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Report

Western Bay of Plenty PT Blueprint - Detailed Business Case

Prepared for Bay of Plenty Regional Council

Prepared by Beca Ltd (Beca)

5 September 2017

Revision History

Revision Nº	Prepared By	Description	Date
0	Andy Lightowler and Craig Richards	Draft for client and peer review	28 May 2017
1	Craig Richards	Revised report. Incorporates client and peer review changes.	19 July 2017
2	Craig Richards	Final report. Costs and economics updated to reflect timetable development. Changes made to address NZ Transport Agency feedback.	5 September 2017

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Craig Richards**		04 August 2017
Reviewed by	**Andy Lightowler**		19 July 2017
Approved by	**Andy Lightowler**		04 August 2017
on behalf of			

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Final Public Bus Route Maps

Executive Summary

This Detailed Business Case (DBC) has been prepared by Beca Ltd on behalf of the Bay of Plenty Regional Council (BoPRC) to support additional investment in public and school bus services in the Tauranga City and Western Bay of Plenty region. The DBC follows a Programme Business Case (PBC) and Strategic Business Case (SBC) process.

The SBC identified a number of problems in regard to public transport (PT) provision in this region and the benefits that increased investment in PT could bring. The PBC investigated the problem and benefit statements further and developed SMART investment objectives that if met will realise the benefits identified in the SBC. From a long list of potential programmes a short list of three possible programme interventions was defined in the PBC. Following a robust evaluation the preferred programme was identified. The programme includes bus network improvement, infrastructure and promotional measures. This DBC develops the bus network component of the preferred programme from the PBC.

The DBC further evaluates the existing public and school bus services to inform the development of potential improvements. Many existing public routes are circuitous with less than desirable frequencies for commuter services, high variability of travel times and operating hours that do not deliver a realistic transportation alternative to private cars. The school bus network follows public bus routes in many places. Growth areas are currently not well served by public transport and new routes or route extensions are necessary to serve these areas.

A short list of possible bus network options was developed through a series of workshops involving stakeholders at Tauranga City Council and the New Zealand Transport Agency. The shortlisted options are higher frequency and lower frequency variations on a bus network similar to existing but with some new and more direct services. The preferred option was defined through a Multi Criteria Assessment that evaluated the short list options against investment objectives, design principles, implamentability and possible effects measures.

The recommended option is a higher frequency option with a new ‘City Loop’ service routing between the CBD, Mount Maunganui and Bayfair. Papamoa routes will terminate at Bayfair and passengers will connect with the City Loop to either the CBD or Mount Maunganui. A new Cross Town Connector service will operate between Bayfair and Tauriko. Express bus services will operate in peak periods between Papamoa East and the CBD and Tauriko and the CBD. Regional services to Te Puke, Katikati and Omokoroa have increased frequencies and minor route changes. Changes to School bus services will be made where public bus services can provide an acceptable alternative transport service.

The recommended option was presented to the public and stakeholders through a public consultation exercise which received a high number of responses, with the majority in support of the new network but some areas of concern and suggestions for improvements. A number of changes were made to the recommended option and the approach to school bus provision following the public consultation. Final route maps are provided in Appendix C and the final timetable is provided on page 54.

The recommended bus service arrived at following public consultation has an estimated annual operating cost of $18.5M (public bus and school bus combined). This is an increase of $6M above the existing annual cost and it is this funding gap that the DBC seeks approval for. The additional cost will be split between the Regional Council and NZ Transport Agency at an additional annual cost of approximately $3M each.

An economic and commercial evaluation of the recommended option has been carried out and identifies the Benefit Cost Ratio of the option to be 3.3. The Strategic Fit and Effectiveness of the programme are both rated as High. Therefore the assessment profile is H/H/M.

Risks of the option are categorised as either financial (Operator cost higher than expected, fuel price impacts, ect) or perception (negative feedback from users). The BoPRC can monitor the likelihood and impact of these risks eventuating over time through ticket sales, revenue, user feedback and surveys etc. If the impact of the risks eventuating warrants changes to bus services at the time this can be considered and implemented by the BoPRC in consultation with the NZ Transport Agency.

Once approved the changes recommended in this DBC will be implemented by the BoPRC during 2018 following a service tender process with bus operators.

1 Introduction

1.1 Background

The Bay of Plenty Regional Council (BoPRC) contracts three separate bus networks in the Tauranga City and Western Bay of Plenty (Western Bay) region: Tauranga urban (Bayhopper), school (Schoolhopper) and intra-regional services. These contracts are due for renewal by early 2018. This provides an opportunity to re-examine public transport in the Western Bay from first principles and look at the bus network as a whole, identifying opportunities to improve the efficiency of the transport network and to re-examine the role that bus services perform in the Western Bay.

Prior to tendering new bus service contracts, a Business Case process has been followed to identify a range of possible alternatives and the most beneficial option for public transport investment in Tauranga and the Western Bay over the next ten years. As a first step towards this, a Strategic Case for change (termed the Western Bay Public Transport Blueprint) was completed in February 2016. This is a joint New Zealand Transport Agency (NZ Transport Agency), Tauranga City Council (TCC), Western Bay of Plenty District Council (WBoPDC) and BoPRC (the project partners) ten-year programme for investment.

Following endorsement of the Strategic Case by the participating organisations, a Programme Business Case (PBC) was completed by Beca Limited (Beca) for the BoPRC in February 2017. This developed the strategic context, confirmed the need for investment, developed the programme of investment and outlined the financial case and delivery mechanism for investment in public transport services and associated capital improvement in the Tauranga City and Western Bay region in the next ten years. The PBC was informed by regular engagement with the project partners.

1.2 The Detailed Business Case

This Detailed Business Case (DBC) has been prepared to identify and evaluate network design options for the Bayhopper and Schoolhopper services and inter-regional services based on the recommended Programme in the PBC, and to define the preferred indicative network design in detail (recommended routes, interchange points and service frequencies). It was proposed in the original business case proposal that this stage would be called an Activity Business Case, however recently it was agreed that this should be appropriately renamed as the joint single stage Indicative / Detailed Business Case.

The main purpose of the DBC is to provide evidence that the preferred option provides the best feasible solution, that it will deliver the outcomes identified in the Strategic Case and is affordable.

The DBC supports a funding application to the NZ Transport Agency to fund a share of the costs of implementing the recommended programme. Following fare recovery, the remaining operating cost will be shared between the BoPRC and the NZ Transport Agency in accordance with the agreed Funding Assistance Rate (FAR).

1.3 Stakeholder and Community Input

As a means of assessing the suitability of the bus network to adequately service future changes in population, employment, land use and travel patterns, an initial network design workshop was held on Tuesday 14 February 2017 and a second workshop was help on Monday 27 March 2017. The two workshops were attended by transport planners from each project partner organisation.

The purpose of the first workshop was to identify gaps and network deficiencies within the current service structure and to identify areas and opportunities for improvement. The purpose of the second workshop was to confirm the recommendations for changes to the network design.

Two workshop were also held by the BoPRC with bus operators in 2016 to receive feedback from operators on any issues and opportunities they may perceive with the existing network structure. This feedback has also informed the DBC.

Public consultation was carried out on possible public and school bus changes in May 2017. Feedback received through this consultation process has informed the final network designs recommended in the DBC.

1.4 Report Structure

This DBC generally follows the recommended structure in NZ Transport Agency guidance with modification to suit the nature of this project. This DBC is structured as follows:

1.4.1 Part A: The Case for the Project

- Section 2 briefly summarises the key aspects of the Strategic Case and PBC relevant to the indicative network design
- Section 3 briefly describes the main characteristics of the current bus networks
- Section 4 summarises the draft bus network design rules that have been developed by the BoPRC to inform the network design process
- Section 5 outlines future land use and transport network changes that will impact on the network design, and considers the ability of the existing bus network to adequately serve this future growth
- Section 6 describes the alternative network design options considered during the DBC development and a shortlist of network variations consistent with the preferred programme identified in the PBC
- Section 7 assesses the shortlist network variations against investment objectives, service design principles and other relevant criteria through a Multi Criteria Analysis (MCA), and recommends a preferred network design
- Section 8 outlines the recommended option assessment including economic analysis, implementability, wider project impacts and the financial case.

1.4.2 Part B: Readiness and Assurance

- Section 9 provides the commercial analysis including a range of potential Public Transport Operating Model (PTOM) unit breakdown structures that could be adopted to procure future bus service contracts along with the implementation strategy and risk assessment
- Section 10 outlines the delivery framework for implementation of the recommended option including consultation, funding, procurement strategy, management and review processes
- Section 11 summarises the findings of the DBC, and outlines how the recommended network design can be implemented.

PART A – PROBLEM AND OPPORUNITIES

2 The Strategic and Programme Case

2.1 Strategic Case

The Western Bay Public Transport Blueprint (Strategic Case) identified the problems facing the Western Bay's public transport service, and the benefits that can be gained from investing to solve these problems. It contained an assessment of how the Blueprint fits within the organisational values for each of the partner organisations and the fit with the NZ Transport Agency's Investment Framework. It also set out the project plan and funding requirements for this project to progress to the PBC development stage.

The following key problems and weightings were identified and agreed with stakeholders:

- The current urban land form and topography makes it difficult to support a more effective and efficient public transport system across the whole network (35%)
- The focus on access to public transport services across the sub-region may mean that public transport is not being best utilised as a competitive alternative mode to private cars (50%)
- The traditional way the benefits of public transport are demonstrated has led to policies, plans and decisions amongst stakeholders that do not fully support the role of public transport in the integrated transport network (15%).

The benefits of investing to address these problems were also identified. Three investment benefits were identified:

- Potential to utilise the existing bus network to achieve better transport outcomes within the same or similar funding envelopes and physical footprint (i.e. improved optimisation of the transport network) (55%)
- Improving the options that are available to people for making trips by public transport giving them more choice as to how and when they wish to travel (i.e. improved travel choice) (25%)
- Potential to better plan and align transport investment to achieving better transport outcomes (i.e. greater alignment of planning and investment) (20%).

There has been no significant change in the transport environment of Tauranga since the Strategic Case was prepared, if anything congestion has worsened and the potential value of the benefits has increased as discussed in the Programme Case section below. The problems and benefits of the Strategic Case therefore remain valid.

2.2 Programme Case

The PBC established that the Strategic Context set out in the Strategic Case is still relevant and provided additional evidence that the problem statements formulated in the Strategic Case are valid.

The PBC found that population growth in Tauranga and the Western Bay has accelerated in recent years with corresponding growth in traffic volumes and a resulting decrease in average travel speeds, indicating that congestion is worsening. There are high travel demands to and from the Tauranga CBD and whilst many bus routes stop in the CBD the uptake in bus travel is low. Bus

journey times are long and variable on many routes. From this evidence the PBC concludes that there is a clear case for additional investment in PT services and infrastructure to attract more people to travel by bus, which will improve the efficiency of the road network.

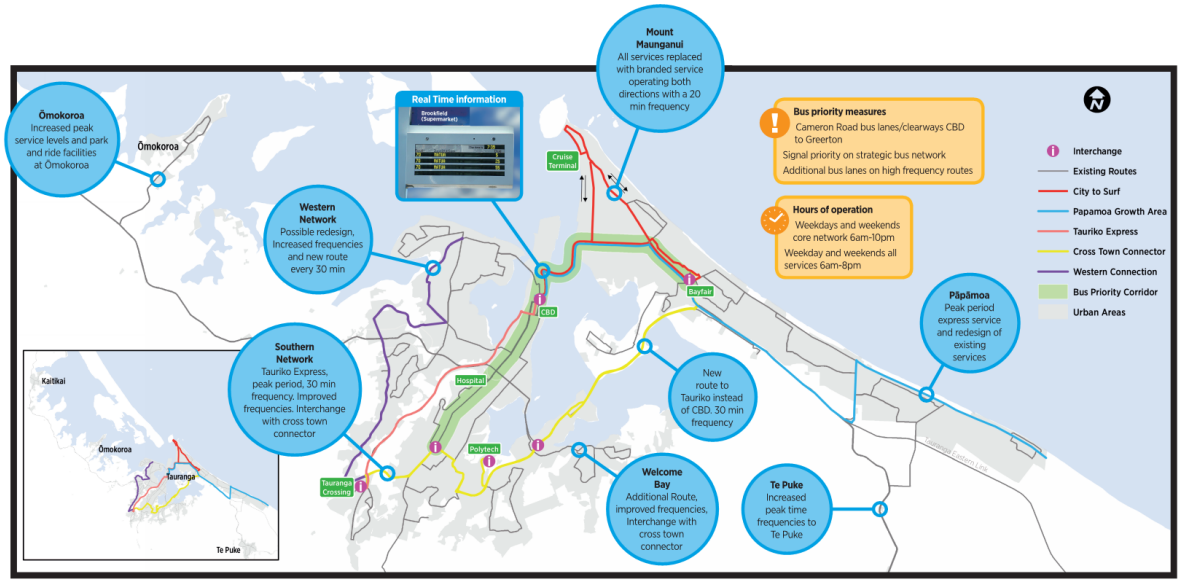
A long list of possible programme options was formulated and evaluated by the lead stakeholder group in the PBC using a MCA. From this, a short-list of three preferred programmes was identified, namely:

- High Performance Plus: focus on improving services and infrastructure in Tauranga City with high frequencies on key Bayhopper bus routes and express buses to growth areas, e.g. Papamoa East and Tauriko, possibly supported by bus priority on the main corridors. Minor improvements to services and facilities in regional areas such as Ōmokoroa and Te Puke.
- Growth Enabler: focus on improving services to new growth areas in Tauranga and the Western Bay. This option would deliver frequent bus services to regional areas such as Katikati, Ōmokoroa and Te Puke, possibly supported by new or improved park and ride facilities. Less emphasis on high frequency services and improved infrastructure in the CBD.
- Balanced Plus: provide some high frequency services in the City balanced with increased levels of service to regional areas such as Katikati, Ōmokoroa and Te Puke. Infrastructure investment is balanced between Bayhopper and regional network improvements.

The three shortlisted programmes were evaluated in the PBC using the NZ Transport Agency's multi-criteria evaluation tables. This evaluation concluded that the High Performance Plus (HPP) programme performs better than the two alternative options against most of the investment objectives, it has a high strategic fit and a higher economic benefit cost ratio (BCR) than the alternative options. As such the HPP programme was recommended.

Figure 2.1 shows the key network changes under the recommended programme.

Figure 2-1: Key Initiatives within Recommended Programme



The recommended programme focusses investment in the Tauranga urban area where there is a higher customer base and avoids higher costs associated with increasing service to regional centres. The programme includes new bus routes and changes to existing routes that will reduce journey times and make bus travel a more attractive option. New routes will include a high frequency 'city loop' (i.e. Hospital - CBC - Mount Maunganui - Bayfair two-way circuit), western and

eastern orbital/connector services and express buses between the City and Papamoa East and Tauriko.

The programme includes the following infrastructure measures:

- Bus priority on Cameron Road
- New or upgraded interchange facilities at key nodes
- Improvements to high use bus stops, e.g. better facilities at the stop and on pedestrian access routes
- Improved park and ride facilities at Ōmokoroa.

In addition the programme includes changes to Schoolhopper bus routes where Bayhopper services can provide an adequate service, investigating zone ticket pricing, and upgrades that have already been committed such as real time information, Wi-fi on buses, and ticketing upgrades.

The key risks to the programme identified were financial uncertainty and negative stakeholder reaction to the changes. Changes to the network may mean that some existing passengers are disadvantaged, and the increased use of urban services by school children may not be popular to some peak period bus users. It was also noted that the actual passenger uptake may not be as high as anticipated, resulting in less revenue than expected, and that the costs assumed may be higher than anticipated.

The PBC was adopted by the BoPRC's Public Transport Committee on 17 February 2017. It was noted by the Transport Committee that this does not at this stage represent a financial commitment by the BoPRC above that in the approved Long Term Plan, but does provide strategic guidance on future financial decisions.

