviewing the documentation supplied.

This is in the context of having undertaken a wider review of the Cardno transportation impact assessment.

For ease of reference, this review follows the content order of the April 2020 memo.

It is not the purpose of this review to rework the analysis. Instead, and where appropriate, an indication has been provided where it is considered further information or analysis would be worthwhile.

Introduction

The memo explains this is a review of estimates made by Aecom in 2015 (730 cyclists and 50 walkers/runners per day in the year after opening).

The approach taken has been to base new estimates upon Australasian experience.

Changes since 2015

This section identifies a number of relevant changes in cycles networks, usage and population.

It is noted that an expected recession associated with the COVID-19 crisis is expected to dampen commuter growth.

However, this effect may be at least partly offset by some increase in recreational cycle usage during the Level 4 and 3 periods, which may be sustained into the future.

Existing background growth in active modes in Wellington

This section reports trends in cycle activity from the NZ Household Travel Survey, WCC commuter counts and a count at the Hutt Road / SH2 off-ramp. All of this information points to significant rates of growth. As the memo notes, this is despite only modest improvements in the available infrastructure.

Table 1 of the memo compares the cost of travel by different modes between Petone and Wellington. These costs are based upon significant assumptions relating to unit costs and travel times which in reality will vary significantly between individuals. For example, a $20 parking fee is assumed to apply to car use – but many drivers have reserved spaces available at their work destinations which are free of charge or subsidised. These figures relate to a point in time - it is unclear to what extent the cost differential between modes may have changed over time and might explain the growth in cycling uptake.

Comparison with growth experienced for similar paths

This section references cycle usage for nine cycle paths (of which three are local, four elsewhere in NZ and two in Australia).

The 'step change' in activity levels and rates of on-going growth are summarised by Table 3 of the memo. Overall, the 'step change' is an increase of 100-150% in the first year, with 8-17% growth in cycle activity and 10-20% growth in pedestrian activity per annum.

This does appear to demonstrate that there is a significant level of suppressed demand for such facilities, which is otherwise difficult to estimate reliably.

It is unclear why the 13km coastal walkway in New Plymouth was not included in the assessment, as this has a number of similarities in terms of the coastal environment, standard and linkage to the New Plymouth CBD.

Comparison with other demand estimates

Reference is made to a number of sources which together suggest that segregated facilities are much more attractive for new users and as a result levels of usage are commonly under-estimated.

This is intuitively reasonable – a major deterrent for cycling uptake is the need to share space with vehicular traffic and the associated actual / perceived safety risks.

Other cycling network developments

This section makes a reasonable assertion that the expected completion of other parts of the cycle network will lead to increases in overall cycling usage as more of a coherent network becomes available, allowing for journeys over longer distances with less reliance upon on-road sections.

While this is correct, the Cardno transportation impact assessment noted a possibility that more localised constraints immediately beyond either end of the proposed pathway might become bottlenecks, resulting in forecasts rates of usage not being fully realised. There is a need to ensure that these potential bottlenecks are addressed as part of the pathway

project.

Population growth and urban development

This section notes the population forecasts for Hutt City and the catchment area of the pathway.

It should also be noted that the provision of the pathway may itself affect rates of growth. For example, Petone may become a more sought-after area in which to live as a result of the improved cycle connectivity to central Wellington.

The focus of the assessment is upon demographic growth in the Hutt Valley as the source of trips to the Wellington CBD. But there is also a reasonable prospect of commuting in the reverse direction, with Wellington residents cycling to employment in the Hutt Valley. Demographic growth for the Wellington area as a whole is also relevant, as the pathway is likely to become a regional recreational 'destination' as well as a commuting facility.

Review of Aecom 2015 Estimate

The memo notes that the Aecom estimates are likely to have been valid at the time they were prepared but could not have anticipated some of the changes (especially around e-bike technology) which have subsequently occurred.

Reference is made to the analysis presented in earlier sections of the memo to conclude that the Aecom estimates are highly likely to be conservative, and this appears to be a reasonable conclusion based upon the available information.

Revised Estimates

Revised estimates of weekday and weekend-day usages are made, based upon a series of assumptions which are in turn based upon the preceding analysis.

The use of exact numbers (rather than rounding, for example to the nearest 10 or 50) gives an impression of accuracy, which may be mis-leading.

Nonetheless, the figures appear quite plausible and justifiable given the basis of the underlying assumptions. There is a real prospect of the pathway not only increasing the attractiveness of commuting between Petone and Wellington, but also becoming a local recreational 'destination' in its own right. People are likely to drive with bikes to one end and make a return cycle, and the availability of the parallel rail service also provides walkers with an ability to walk one way and get the train the other (like the Paekakariki Escarpment Track).

Conclusions

This review concludes that:

- the assessments have been thorough and soundly based upon empirical information;
- the forecasts are based upon a range of information sources which individually indicate that higher rates of usage are likely but cumulatively present a compelling case;
- these higher forecasts are more realistic and make allowance for a number of factors which were not relevant at the time of the Aecom 2015 forecasts;
- while the assessment focuses upon the primary commuter movement from Petone to Wellington, the reverse commute may also become significant in volume;

- there is a need to ensure that potential bottlenecks in cycling / walking facilities immediately beyond each end of the pathway are addressed to ensure that uptake is not constrained; and
- variability in the forecast rates of usage are only relevant insofar as they might affect the level of service experienced by pathway users (and therefore the intended cross-section) – it would be helpful if some indication was provided of the extent to which the proposed cross-sectional standard of the pathway is 'future-proofed' in the event that the revised (or even higher) forecasts are realised.

Yours sincerely,

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