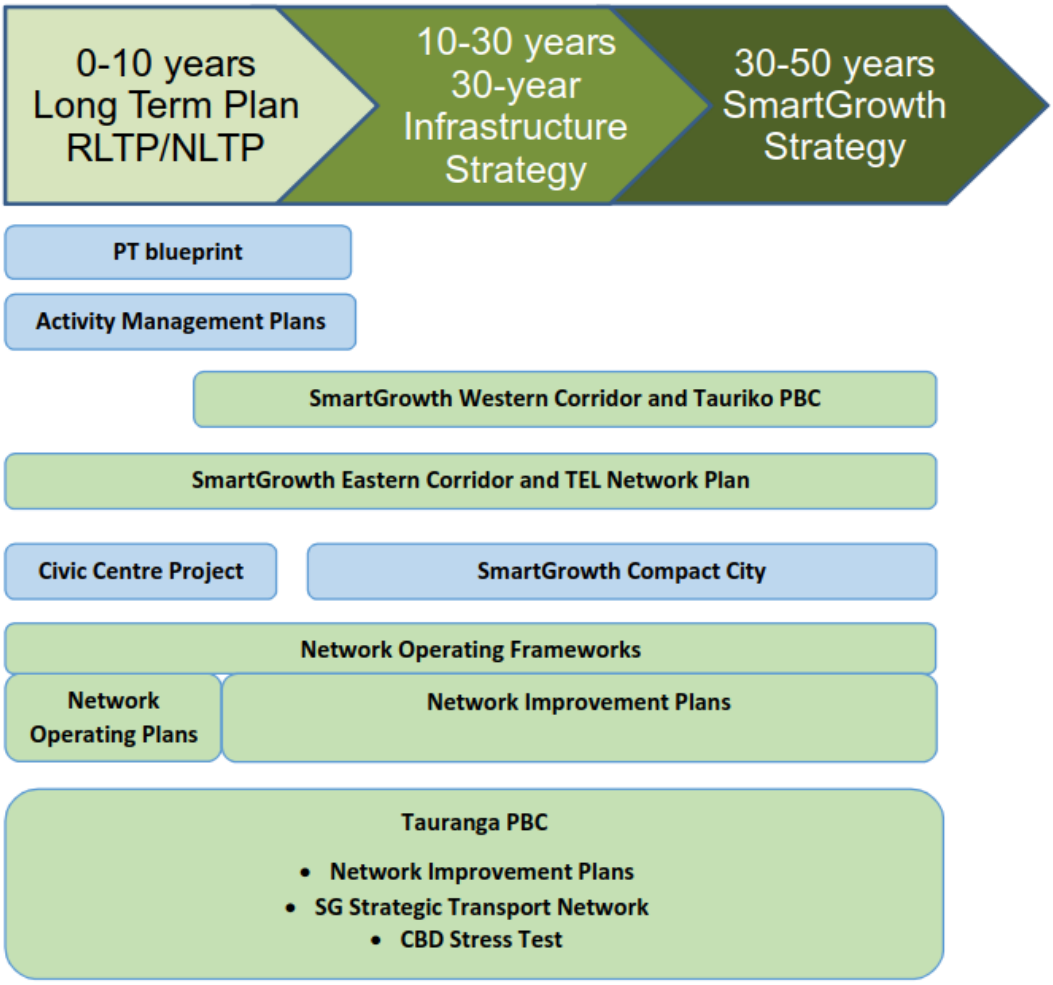
This DBC develops the network design component of the recommended programme in the PBC including routes, frequencies and costs for bus service provision. Other initiatives in the recommended programme of the PBC such as bus priority measures and infrastructure improvements will be subject to specific DBC's for each activity as necessary but are referred to as complementary measures in this DBC.

2.3 Related Projects

The PT Blueprint work is one of a number of transportation strategies and work streams currently being progressed in the region, other complementary projects include Network Operating Plans[1] (NOP) for Tauranga City and the Tauranga Programme Business Case. The following diagram shows the key interrelated programmes and their respective planning horizons.

[1] A Network Operating Plan is a multimodal transport strategy that seeks to improve level of service where deficiencies exist depending on an agreed mode hierarchy by location and time of day.

Figure 2-2: Complementary Programmes



3 Exiting Bus Networks

This section briefly summarises the broad structure of the current bus network and the current use, strengths and weaknesses. It also considers the ability of the existing bus network to serve the needs of the City's future growth.

3.1 Network Characteristics

3.1.1 Urban Services

The current Bayhopper network is shown on **Figure 3-1** and summarised in **Table 3-1**. Key characteristics of the network are:

- 12 main routes
- All 12 routes apart from one (route 30) serve the CBC
- Route 30 operates between Papamoa and Mt Maunganui via Bayfair

- Route 52 operates between Greerton and The Lakes in the off-peak period, but provides a CBD express service in peak periods
- Two routes are cross-city (routes 1 and 2)
- Buses run seven days a week and on all public holidays except Christmas Day and Good Friday
- The majority of routes operate with a 30 minute frequency on Mondays to Fridays and an hourly weekend frequency, some routes operate additional peak period services
- Routes 30, 52 and 59 operate hourly all week
- Two other routes only operate on two days of the week (routes 78 and 79 between the CBD and Mangatawa and Matapihi respectively) - both of these routes are served by two journeys per day
- Go Bus Transport Limited ("Go Bus") operates all Bayhopper services.

Figure 3-1: Existing Bayhopper Network

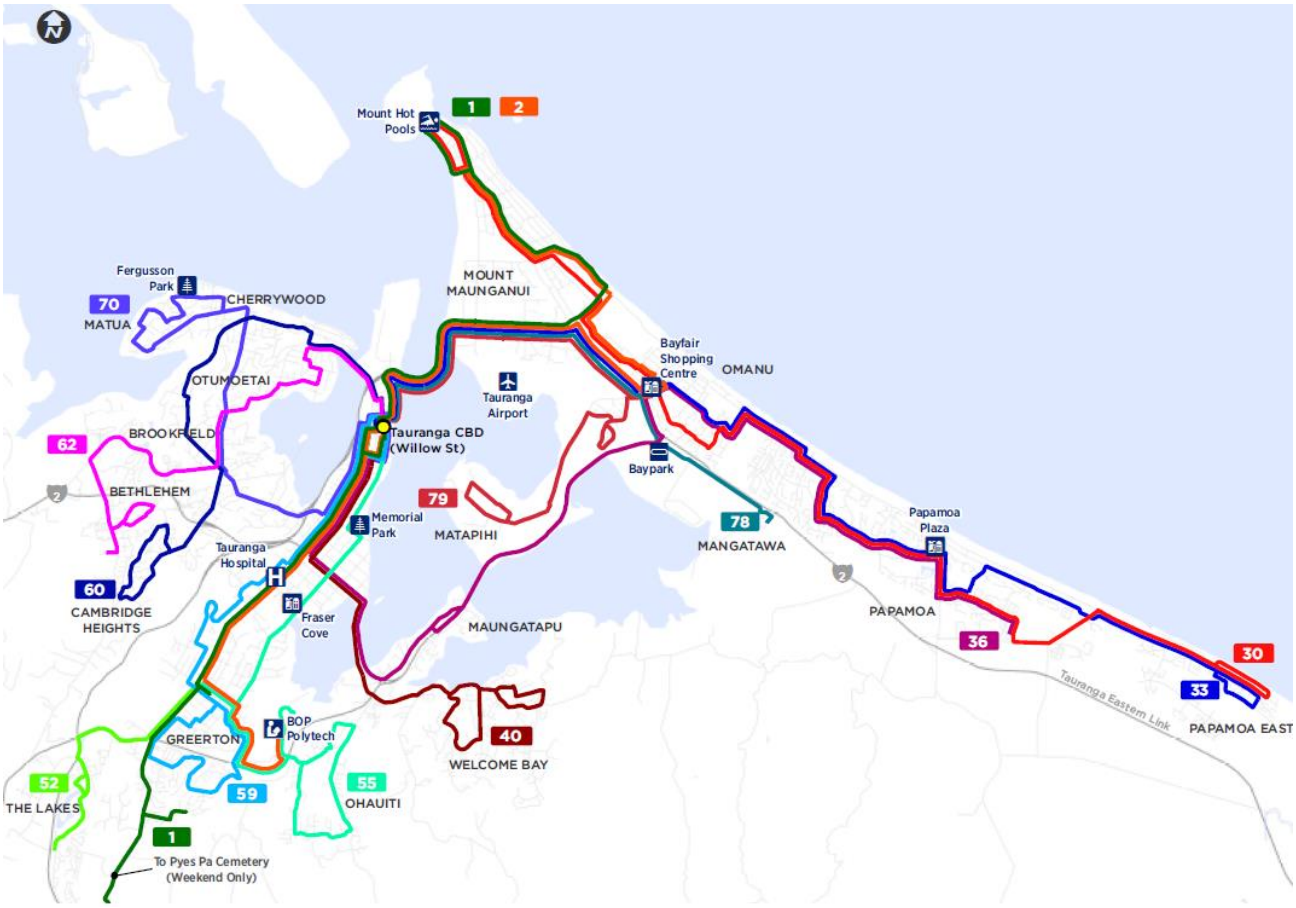


Table 3-1: Existing Bayhopper Services

Route	Description	Weekday Frequency	Weekend Frequency
1	Pyes Pa – Greerton – City – Mount Maunganui	30 minutes	1 hour
2	Windermere – Greerton – City– Bayfair – Mount Maunganui	30 minutes (plus additional peak service)	1 hour
30	Papamoa – Bayfair – Mount Maunganui	1 hour	1 hour
33	City – Bayfair – Papamoa	30 minutes (plus	1 hour

Route	Description	Weekday Frequency	Weekend Frequency
		additional peak services)	
36	City – Maungatapu – Bayfair – Papamoa	30 minutes	1 hour
40	City – 15th Ave – Welcome Bay	30 minutes	1 hour
52	Greerton – The Lakes	30 minutes	1 hour
55	City – Fraser Street – Greerton – Windermere – Ohauiti	30 minutes	1 hour
59	City – Sunvale – Greerton – Oropi	1 hour	1 hour
60	City – Bellevue – Brookfield – Cambridge Heights	30 minutes	1 hour
62	City – Pillans Point – Brookfield – Bethlehem	30 minutes	1 hour
70	City – Brookfield – Cherrywood – Matua	30 minutes	1 hour
78	City – Mangatawa	n/a	n/a
79	City - Matapihi	n/a	n/a

Bayhopper services are operated with a mixture of vehicles with seating capacities ranging between 29 and 40. The contracted minimum fleet sizes required to be operated are summarised in **Table 3-2**.

Table 3-2: Contracted Minimum Seating Capacities by Route (Bayhopper)

Route	Minimum Seating Capacity Contracted
1	35
2	35
30	40
33	40
36	40
40	29
52	29
55	29
59	29
60	29
62	29
70	35

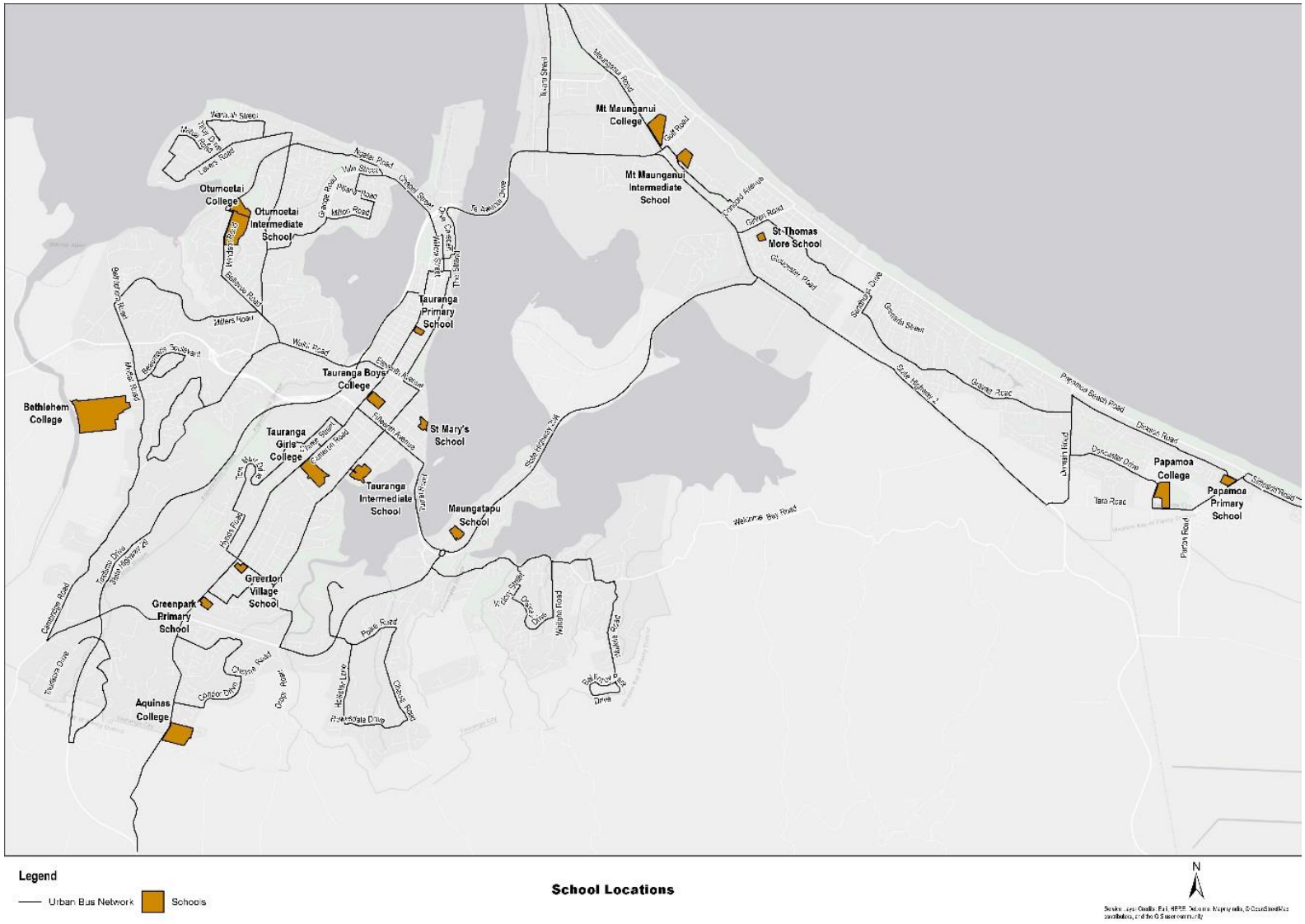
Assessment of the existing public bus service in the PBC concluded that many existing routes are circuitous with less than desirable frequencies for commuter services, high variability of travel times and operating hours that do not deliver a realistic transportation alternative to private cars for many travellers.

3.1.2 Schoolhopper Network

There are currently 46 Schoolhopper routes operating in the Western Bay area serving the following 17 schools and colleges, as shown in **Figure 3-2**:

- Aquinas College
- Bethlehem College
- Greenpark School
- Greerton School
- Maungatapu Primary
- Mount Maunganui Intermediate
- Mount Maunganui College
- Otumoetai College
- Otumoetai Intermediate
- Papamoa Primary School
- Papamoa College
- St Mary School
- St Thomas Moore School
- Tauranga Boys College
- Tauranga Girls College
- Tauranga Intermediate
- Tauranga Primary.

Figure 3-2: Location of Schools Served by Schoolhopper Buses



Some Schoolhopper routes only operate in the AM or PM peak, not both.

The following Schoolhopper routes do double runs (i.e. the vehicle operating the service also operates another route) in both the morning (AM) and evening (PM) periods, unless otherwise stated below:

- 406
- 407
- 408 (PM peak only)
- 410 (PM peak only)
- 412
- 413
- 517 (PM peak only)
- 518
- 657.

Maps of the existing school bus routes for each school are provided in **Appendix A**. The maps show that most of the school bus routes overlap public bus routes, whilst this indicates that the public bus service may provide an acceptable alternative in places there are a number of other issues such as capacity on the bus, timetables and possible interchange to consider in regard to schoolhopper bus planning. This will be explored further in Chapter 6.

The number of school bus routes operated has reduced significantly since 2015, when the Ministry of Education (MoE) withdrew funding for the majority of the school bus network as a result of a change to its School Transport Assistance policy.

3.1.3 Regional Commuter/Shopper Services

The Western Bay is also served by regional commuter (i.e. Monday to Friday AM and PM peak periods only) and regional shopper (Monday to Friday or Monday to Saturday inter-peak only) services that connect through to key locations in Tauranga. The routes operated are summarised in **Table 3.3**.

Table 3-3: Regional Commuter/Shopper Services

Route	Description	Service Type	Weekday Frequency	Weekend Frequency
80	Katikati – Tauranga	Commuter	3 services per day	No service
81	Ōmokoroa – Tauranga	Commuter	2 services per day	No service
82	Waihi Beach – Katikati – Tauranga	Shopper	2 services per day (Tuesdays and Thursdays only)	2 services (Saturdays Only)
82a	Waihi Beach – Katikati – Tauranga (trial service)	Shopper	Fridays only	No service
221	Te Puke – Tauranga	Commuter	3 services per day	No service
222	Te Puke – Tauranga	Shopper	2 services per day (Wednesdays and Fridays only)	No service
222a	Maketu – Bayfair (trial	Shopper	1 service per day	No service

Route	Description	Service Type	Weekday Frequency	Weekend Frequency
	service)		(Wednesdays and Fridays only)	

3.2 Bus Stops

There are over 500 bus stops in Tauranga, some of which have shelters. In the TCC area there are two types of bus shelter provided, one is the TCC bus shelter and the other is an Adshel bus shelter which is managed privately as advertising space.

3.3 Bus Priority

The only bus priority measures which currently exist in Tauranga are bus lanes on Hewletts Road between Maunganui Road and Totara Street (in both directions of travel). The PBC identified bus priority on Cameron Road as a component of the recommended programme to be investigated further and delivered by TCC following an activity specific business case / design and implementation process.

3.4 Fares and Fare Box Recovery

The following fares currently apply to urban and school services. Fares were increased in March 2017 and generally increase annually at or close to the rate of inflation.

- $3.40 cash ($2.72 with a Smartride card)
- $7.80 daysaver
- Free off-peak travel for NZ Supergold card holders
- School students travel for $2.00 ($1.60 with a Smartcard).

Free transfer is permitted to another route within 60 minutes of the passenger boarding the bus.

The cost of fares for regional services, e.g. Katikati, Omokoroa, Te Puke vary depending on the length of journey between $3.60 and $8.80 (Katikati) or $10.50 (Waihi Beach).

The PBC found that the cost of a two way bus fare in Tauranga is typically more than the cost of parking in Tauranga City but TCC have recently increased parking costs in the CBD and parking charges are now more in line with the costs of bus travel.

The fare box recovery for bus services in the Tauranga area in 2015/16 was:

- Bayhopper services - 29.3%
- Schoolhopper services - 24.6%
- Matapihi-Tauranga service - 4.6%
- Mangatawa-Tauranga service - 2.7%
- Te Puke – 25%
- Katikati / Omokoroa – 34%.

The fare box recovery for the whole of the Bay of Plenty region is around 32% (compared to a target of 35% stated in the Bay of Plenty Regional Public Transport Plan). The PBC set a target fare recovery of 45% to be achieved by 2026. Increasing revenue whilst reducing costs will be necessary to achieve this.

3.5 Demand for Bus Services

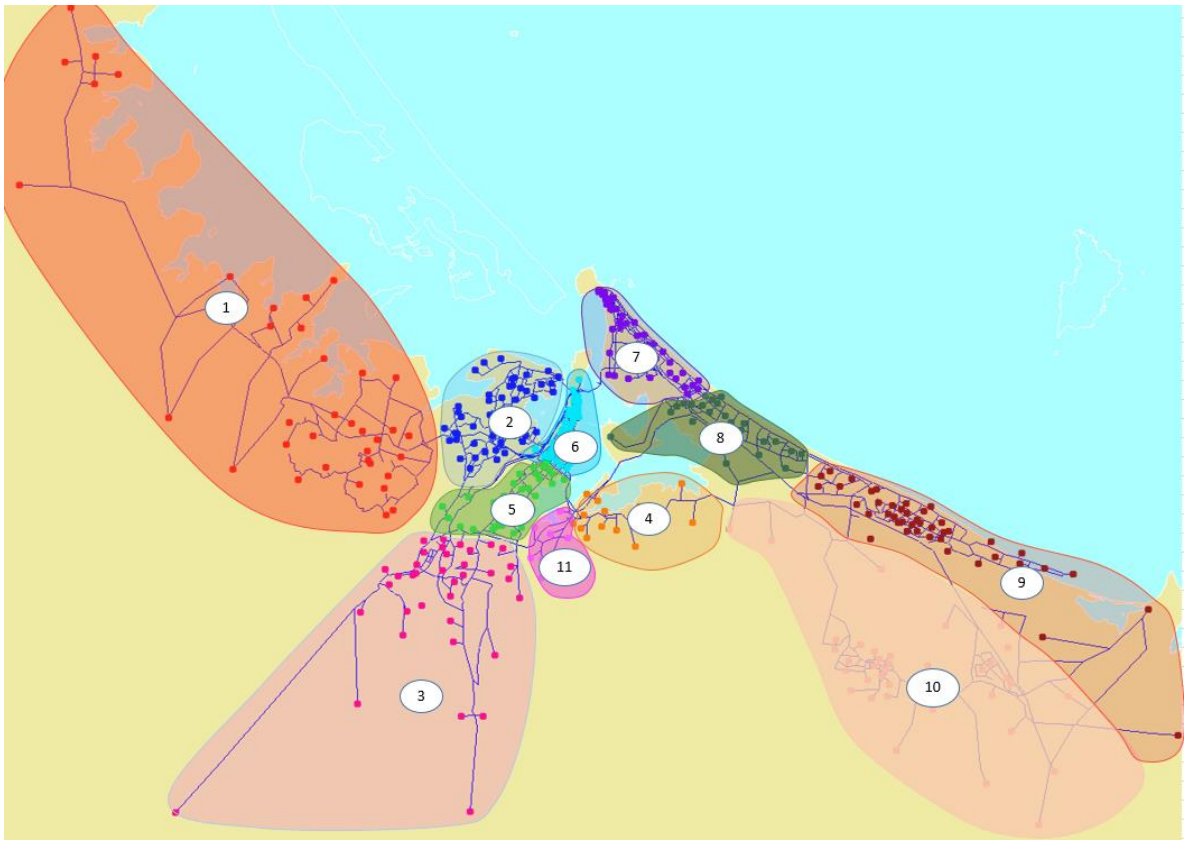
3.5.1 Bus Patronage, Mode Share and Demographics

Approximately 1.86 million trips are currently made on the Bayhopper network every year. Patronage grew strongly (more than 15% per annum) between 2006 and 2010. Average patronage growth for the past ten years is approximately 3% per annum.

The bus mode share for journey to work in Tauranga is around 2% which is less than a quarter of the national mode share, although bus mode share is higher, around 5 or 6%, for journeys to the CBD during the AM peak period. Increasing the bus mode share towards the national average would take a significant number of (potentially longer) trips off the Arterial road network.

The following figures show PT mode share from the 2013 Census for travel between the zones identified in the figure.

Figure 3-3: Census Travel Zones and Percent PT Mode Share (table)



From/To	1	2	3	4	5	6	7	8	9	10	11
1	0.1%	1.4%	0.7%	0.0%	0.2%	1.4%	0.6%	0.0%	0.0%	0.7%	0.0%
2	0.4%	0.9%	1.5%	8.3%	0.4%	2.4%	1.0%	0.4%	0.2%	0.3%	0.0%
3	0.1%	0.2%	0.5%	0.0%	0.1%	0.9%	0.6%	0.0%	0.0%	0.6%	0.0%
4	0.5%	0.0%	1.0%	0.8%	1.8%	3.7%	1.3%	4.8%	0.1%	1.0%	0.0%
5	0.7%	1.3%	2.0%	0.0%	2.2%	4.4%	2.4%	3.4%	4.9%	0.3%	5.2%
6	0.0%	2.5%	0.7%	0.0%	2.9%	2.5%	1.2%	0.9%	0.0%	0.0%	9.4%
7	1.1%	0.2%	1.5%	4.9%	1.4%	2.8%	0.7%	2.2%	0.3%	0.7%	0.0%
8	2.1%	1.1%	1.7%	0.0%	1.2%	4.9%	1.2%	2.1%	1.2%	1.1%	0.0%
9	0.0%	0.2%	1.0%	0.0%	0.7%	2.9%	1.5%	2.8%	2.0%	1.3%	0.0%
10	0.0%	0.3%	1.1%	0.0%	0.2%	0.8%	1.1%	0.0%	0.0%	0.4%	0.0%
11	1.5%	0.0%	1.0%	3.4%	1.8%	2.2%	0.2%	0.0%	0.4%	0.5%	0.0%

Unsurprisingly the highest PT mode shares occur to and from zones 5 and 6 which are the central Greerton to Harbour Bridge areas. Also unsurprisingly the to/from matrices are higher where bus reasonably practical services exist, for example there is no bus travel from Papamoa to zone 11 (Bay Polytech) which is likely to be influenced by the lack of bus service connecting these locations. Filling such voids will be important for the route design going forward to increase mode shift.

Typically users of public transport are not biased towards low incomes any more than the demographics of the community as a whole. 68% of public transport users in Tauranga have access to a private car all of the time and a further 15% have access some of the time (Tauranga Bus User Survey).

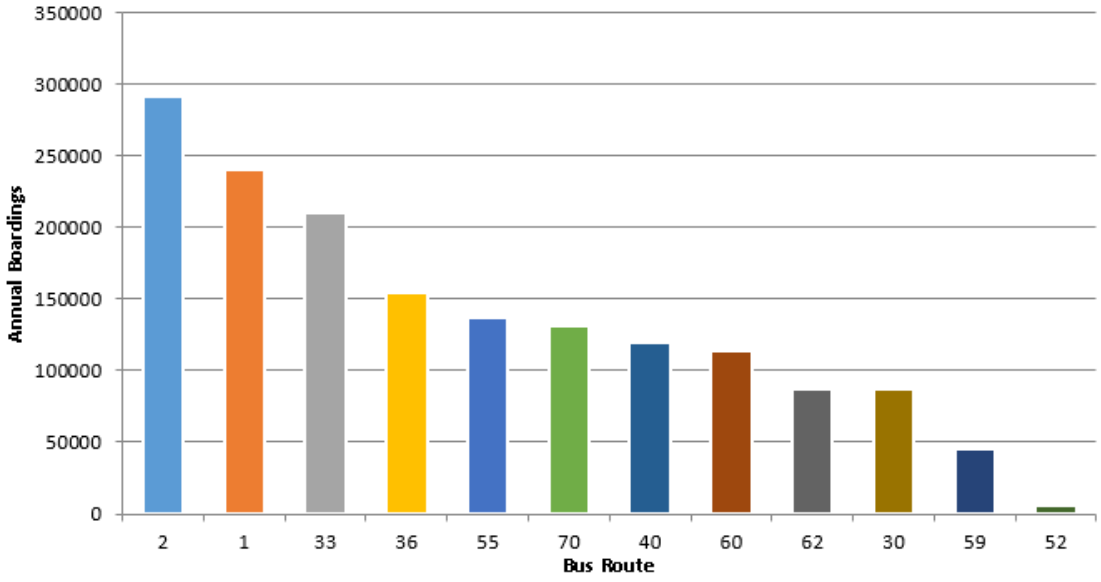
3.5.2 Demand by Bayhopper Route

Boarding data by route for Bayhopper and Schoolhopper services was obtained from the BoPRC for the months of April 2016 and May 2016 along with annual 2015 to 2016 data.

At this time only the location of passenger boarding and the type of ticket sold is obtainable through existing ticketing systems. Without passenger 'tag off' data it is not possible to accurately determine passenger destinations or length / travel time of journeys.

Figure 3-3 shows the level of demand (two-way) by bus route for the one year period between 1 May 2015 and 30 April 2016. Of the urban services, route 2 (Bay Polytech – CBD – Mount Maunganui) has the highest passenger use with over 290,000 annual passenger boardings. Route 1 (Pyes Pa – Greerton – CBD – Mount Maunganui) and Route 33 (CBD – Bayfair – Papamoa) have the next highest levels of use, both attracting over 200,000 annual boardings. Routes 36, 55, 70, 40 and 60 all have between 100,000 and 150,000 annual passenger boardings.

Figure 3-4: Passenger Demands by Bus Route (Bayhopper Services)



3.5.3 Distribution of Demand for Bayhopper Services

Figures 3-4 to 3-8 inclusive show the current distribution of boarding demand (ticket sale by location) for Bayhopper services for adult, child, tertiary student, Supergold and all ticket purchases respectively in the Monday to Friday AM peak period (07.00-09.00 hours).

Figure 3-5: Adult Ticket Boarding Demand

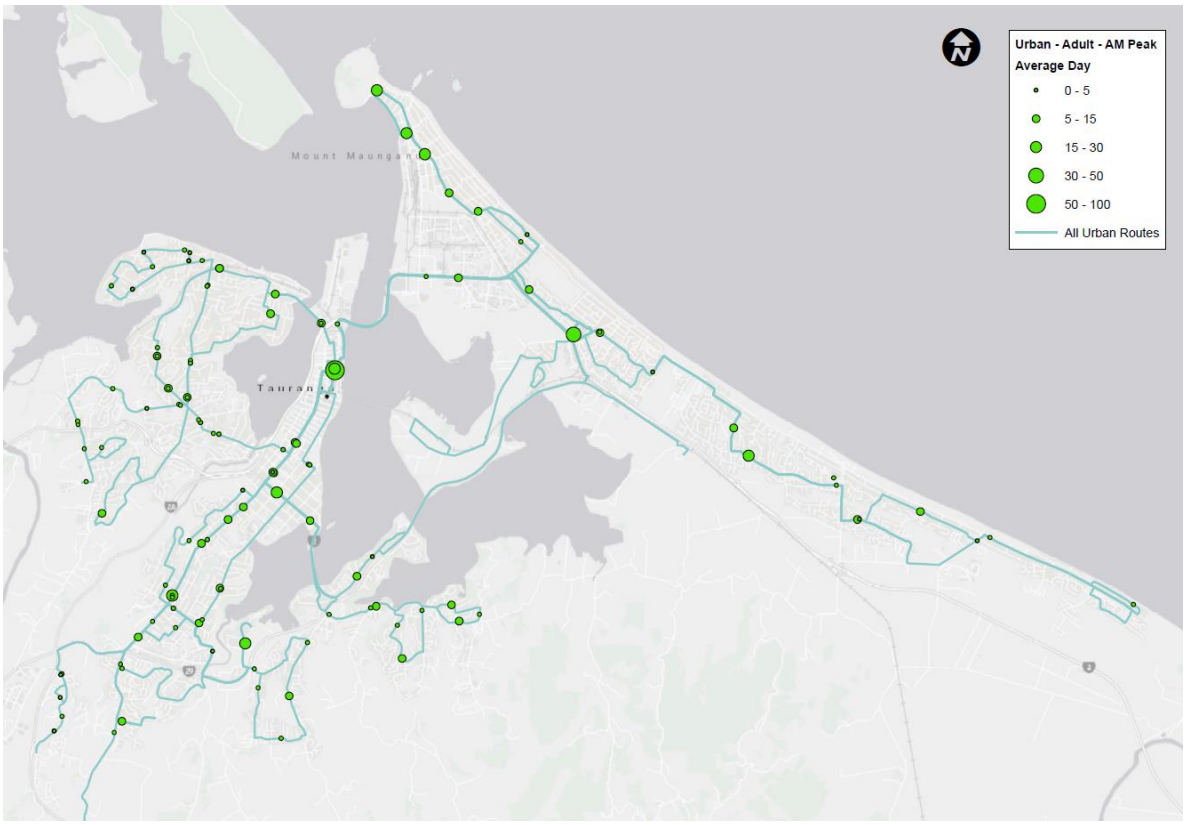


Figure 3-6: Child Ticket Boarding Demand

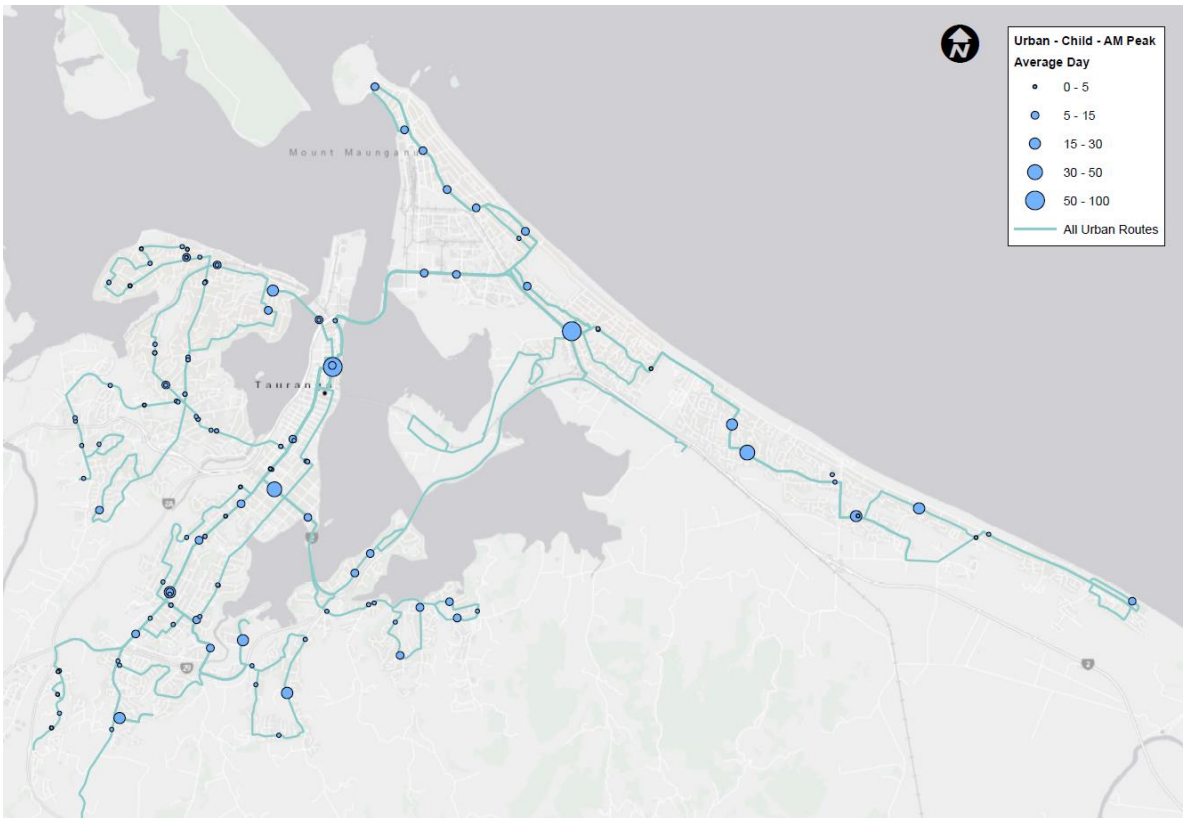


Figure 3-7: Student Ticket Boarding Demand

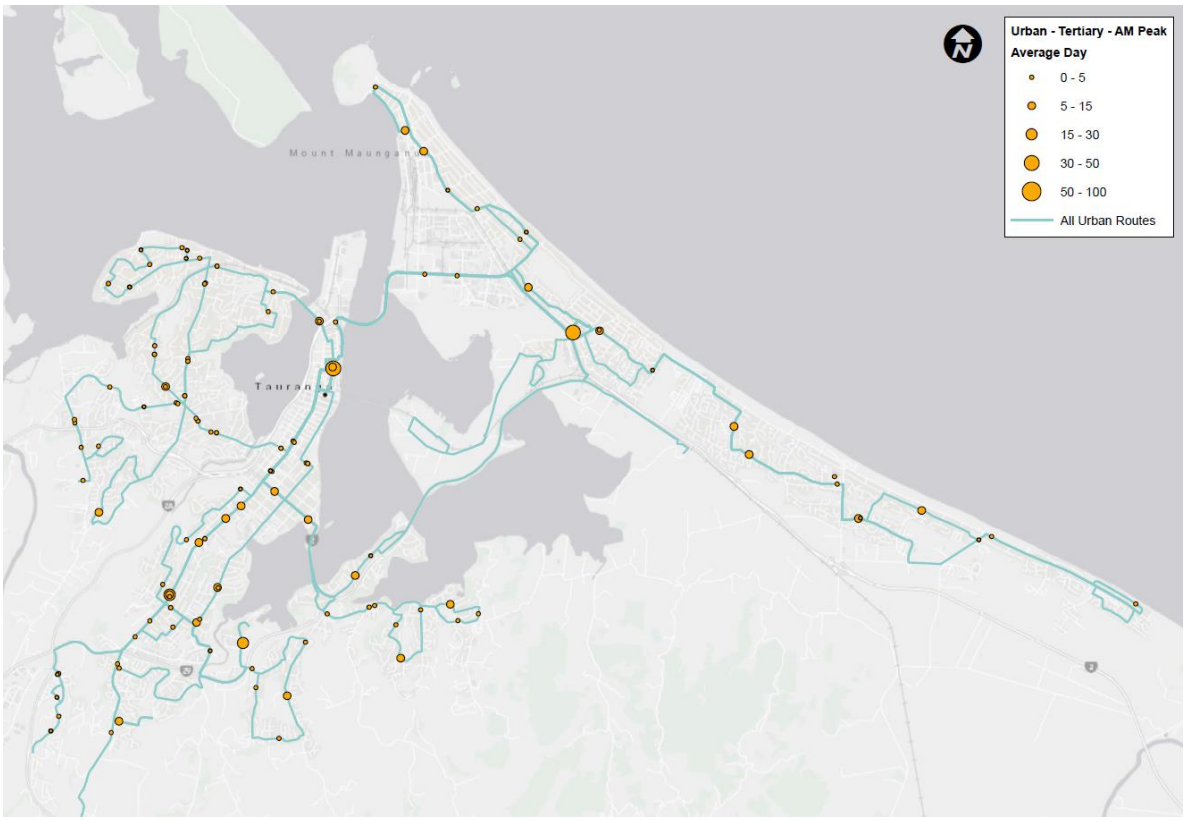


Figure 3-8: Supergold Ticket Boarding Demand

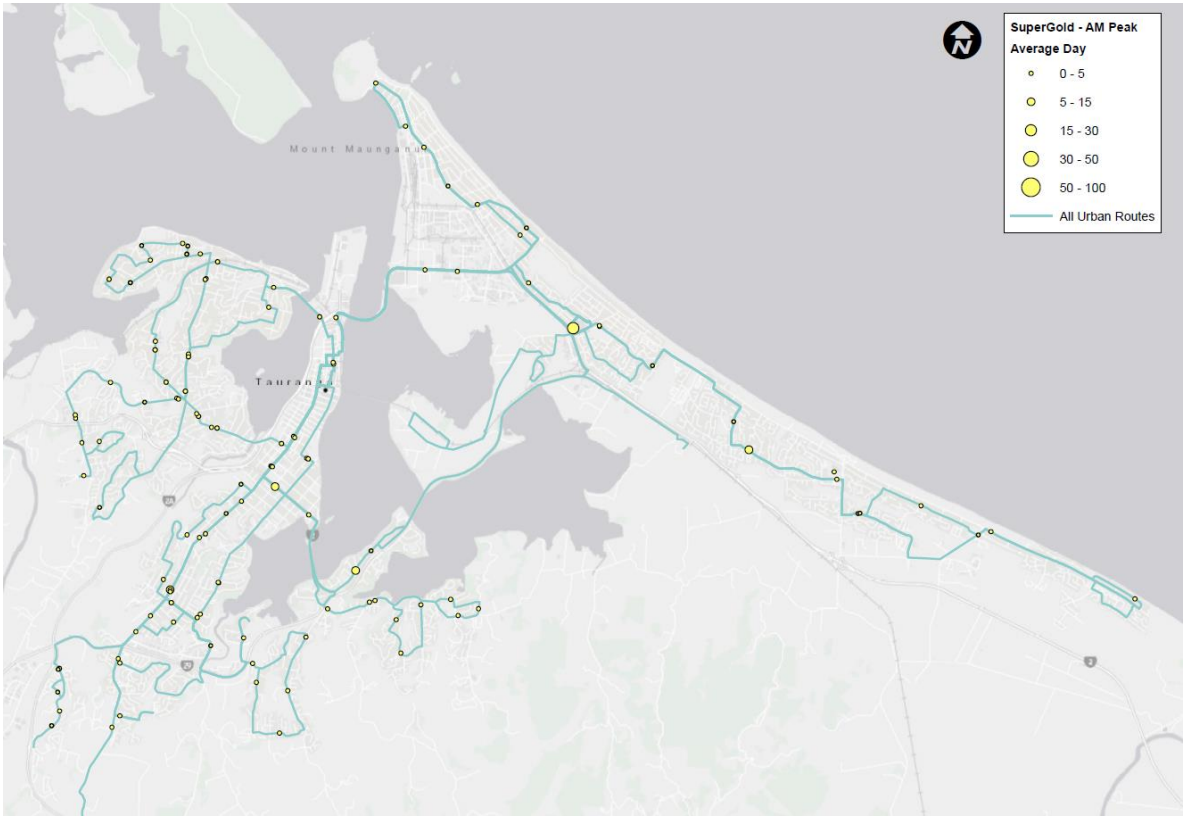
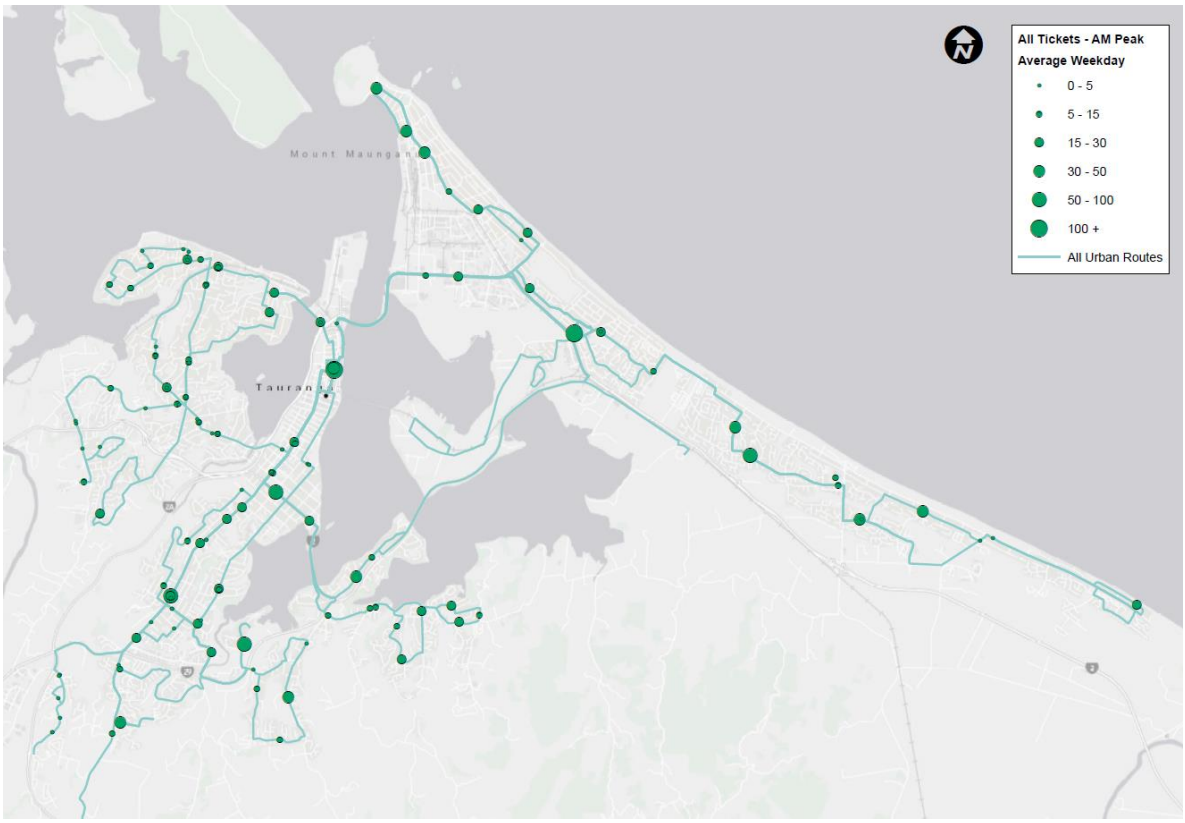


Figure 3-9: All Ticket Boarding Demand



The route demand and ticket sale data confirms the key corridors and origins of passenger demand being Cameron Road, Maunganui Road, CBD, Bayfair, Greerton and Bay Polytech.

3.5.4 Demand by Time of Day and Day of Week (Bayhopper Services)

Approximately 20% of all weekday boarding's occur during the AM peak period of 7am to 9am. This proportion is lower in the PM peak of 4pm to 6pm (approximately 15%), which is likely to be influenced by higher school pupil boarding's during the AM than the PM (many after school trips would occur between 3pm and 4pm).

Approximately 86% of all Bayhopper journeys occur on weekdays (14% occur on weekends / Public Holidays). Weekend use of buses is significantly lower than would be expected, e.g. total travel demands are not \ significantly lower in weekends than weekdays and travellers tend to be less time constrained in weekends so PT should be a reasonable alternative. Low weekend usage may be influenced by lower frequencies of service in weekends offering a less useful service. Increasing weekend use presents an opportunity to increase revenue without significant increases in cost, as peak bus demand is driven by the number of buses required to serve weekday demands.

3.5.5 Distribution of Demand for Bayhopper Services

Figure 3.9 to **Figure 3.11** inclusive show the current distribution of boarding demand for Bayhopper services for all ticket purchases respectively in the AM peak period (07.00-09.00 hours) on Mondays to Fridays (**Figure 3-9**), Saturdays (**Figure 3-10**) and Sundays (**Figure 3-11**).

Figure 3-10: AM Peak Weekday Ticket Boarding Demand

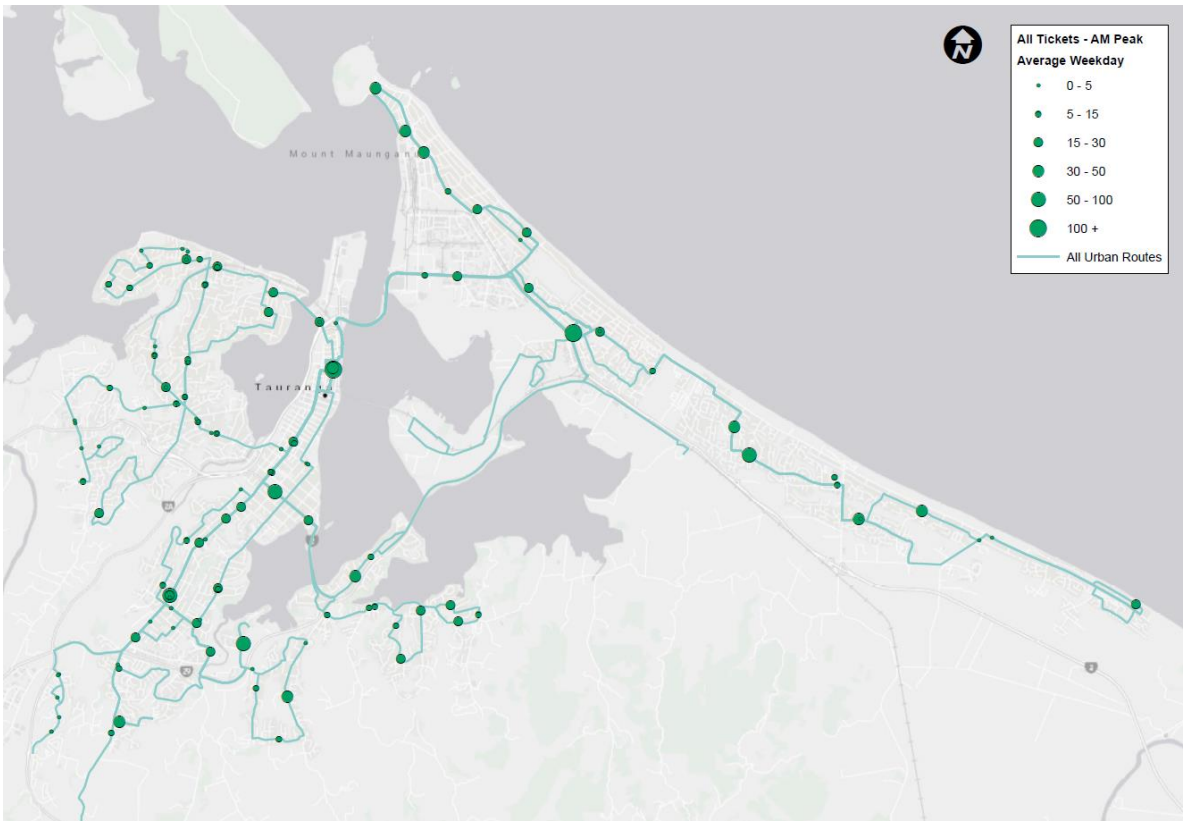


Figure 3-11: Saturday Boarding Demand

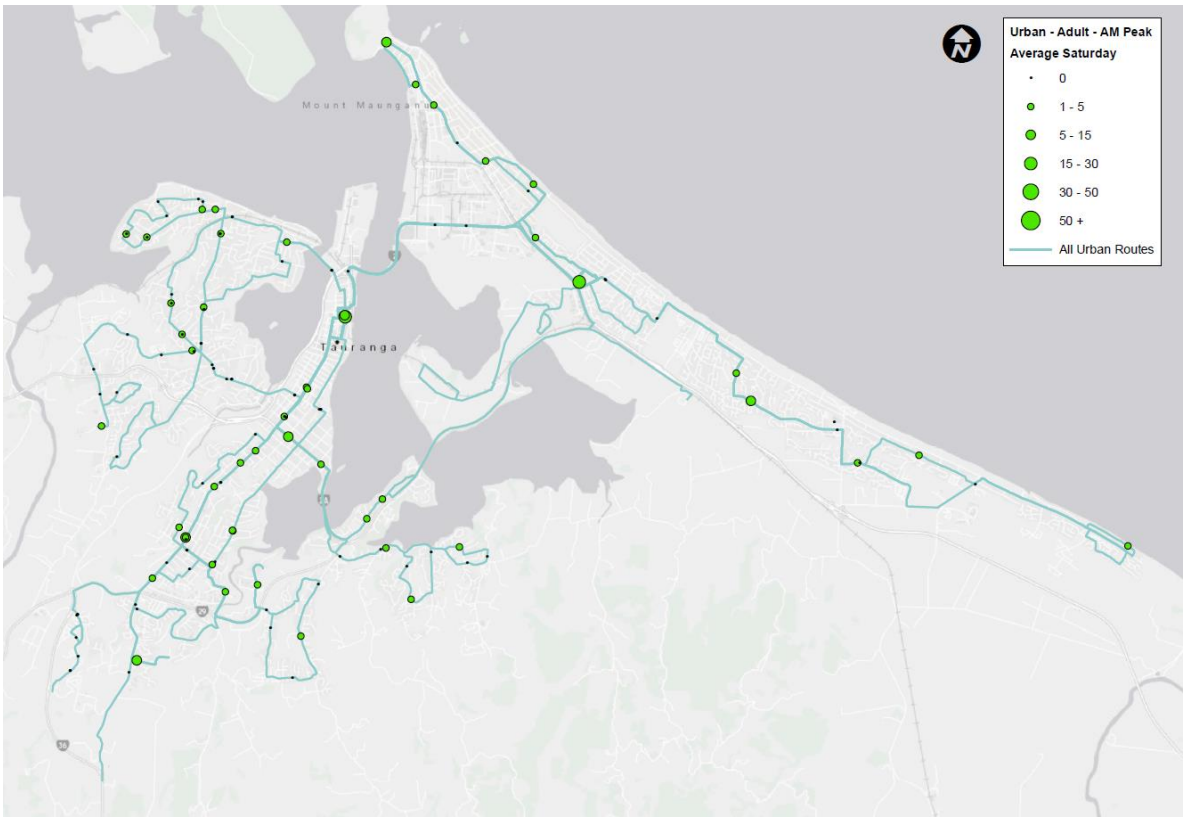
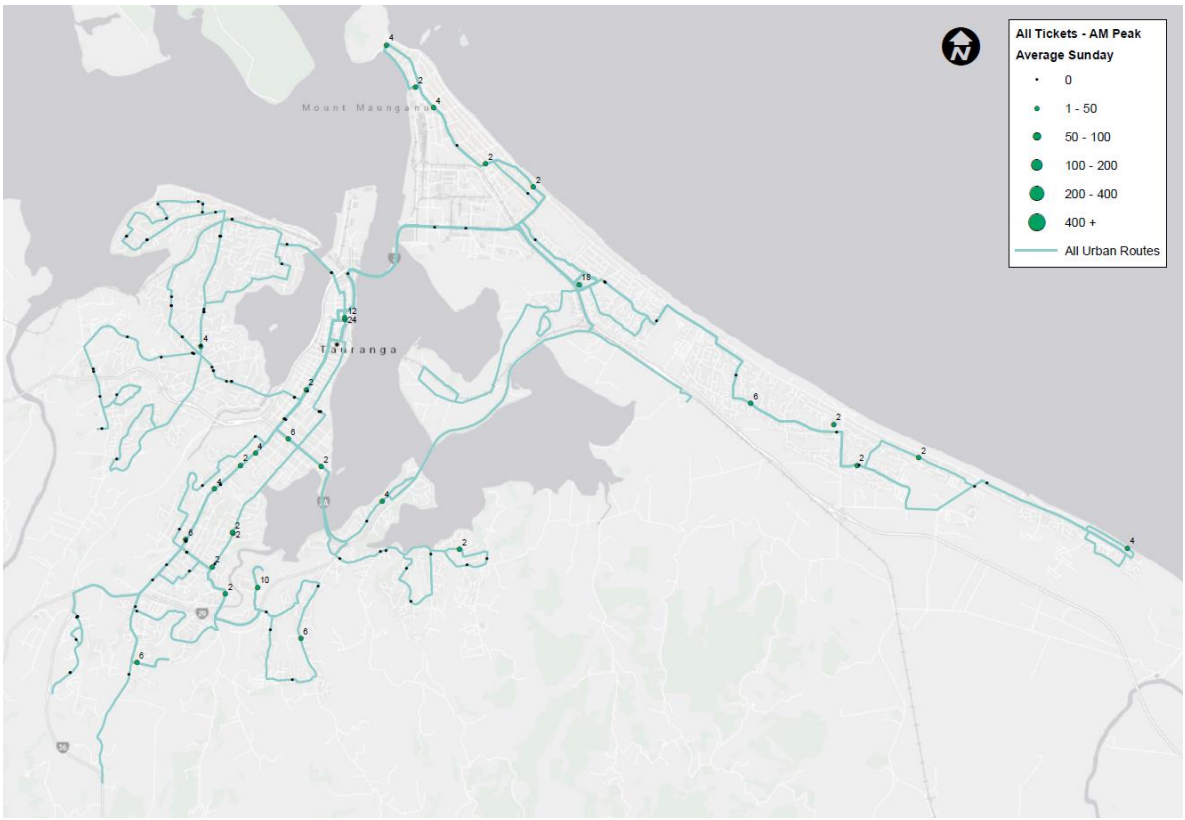


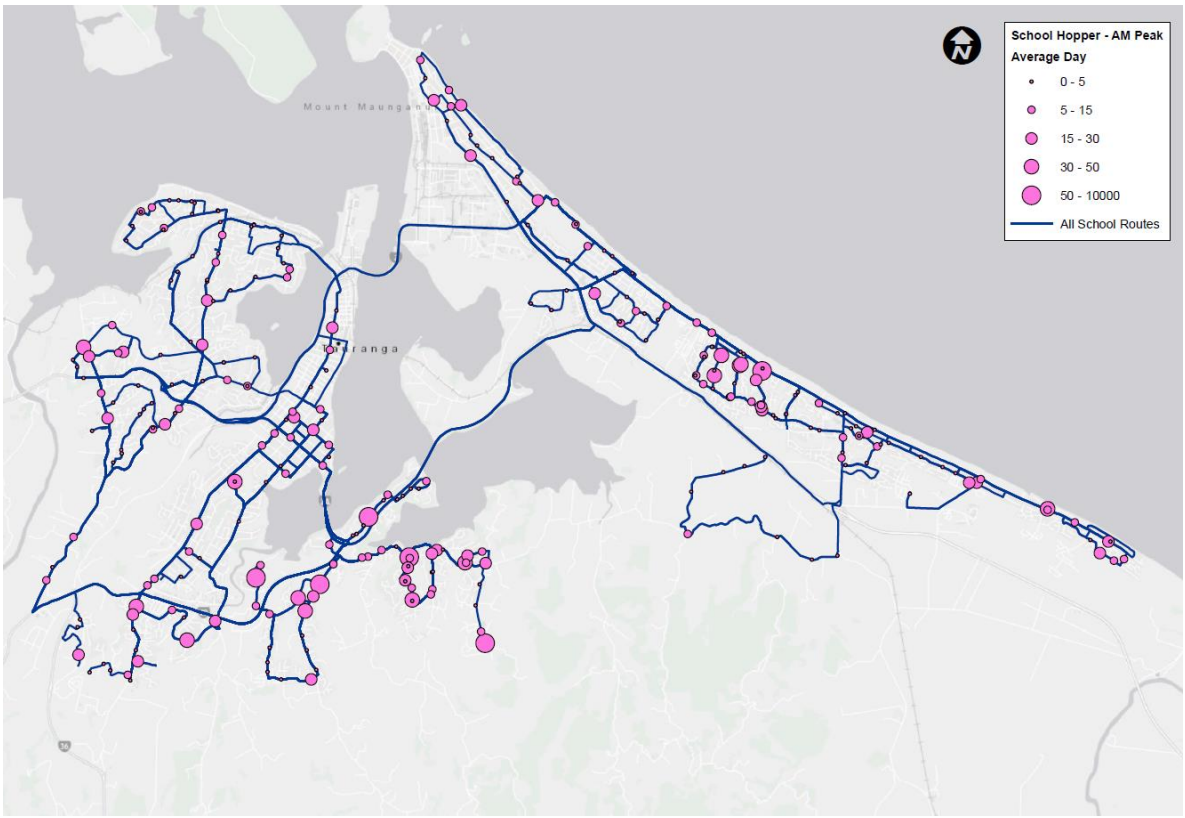
Figure 3-12: Sunday Boarding Demand



3.5.6 Distribution of Demand for Schoolhopper Services

Figure 3.12 shows the current distribution of boarding demand for Schoolhopper services in the AM peak period.

Figure 3-13: School Hopper Boarding Demand



3.5.7 Schoolhopper Services

The Schoolhopper service currently carries approximately 580,000 passenger trips per year. Table 3-4 summarises the level of demand by school served, the figures are approximate and some routes serve more than one school so the number of routes shown is not exact.

Table 3-4: Schoolhopper Demand by School (average passengers)

School Served	Number of Routes	AM Peak Demand	PM Peak Demand
Aquinas College	9	250	260
Bethlehem College	8	230	270
Greenpark School	2	75	70
Greerton School	1	30	55
Maungatapu Primary	1	40	10
Mount Maunganui Intermediate	6 (plus college routes)	90	100
Mount Maunganui College	12	120	210
Otumoetai College	4	115	130
Otumoetai Intermediate	2 (plus college routes)	100	100
Papamoa Primary School	2	35	35
Papamoa College	2 shared with primary	35	35

School Served	Number of Routes	AM Peak Demand	PM Peak Demand
St Mary's School	2 (shared with TGC)	20	20
St Thomas Moore School	1	20	20
Tauranga Boys College	7	170	190
Tauranga Girls College	8	100	150
Tauranga Intermediate	10	120	140
Tauranga Primary	2	20	10

3.5.8 Demand for Regional Commuter/ Shopper Services

Demand on regional buses is much lower than the urban network. The Te Puke services currently carry approximately 12,000 passengers per year and Katikati / Omokoroa services carry approximately 18,000 passengers per year.

3.6 Current Bus Network Strengths and Weaknesses

3.6.1 Bayhopper Services

The main deficiencies of the existing services have been identified through feedback received from bus operators and the BoPRC. These are:

- Services are not well co-ordinated to give consistent frequencies on the main Arterial roads served by more than one route (e.g. Cameron Road)
- Services are not well co-ordinated to enable efficient transfers at the main hub in the CBD
- Many routes are circuitous and indirect, adding to the journey time and length
- There is little inter-connectivity between services outside of the CBD hub
- Frequencies are too low to be attractive on some routes, especially at weekends and early/late in the daytime
- Services do not start early enough, or finish too early in the day.

Table 3-5 summarises the main strengths and weaknesses of each Bayhopper route.

Table 3-5: Current Bayhopper Routes – Strengths and Weaknesses

Route	To/from	Strengths	Weaknesses
1	Pyes Pa – Greerton – City – Mount Maunganui	Provides frequent cross-city linkages	Not well co-ordinated with other services on Cameron Road to give consistent headways Length of route can make services unreliable.
2	Windermere – Greerton – City – Bayfair – Mount Maunganui	Provides frequent cross-city linkages, higher frequency	Not well co-ordinated with other services on Cameron Road to give consistent headways Length of route can make services unreliable. Indirect route between Mount Maunganui and Bayfair, and between the City and Wyndermere
30	Papamoa – Bayfair – Mount Maunganui	Provides a direct service between Mt Maunganui and Papamoa	Indirect, long journey time, low frequency
33	City – Bayfair – Papamoa	Serves Karewa Parade	Indirect. Does not serve Wairakei Avenue, Emerald Shores Drive
36	City – Maunatapu – Bayfair – Papamoa	Provides a direct link from Maungatupu to Bayfair	Indirect route from Bayfair to the City via Maungatapu and Tauranga South. Serves little demand between Maungatapu and Bayfair
40	City – 15th Avenue – Welcome Bay	-	Indirect route from some areas of Welcome Bay due to long loop route
52	City - Greerton – The Lakes	-	Low patronage and limited coverage
55	City – Fraser Street – Greerton – Windermere – Ohauti	Provides coverage through Fraser Cove and past Polytech and Schools	Indirect route between some areas of Ohauiti and the City
59	City – Sunvale – Greerton – Oropi	-	Indirect route between Oropi and the CBD Currently loops through Oropi Road but attracts little patronage
60	City – Bellevue – Brookfield – Cambridge Heights	-	Indirect route between Cambridge Heights and the City
62	City – Pillans Point – Brookville - Bethlehem	-	Indirect route between Bethlehem and the City
70	City – Brookfield – Cherrywood - Matua	-	Indirect route between Matua and the City

3.6.2 Schoolhopper Services

The main strengths and weaknesses of the Schoolhopper services are:

- Fixed timings and only one service per route per peak means journey options (and therefore attractiveness of service to customers) is limited
- Routes are often indirect.

3.6.3 Regional Commuter/ Shopper Services

The main strengths and weaknesses of the regional commuter/shopper services are:

- The timing of the services do not always meet customer needs due to operational constraints
- Services from some areas do not provide efficient journeys to key destinations such as Tauranga Hospital/Bayfair/Mount Maunganui
- The coverage of services in Te Puke is limited.

4 Future Network Design Principles

To support the preparation of the future bus network design, a set of design principles was developed by the BoPRC in 2016 for Bayhopper and Schoolhopper services. These principles seek to provide direction on how the two bus networks are to be developed and assist in the delivery of the benefits identified in the Strategic Case.

4.1 Bayhopper Network

4.1.1 Service Priorities

The following service priorities were identified:

- **Reliability** – Our network can be trusted to do what it 'says on the box'
- **Meets user needs** – Goes where people need it to go
- **Journey times** – Our network has journey times that make it competitive with other modes
- **Connected network** – Allows users to transfer between services and freely travel around the city and on to other destinations.

4.1.2 Service Design Principles

The following service design principles were identified:

- Sufficient slack time should be built into timetables to maintain reliability allowing for congestion growth
- Should meet existing demands from users and aim to attract additional users
- Services should be delivered to growth areas to signal and provide users with long term public transport stability
- Should take into consideration existing and potential regional services in particular those servicing satellite communities in the Western Bay of Plenty
- Should incorporate a service hierarchy that is easy to understand and allows user to easily identify areas that are supported by frequent public transport services
- The service design should reflect the existing, decentralised urban form of Tauranga whilst supporting growth in the CBD
- Service design should encourage urban forms that will reinforce patronage growth
- Where possible infrastructure solutions should be identified that will allow for more direct, reliable bus services.

4.1.3 Types of Services

The types of urban services identified are summarised in **Table 4-1**.

Table 4-1: Types of Urban Services

	Special	Frequent	Connector	Access	Regional
Description	Orbiter or serving special destinations such as airports or cruise terminal	Fast and frequent services	The work horse of the network	Services that are provided to ensure minimum level of service to as many people as possible	Typically designed to accommodate commuters and provide access to services in larger centres
Frequency	15-60 min	15 min or less	30 min	60 min	As required
Stop Spacing	600m or greater	800m or greater	600m or greater	approx. 400m	Typically key destinations only
Livery	Bespoke	Emphasised	Standard	Standard	Standard
Service Planning	As required	Uses main arterials with few detours. Connects major attractors. Significant bus priority utilised	Direct routes with deviations for attractors. May have some bus priority measures	May be circuitous to provide maximum coverage	Will be direct with detours for major attractors
Transfer Design	Depends on locations served and frequency.	Frequency should allow for timetabled connections with minimal delay	May hub or interchange with connector /frequent services.	Where possible should connect to Frequent services	Should link to a main hubs to enable onward journeys
Suggested Hours of Operation	As required	6am-9pm*	6am-7pm	7am-6pm	As required

*later on Friday/Saturday

4.2 Schoolhopper Network

4.2.1 Priority on the Public Network

Secondary and intermediate school students should, in the first instance, be served by the public bus network (Bayhopper services). Schoolhopper services will be provided where the capacity or coverage of the public network is insufficient to cater for demand.

Primary schools should, wherever practicable, be served by Schoolhopper services ahead of Bayhopper services. This is because Bayhopper services will not always be seen as a safe or comfortable choice for primary school students and their parents.

4.2.2 Flexibility

Schoolhopper service contracts should be flexible enough to allow for changing demands as the demographics of an area or school roles change.

4.2.3 Hours of Operation

Schoolhopper services should be planned to operate with no pick-ups prior to 7:30am, and no drop-offs after 4:30pm. This is to ensure students are able to arrive home at a reasonable hour.

4.2.4 Minimum Distance to School

All school services are to include stops (to allow pick-ups) to within two kilometres of each school unless there are capacity constraints on the service. The current MoE criteria requires that Years one (first year at primary) to eight (first year at secondary) must live at least 3.2 kilometres from their nearest appropriate school; Years nine and upwards must live at least 4.8 kilometres from their nearest appropriate school. The proposed change will result in services operating much closer to the school gate and will therefore have a greatly increased student catchment. It is expected that this will reduce the number of parents needing to drop off students at school.

4.2.5 Maximum Distance to School

It is proposed that all school routes will serve students within a radius no greater than 8-10 kilometres of their school. Currently no maximum distances apply, so long as the student is attending their nearest appropriate school. This change will significantly cut the cost of servicing some schools where routes are currently up to 20 kilometres in length. Students who live further from their schools are still able to catch Bayhopper services to attend their schools.

4.2.6 Schools Served

The current MoE rules are based on providing transport for students living more than 3.2 kilometres (years 1-8) and 4.8 kilometres (years 9+) from their nearest appropriate school. It is proposed to maintain service to current schools, but with routes adjusted, removed and added as per the design principles. Additional schools may be served by Schoolhopper services if a request from the school is made and routes can be delivered with similar per student costs as existing services and where an appropriate Bayhopper service is not available.

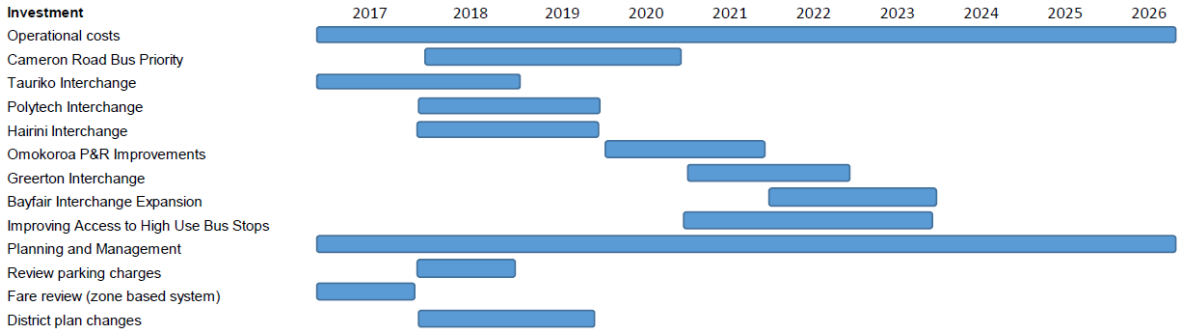
5 Future Land Use, Transport Demand and Road Network Changes

This section outlines future land use and road network changes in and around Tauranga over the next ten years that could impact on the provision of bus services in the Western Bay of Plenty.

5.1 PBC Programme Measures and Other Complimentary Initiatives

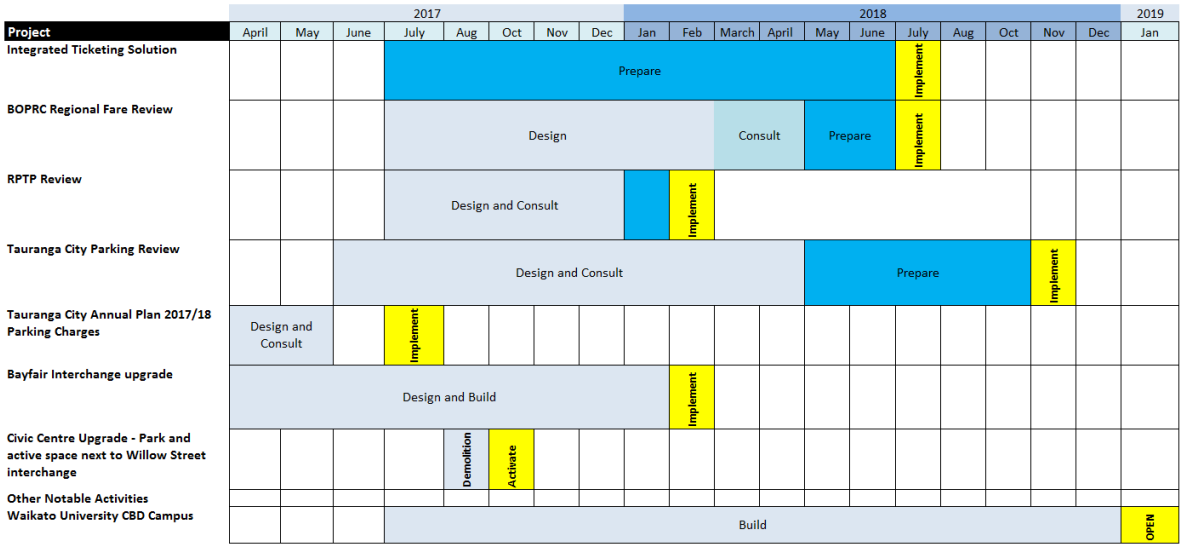
The PBC identified a range of supporting actions, in addition to the network review covered in this DBC, necessary to achieve the benefit statements. The following table shows the initiatives considered and recommended timeframes.

Figure 5-1: Complimentary PBC Initiatives



In addition to the initiatives identified in the PBC, there are a range of additional complimentary initiatives linked to PT delivery in planning or development at present, as shown in the following figure.

Figure 5-2: Additional Complimentary Initiatives Outside PBC



The BoPRC as programme lead is working with relevant stakeholders, e.g. TCC and the NZ Transport Agency to achieve coordination and delivery of the initiatives and programmes.

5.2 SmartGrowth Spatial Plan Overview

SmartGrowth is the spatial plan for the Western Bay of Plenty sub-region. It is a comprehensive, long term strategy which sets the strategic vision and direction for the growth and development of the Western Bay, on key issues across the spectrum of social, environmental, economic and cultural objectives.

The Settlement Pattern is an important component of the SmartGrowth strategy. It provides a blueprint for growth and development which identifies the existing and future location of residential and business land and considers the mix of land-use, transportation and other infrastructure in an integrated manner.

The SmartGrowth strategy is a component of a wider Bay of Plenty regional framework which has an emphasis on natural resource use, economic development, energy management and transport planning.

5.3 Major Development Areas

The SmartGrowth strategy has identified the main land development areas as follows:

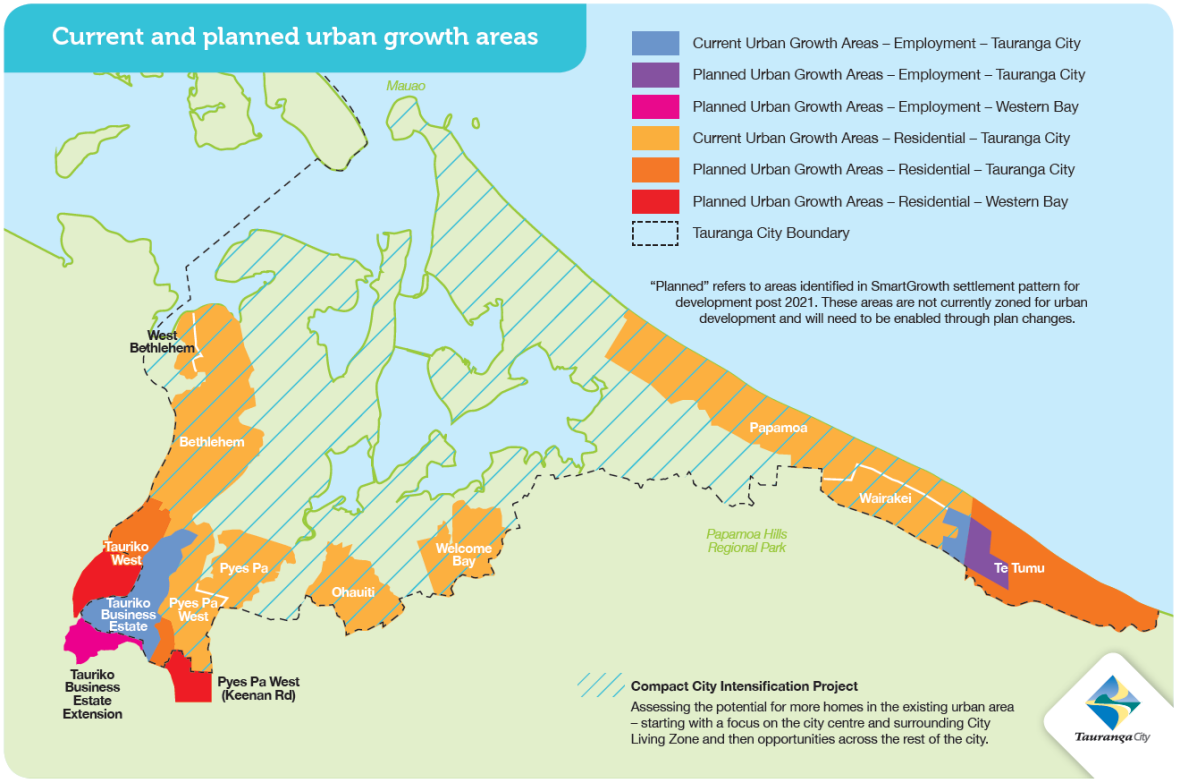
- Consolidation of development within existing urban areas of Waihi Beach, Katikati, Omokoroa, Tauranga, and Te Puke
- Redevelopment through mixed-use intensification nodes focussed on business and community centres, and at other preferred locations
- Greenfield development at increased development densities in Residential Growth Areas at Waihi Beach, Katikati, Omokoroa, Bethlehem, Pyes Pa, Papamoa, Papamoa East, and Te Puke.

Intensification nodes are expected to accommodate approximately 25% of new developments:

- Tauranga Isthmus (Tauranga Central, 11th Avenue, Gate Pa, Greerton, Pyes Pa)
- Mount Maunganui (Central Parade, Downtown Mount, Bayfair)
- Papamoa (Domain Road, Parton Road, Papamoa East).

Development focus in Tauranga City will be on the key growth locations shown in **Figure 5-3**.

Figure 5-3: Current and Planned Urban Growth Areas



5.4 Major Residential Growth Plans

In sub-regional terms the development allocation for residential growth is likely to be as follows:

- Greenfield Residential Development (average of 15 dwellings per hectare): 60% of growth
- Intensification Nodes (30 to 40 dwellings per hectare): 30%
- General Intensification: 7%
- Rural: 3%.

Therefore around 60-65% of future growth in the sub-region will be in greenfields developments and 35-40% will be intensification. The main areas that this greenfield development will occur in the next ten years are likely to be Pyes Pa and Papamoa.

Approximately 75% of urban intensification is expected to be accommodated within the Tauranga City area. The Tauranga City growth will be achieved through higher density redevelopment of a number of intensification nodes as well as raising the development densities within undeveloped land on the edge of the City from ten households per hectare to 15 households per hectare.

Figure 5-4 to **Figure 5-6** show the existing (2013) and anticipated future (2028) population densities, and the expected change in population density between 2013 and 2028. This indicates that significant Greenfield development and corresponding density change can be seen in areas such as Pyes Pa East and West, Bethlehem and Papamoa.

Figure 5-4: 2013 Population Density

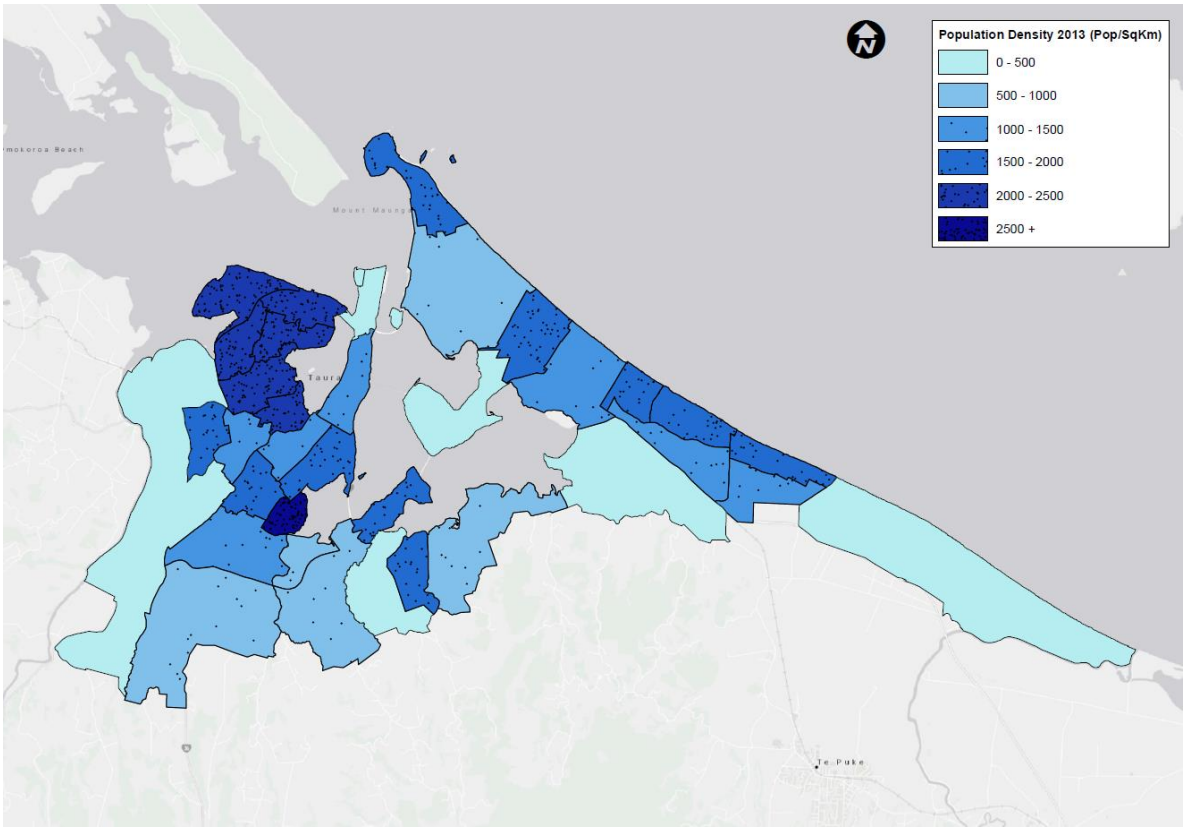


Figure 5-5: 2028 Population Density

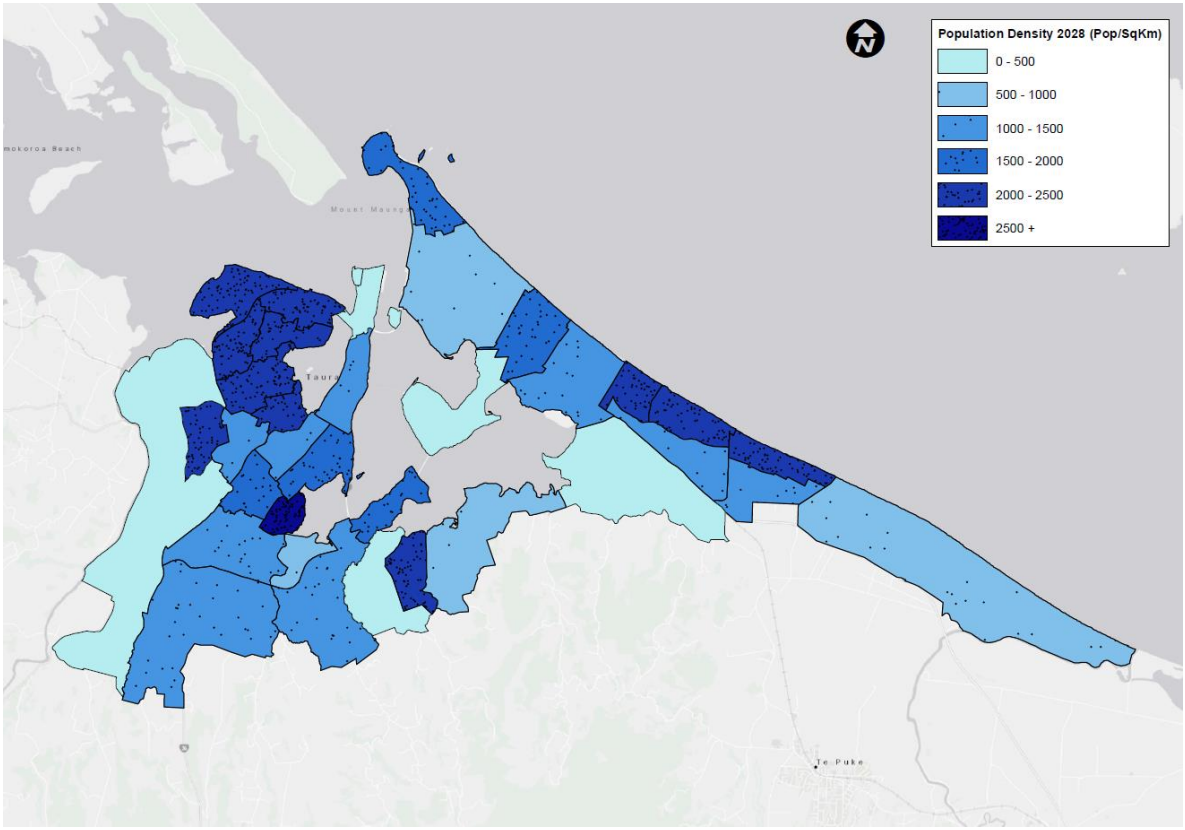
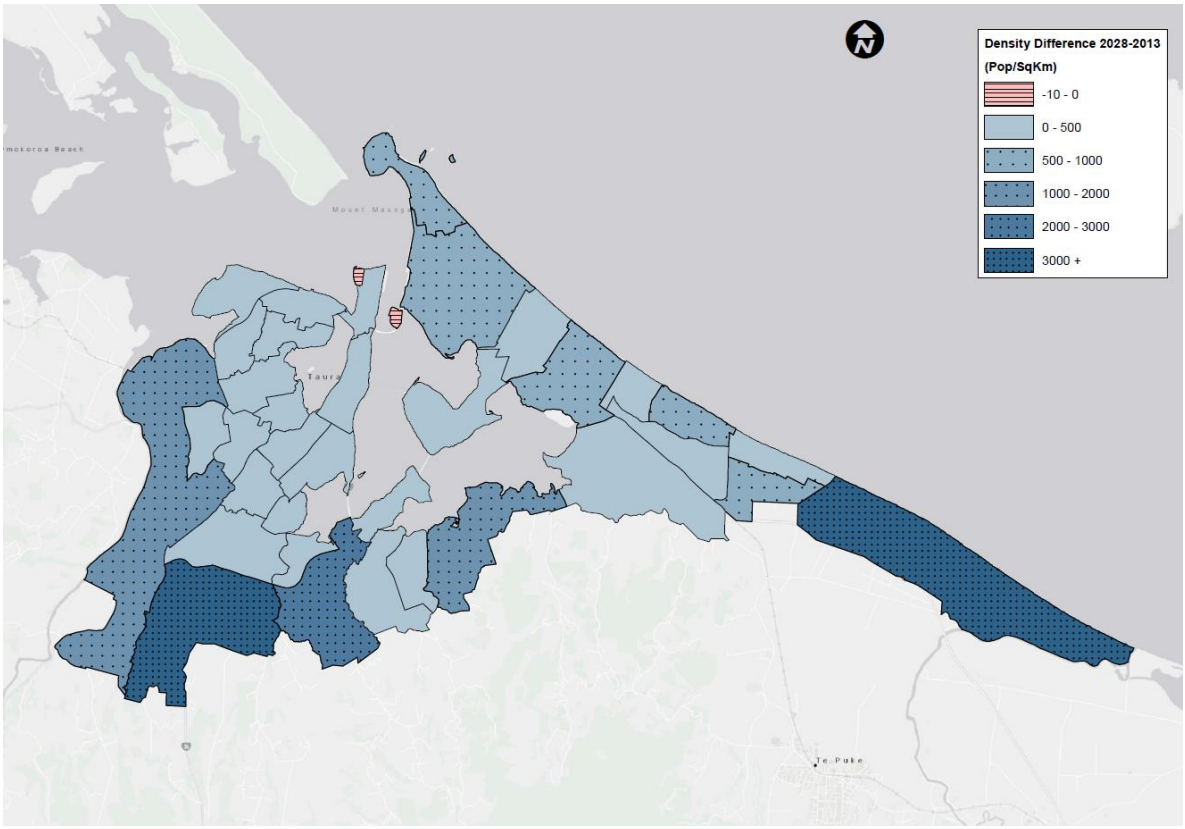


Figure 5-6: Population Density Change



Key issues from the SmartGrowth strategy likely to impact on the future development of the bus network in Tauranga are summarised below.

5.4.1 Greenfield Development

The new Greenfield growth nodes such as Wairakei and Pyes Pa West will need to be serviced by bus services from the commencement of development to facilitate the maximum take up.

5.4.2 Urban Node Developments and Intensification

Intensification of existing developed areas will require the likely improvement of existing bus services rather than the development of new routes, along with the development of secondary suburban interchanges at locations such as Greerton, Brookfield, Bayfair and Mount Maunganui, as well as the CBD.

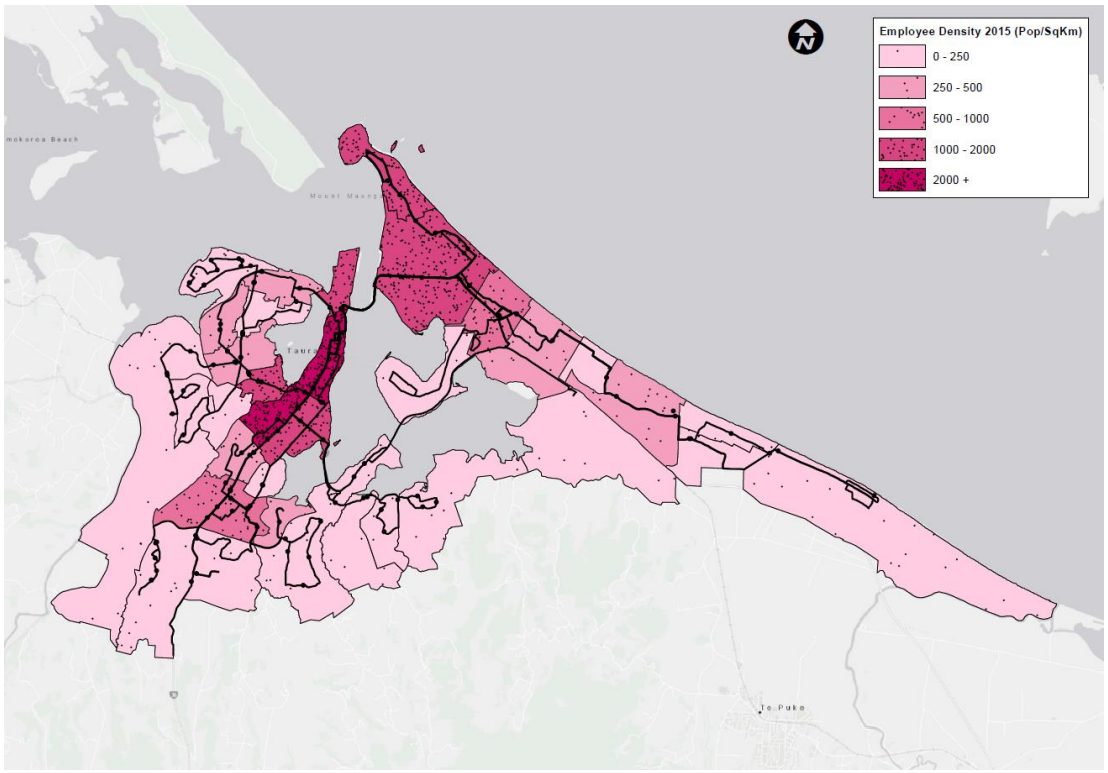
5.5 Commercial Growth Plans

In terms of commercial land SmartGrowth supports a 'centres-based' approach to commercial areas, preferring to concentrate business activity closer to the CBD.

SmartGrowth considers the growth of industrial and commercial activities that provide employment to support a growing residential population. The current industrial and commercial areas at Mount Maunganui and Greerton with future zoned land at Tauriko are and will become significant contributors to the local and regional economy. The Port of Tauranga provides an international gateway for the regional and national economy. Efficient movement of people and freight to these areas is essential to Tauranga's economic and social wellbeing into the future.

Figure 5-7 shows the existing (2015) employment densities.

Figure 5-7: Existing Employment Density



Within the city boundaries, developments such as at Bayfair, Fraser Cove, Gate Pa and Bethlehem are anticipated to continue to generate demand along the main routes already serviced by the bus network. There are no other large developments within the City expected in the next 10 years currently beyond the ongoing development of the City amenities that are likely to lead to significant impacts on the network.

5.6 Summary of the Main Land Use Changes Expected to Impact on the Future Bus Network

The main land use changes expected to impact on the future bus network in the Western Bay of Plenty area are as follows:

- Creation of substantial new residential areas at Wairakei, Te Tumu, Oropi, Welcome Bay, Ohauiti, South Bethlehem and Pyes Pa West and Papamoa East
- Continuation of residential growth in areas such as Bethlehem, and Pyes Pa East
- Intensification of residential development in Greerton, Arataki and the CBD
- Growth in areas outside of Tauranga requiring transport links such as Te Puke, Ōmokoroa and Katikati.

In order to maintain the accessibility of the bus network as the City grows it will be necessary to extend services into the new urban growth areas. This will require careful transitioning and optimisation of services to maintain both mobility and access. For example as the City expands outwards a “spoke and hub” system may no longer meet the needs of patrons and the speed and convenience of routes would be compromised. Triggers for transitioning to spoke and wheel systems and the increased provision of ‘orbiter’ services will need to be carefully considered.

Additional direct/express services, and the creation of public transport hubs perhaps at suburban shopping centres, may also be required to maximise patronage.

5.7 Changes in Future Travel Demand

The Tauranga Traffic Model (TTM) is a regional traffic model that has been used by the NZ Transport Agency, the WBoPDC and TCC for many years to assist in planning and design of road networks and other transport projects. Information on current (2016) and predicted future (2026) travel patterns was extracted from the model. The future travel pattern forecasts take into account expected changes to land use and population.

The model outputs have been examined to identify the key changes in transport movements within Tauranga City during AM and PM peak periods (Mondays to Fridays) between 2016 and 2021/2026.

The ten largest trip demands between key sectors of the Tauranga City area in 2016 during the AM peak hour are shown in **Figure 5-8** and summarised in **Table 5-1**. The arrows represent the travel demand direction, e.g. between Mount Maunganui and the CBD and the values represent the number (volume) of trips e.g. 800.

In summary:

- Pyes Pa West, Otumoetai / Matua and the Papamoa to Mount Maunganui corridor appear to be the most important areas in terms of a priority for future public transport provision
- Travel within Tauranga City is higher than demands to and from regional areas such as Te Puke and Omokoroa / Katikati.

- There are high travel demands to the CBD but also to Cameron Road south and Mount Maunganui.

Figure 5-8: Top 10 Cross Sector Vehicle Trip Demands during the AM Peak Period

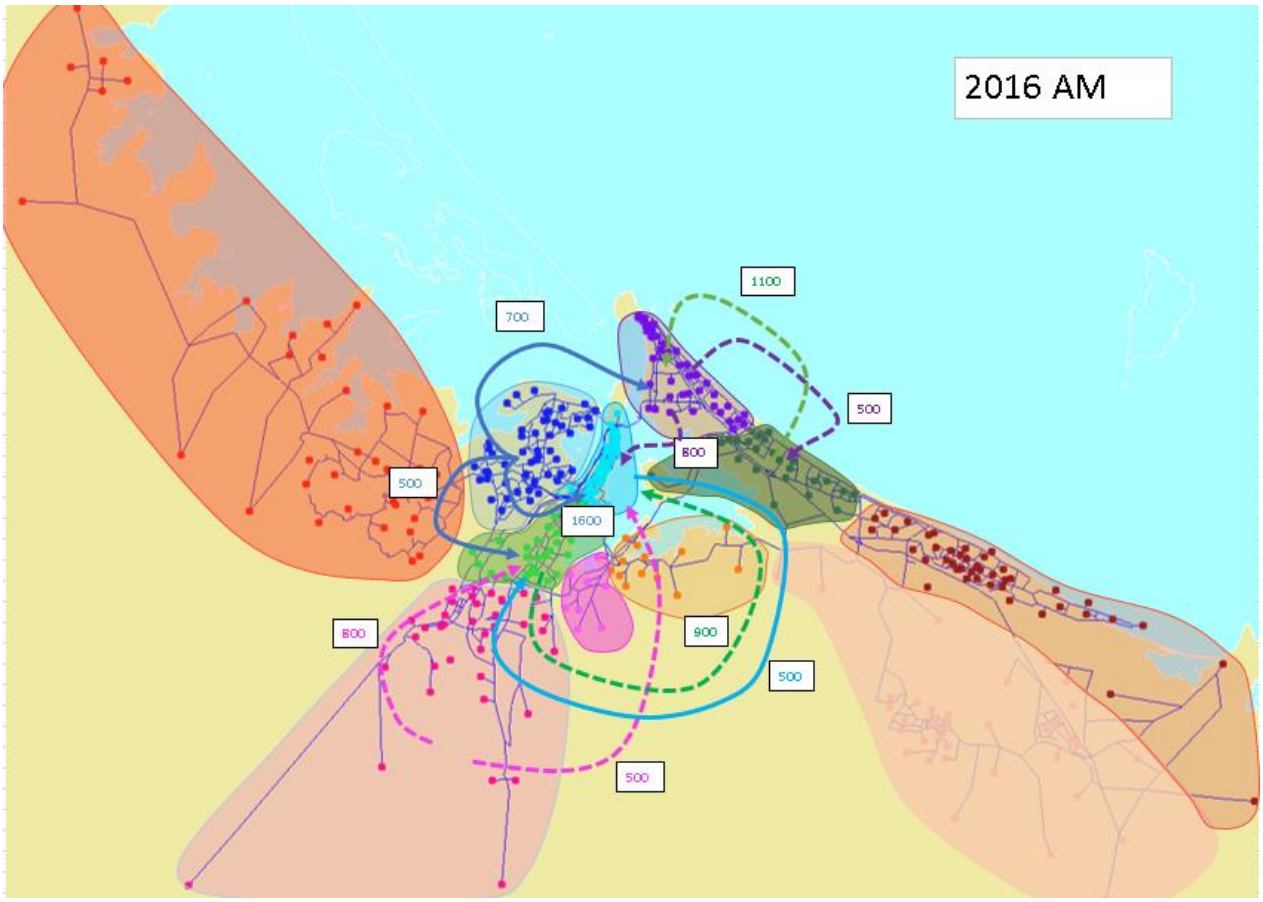


Table 5-1: Top 10 Cross Sector Vehicle Trip Demands during the AM Peak Hour

Origin/ Destination	Cameron Road South	CBD	Mt Maunganui	Papamoa
Otumoetai, Matua	500	1600	700	-
Pyes Pa South	800	500	-	-
Cameron Road South	-	900	-	-
CBD	500	-	-	-
Mount Maunganui	-	800	-	700
Papamoa	-	-	1400	-

5.8 Road Network Changes

There are a number of road network changes that could impact on the future bus network design. These are described below.

5.8.1 Tauranga Northern Link

Construction of the Tauranga Northern Link (TNL) bypassing Bethlehem and Te Puna will start in 2019 and is expected to open by 2022. It will be a catalyst for development that will impact on

creating new areas to be serviced and may provide an alternative route for express bus services from Omokoroa and Katikati.

5.8.2 Hairini Link

The Hairini Link project will provide a new link road underneath the Maungatapu roundabout which will separate local traffic from traffic on State Highway 29 (SH29). It will connect directly to Welcome Bay Road and will improve traffic flow around the Maungatapu and Hairini roundabouts. There is potential for Crown land within the construction area to be utilised as a bus interchange once construction is complete, this is being considered by the BoPRC and NZ Transport Agency.

5.8.3 Baypark to Bayfair Link

The Baypark to Bayfair Link upgrade includes grade separated interchange of the Maunganui-Girven and Te Maunga intersections. The upgrade includes bus stops on SH2.

An additional requirement of this project is the need to relocate the Bayfair bus interchange to Farm Street where a new bus stop will be provided by TCC. This will improve interchange and speed up travel through Bayfair as buses will not have to travel through the Bayfair car park in future.

5.8.4 Other Planned Changes to the Road Network

Other planned or proposed changes to the road network that could affect the future network design are summarised in **Table 5-2**. This list is a high level indication of possible future upgrades and not all of these changes are committed or certain, we understand TCC are reviewing the timeframes for many of these projects.

In addition to these major upgrades, TCC currently intend to replace a number of priority controlled intersections in the City with traffic lights. This provides an opportunity to incorporate bus priority at intersections on the bus network in future.

Table 5-2: Proposed Form and Timing of Projects Assumptions (next 10 years only)

Projects	Descriptions	
SH2 – Omokoroa Road Roundabout (and closure of SH2 / Francis Road intersection)	■ Francis Road is disconnected from SH2 and connected to Omokoroa Road via a new roundabout; ■ SH2 / Omokoroa Road intersection is upgraded from priority to roundabout.	In 2021
SH2 – Tauranga Eastern Link (Ultimate)	New full diamond interchange connecting to Papamoa East.	In 2026
SH2 – Te Puke Intersections upgrade	■ Realign Te Puke Quarry Road; ■ Relocate the SH2 / Te Puke Quarry Road intersection north of current location and upgrade to a roundabout; and ■ Upgrade the SH2 / No. 3 Road intersection to a roundabout.	In 2016
SH2 – Maunganui / Girven Intersection upgrade - grade separation	2-lane grade separated flyover at MGI over signalised intersection and diamond interchange over SH2 at Te Maunga (SH2/29) Intersection,	In 2021
SH29 / Route K and Taurikura Dr / Lakes Boulevard – roundabout upgrade	Slip lanes as a form of upgrade at the two roundabouts.	In 2016
SH29 – Route K to Barkes Corner four laning	Widening of SH29 from 2 to 4 lanes between Route K and Barkes Corner.	In 2026
SH29 – Route K to Barkes Corner – grade separation	2-lane grade separated link bypassing the Barkes Corner on SH29.	In 2026
SH2A/SH29 – Hairini to Maungatapu Bridge four laning	Widening of SH2A/SH29 from 2 to 4 lanes from Maungatapu roundabout including Maungatapu bridge.	In 2026
Omokoroa Road (Francis Road to SH2) four laning	Widening of the section between Francis Road (realigned) and SH2 from 2 to 4 lanes.	In 2021
Hasting Road	Closure of existing access onto SH29 and realign to join Lakes Boulevard.	In 2026
Tauriko IMF Industrial Development Network (south)	Extension of Taurikura Drive from Kennedy Road extension to Belk Road via a roundabout.	In 2021
Tara Road four laning	Widening from 2 to 4 lanes.	In 2026
Domain Road four laning	Widening from 2 to 4 lanes between Tara Road and Papamoa Beach Road.	In 2021
Girven Road four laning	Widening from 2 to 4 lanes between Gloucester Road to Maranui Street.	In 2026
Gloucester Road / Grenada Street connections in Papamoa	Connect the western and eastern ends of Gloucester Road and Grenada Street.	In 2021
Papamoa East Stage 1 Structure Plan Network	Internal road network for the residential development in Wairakei.	In 2021

6 Alternatives and Option Development

This section describes the option development and shortlisting of options considered by the project partners through the process of developing the DBC. It considers the ability of the existing bus network to serve future growth and the potential changes that could be made to better serve future needs.

6.1 Bayhopper Network Design Initial Options

With regard to network design, the PBC stipulates that the redesigned network will include:

- Improved frequencies with services every 15 / 20 minutes on most urban routes
- A 'City Loop' bus route connecting the CBD with Mount Maunganui and Bayfair with a target frequency of 15 minutes
- An 'eastern connection' service between Bayfair and Tauriko with interchange at key connection points such as Hairini, Bay Polytech (Windermere Campus), and Greerton
- A 'western connection' service between Tauriko and Otumoetai, possibly extending to the CBD
- Tauriko and Papamoa East express services to the CBD operating during peak periods
- All existing bus routes will be reviewed and redesigned if necessary to achieve investment objectives.
- Minor improvements to services and facilities in regional areas such as Omokoroa and Te Puke.

With these guiding principles in mind, a number of possible network design variations were discussed and compared with the project partners at the initial DBC workshop in February 2017. Some of the long list of options considered and discussion / decisions made at this workshop in refining the long list to the agreed design are outlined in the following table.

Table 6-1: Long List of Changes to Bayhopper Routes Considered

Route	To/from	Existing Weaknesses (from table 3-5)	Summary of Route Changes Considered
1	Pyes Pa – Greerton – City – Mount Maunganui	Not well co-ordinated with other services on Cameron Road to give consistent headways. Length of route can make services unreliable.	Truncate at CBD vs continue as existing. Route via Cameron Road or via Fraser Street. Variations of routing around Greerton/ Pyes Pa Connection to Grace Hospital. Extension to Aquanis College or not.
2	Windermere – Greerton – City – Bayfair – Mount Maunganui	Not well co-ordinated with other services on Cameron Road to give consistent headways Length of route can make services unreliable. Indirect route between Mount Maunganui and Bayfair, and between the City and Wyndermere	Retain service, truncate at CBD or remove route replaced with a modified Route 55 service at higher frequency.
30	Papamoa – Bayfair – Mount Maunganui	Indirect, long journey time, low frequency	Operate to Mount Maunganui or truncate at Bayfair. Operate via Grenada Street or via Gloucester Road/Lotus Avenue Variations of routing in Papamoa East. Operate via Opal Drive/ Dickson Road or via Doncaster Drive/ Tara Road.
33	City – Bayfair – Papamoa	Indirect. Does not serve Wairakei Avenue, Emerald Shores Drive	Operate to the CBD or truncate at Bayfair Operate via Grenada Street or via Gloucester Road/Lotus Avenue or via Papamoa Beach Road. Operate via Opal Drive/Dickson Road or via Doncaster Drive/Tara Road
36	City – Maunatapu – Bayfair – Papamoa	Indirect route from Bayfair to the City via Maungatapu and Tauranga South. Serves little demand between Maungatapu and Bayfair	Retain or replace with a Cross Town Connection from Bayfair to Tauriko Only operate between City and Maungatapu (terminating on Taipari Street/Te Hono Street).
40	City – 15th Avenue – Welcome Bay	Indirect route from some areas of Welcome Bay due to long loop route	Split into two welcome bay routes or retain as one route with higher frequencies. Various route considerations within Welcome Bay. Route via Fraser Street or via Cameron Road.
52	City – Greerton – The Lakes	Low patronage and limited coverage	Retain or replace with cross town connection. Retain express service only or full service.
55	City – Fraser Street – Greerton – Windermere – Ohauti	Indirect route between some areas of Ohauiti and the City	Operate via Cameron Road or Fraser Street Various route considerations within Welcome Bay

Route	To/from	Existing Weaknesses (from table 3-5)	Summary of Route Changes Considered
59	City – Sunvale – Greerton – Oropi	Indirect route between Oropi and the City Currently loops through Oropi Road but attracts little patronage	Route via Cameron Road or existing route behind Hospital Various route considerations through Greerton
60	City – Bellevue – Brookfield – Cambridge Heights	Indirect route between Cambridge Heights and the City	Operate via Waihi Road direct to CBD rather than via Otumoetai. Operate via Otumoeti Road instead of Bellevue Road/Windsor Road/Ngatai Road Extend to serve area of Bethlehem to south of SH2 currently served by route 62. Route via Brookfield shopping centre to support interchange with other routes.
62	City – Pillans Point – Brookville – Bethlehem	Indirect route between Bethlehem and the City	Operate via Grange Road (in one or both directions) instead of via Bureta Road, Seaview Road, Pillans Road, Goods Road, Milton Road. Operate via Wahi Road direct to City rather than via Otumoetai Serve area of Bethlehem to south of SH2 by route 60.
70	City – Brookfield – Cherrywood – Matua	Indirect route between Matua and the City	Operate via Chapel Street instead of Waihi Road Operate westbound via Smiths Road (instead via Weka Street, Manuwai Drive, Matua Road, Warrington Street, Tiby Drive, Waratah Street and Ranui Street). Eastbound route to be unchanged (i.e. via Levers Road)

In addition to the above considerations for existing routes, the new city loop and cross town routes identified in the PBC were considered and a new Otumoetai service identified to serve this area if necessary due to changes to routes 60, 62 and 70.

Table 6-2: Long List of Changes to Bayhopper Routes Considered

Route	To/from	Summary of Route Changes Considered
City Loop	Hospital, City, Mount Maunganui, Bayfair	Route via Airport or not. Route to Hospital or truncate at City. Various routing options in Mount Maunganui
Cross Town	Bayfair - Tauriko	Divert to Welcome Bay interchange, Bay Polytech, Greerton or not. Various routing considerations within Tauriko. Provide school time extensions to Aquanis College or not.
Western Connection	Otumoetai - Tauriko	Include now or defer to a later date. Routing via Otumoetai Road or Windsor Road
Otumoetai Service	Otumoetai	Various routing options in Otumoetai. Operate alternating one way loops from City (bidirectional)

6.2 Shortlist of Network Design Variations

Based on the identified strengths and weaknesses of the current bus network, and taking into account the future network design principles described in Section 4, four alternative Bayhopper network design options were developed following the second design workshop in March 2017.

The network design options seek to achieve the investment objectives defined in the PBC through meeting future land use changes, improving patronage and increasing operational efficiencies. The changes are devised to deliver a robust structure for the route network that can accommodate the future growth of the City.

The network design options represents the ultimate stage in the process of determining how the Bayhopper network could develop over the next ten years. With such a network in place, as growth occurs, the demands for bus services can generally be best met through continued improvements to frequencies and hours of operation, rather than to the actual route structure themselves. The one exception to this is the 'western connector' orbital service which is identified as a future route to be introduced if / when growth in the Tauriko area supports such a service.

Essentially the four shortlist options are two slightly different networks plus higher and lower frequency variations on these networks. In broad terms, the four shortlist network design options are:

- Option 1: A higher frequency network with Papamoa routes (30 and 33) extending to the CBD or Mount Maunganui and a new 'City Loop' service between the Hospital, CBD, Mount Maunganui and Bayfair.
- Option 2: A higher frequency network with Papamoa routes (30 and 33) truncated at Bayfair and the new 'City Loop' service operating between the CBD, Mount Maunganua and Bayfair (not travelling to the Hospital).
- Option 3: A lower frequency network with Papamoa routes extending to the CBD or Mount Maunganui and a new 'City Loop' service between the Hospital, CBD, Mount Maunganua and Bayfair
- Option 4: A lower frequency network with Papamoa routes truncated at Bayfair and the new 'City Loop' service operating between the CBD, Mount Maunganui and Bayfair (not travelling to the Hospital).

The following figures show the proposed network changes for the shortlisted options for urban and regional services. These figures show the two Papamoa Routes terminating at Bayfair and the City Loop extending to the Hospital however these locations may change depending on which of the above four options is recommended.

Figure 6-1: Draft Urban Bus Network

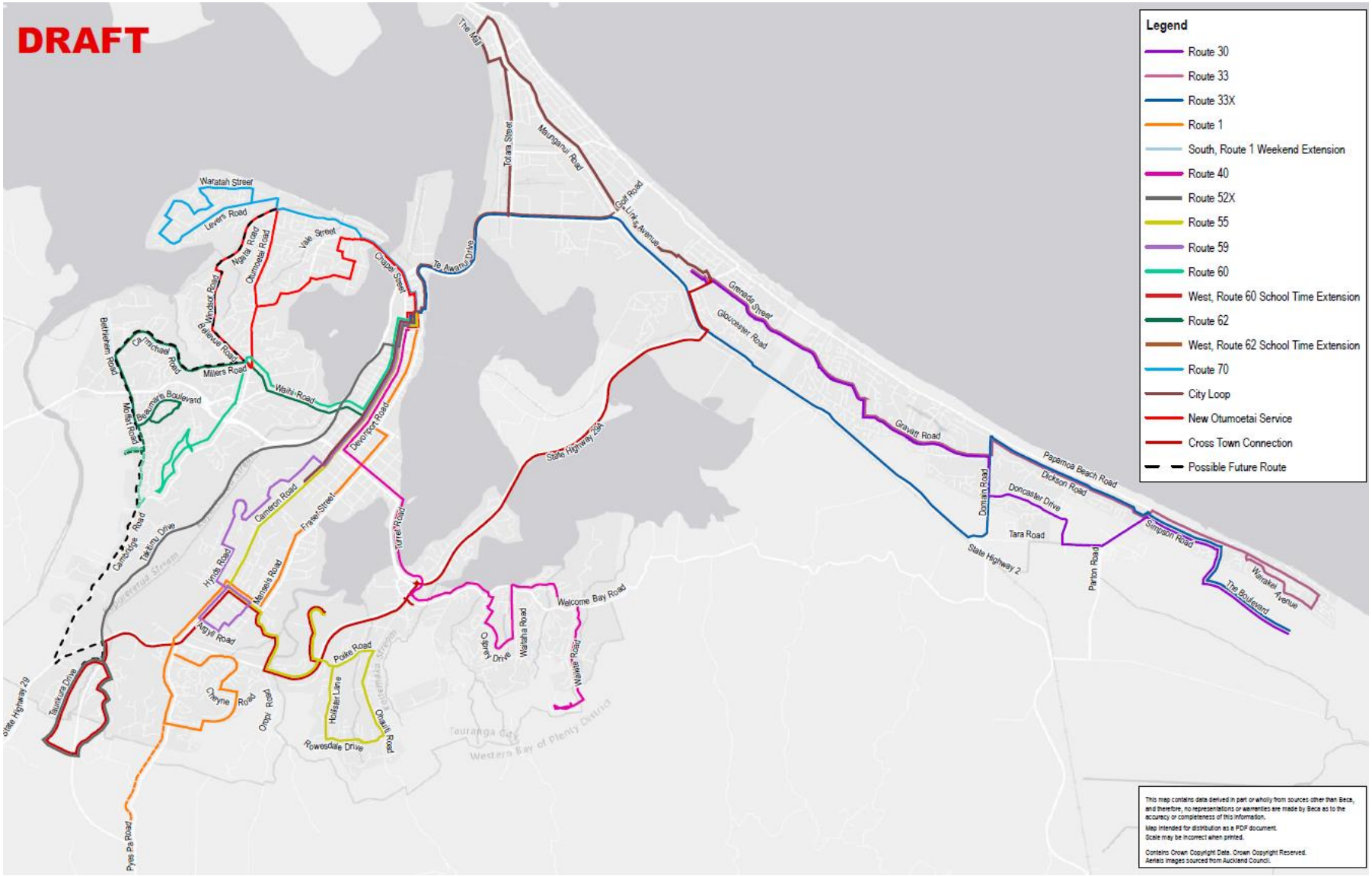


Figure 6-2: Draft Katikati & Omokoroa Bus Routes

Figure 6-3: Draft Te Puke Bus Route

6.2.1 Service Frequencies

The following table summarises the service frequencies by route for the higher and lower option variations. The frequencies have been drafted by the project group to improve frequencies across all services as targeted in the PBC with particular focus on achieving 15 minute frequencies on the City Loop services as identified in the PBC. 15, 20, 30 minute frequencies assist with timetabling in regard to coordinating arrivals and departures.

Table 6-3: Short List Option Frequencies

Route	Frequency (minutes between buses)			
	Higher Frequency Options		Lower Frequency Options	
	Weekday	Weekend	Weekday	Weekend
Papamoa - Mount Maunganui	20	30	30	60
Papamoa - CBD	20	30	30	60
Papamoa - CBD Express	30	No Service	30	No Service
City Loop Clockwise	15	30	15	30
City Loop Anticlockwise	15	30	15	30
Matua	20	30	20	60
Otumoetai	20	30	20	60
Bethlehem Carmichael Road	20	30	20	60
Bethlehem Cambridge Road	20	30	20	60
Tauriko Express	30	No Service	30	No Service
Pyes Pa	20	30	20	60
Greerton	20	30	20	60
Cross Town Connection	30	30	30	60
Ohauiti	15	30	20	60
Welcome Bay Waikite Road	15	30	20	60
Katikati Commuter	Hourly in peaks	No Service	Hourly in peaks	No Service
Omokoroa Commuter	30 min in peaks	No Service	30 min in peaks	No Service
Katikati & Omokoroa Shopper	2 services off peak	No Service	2 services off peak	No Service
Te Puke Commuter to Bayfair	60	60	60	60

6.2.2 Hours of Operation

All options include increased hours of operation, targeting 15 hours per day seven days per week on average, although the frequency of services at the beginning and end of the day will reduce, e.g. between 6am and 8am and after 6pm there will be fewer buses per hour in operation. Longer hours and improved weekend frequencies respond to some of the issues identified in the review of existing services and feedback received from stakeholders and the public.

6.3 Schoolhopper Service Changes

Potential changes to Schoolhopper services were identified at the two network design workshops held in February and March 2017, based on the future network design principles described in Section 4. In

particular, consideration was given to routes which are largely duplicated by the proposed Bayhopper network, routes which provide for journeys in excess of 8-10km, and routes which deviate from the proposed Bayhopper network.

The following services have been identified as being routes which could be withdrawn as the majority of current users could make their journey by the proposed Bayhopper network:

- 302 - Papamoa to Acquinas College
- 303 - Arataki to Acquinas College
- 305 - Mt Maunganui to Bethlehem College
- 306 - Bayfair to Bethlehem College
- 307 (AM) / 308 (PM) – Papamoa to Mt Maunganui College (returns to Mt Maunganui)
- 311 (AM)/ 312 (PM)/ 313 (AM) / 314 (PM) / 315 (AM) / 316 (PM) / 317 (AM) / 318 (PM) - Papamoa to Mt Maunganui College
- 319 - Papamoa to Papamoa Primary
- 320 – Papamoa/Mt Maunganui to St Mary's Primary
- 351 – City/Cambridge Road to Acquinas College
- 406 – Maungatupu to Various Schools
- 408(1) and (2) – Welcome Bay to Tauranga Girls College / Tauranga Intermediate
- 409 – Welcome Bay to Tauraga Boys College
- 410/411/412/413/414 – Welcome Bay to Various
- 502 – Ohaiuti to Acquinas College
- 503 – Maungatupu/Avenues to Acquinas College
- 517/518/519 – Ohaiuti to Various
- 520 – Winermere to Various
- 551 – Pyes Pa to Bethlehem College
- 553 – Freburn Road to Various
- 555 – Cheyne Road to Various
- 652 – Otumoetai/Matua to Acquinas College
- 653 – Bethlehem to Acquinas College
- 656 – Otumoetai to Acquinas College
- 657 – Bethlehem/Cambridge to Various
- 658(1) – Bethlehem/Cambridge to Otumoetai College.

The following services have been identified as being routes which could be truncated at the locations indicated, as they provide for journeys in excess of 8-10km:

- 301 (at Bayfair)
- 404 (at the Acquinas College school catchment boundary)
- 552 (at the Greenpark Primary school catchment boundary)
- 659 (at the Tauranga Intermediate school catchment boundary).

The following services have been identified as being routes which could be revised:

- 301 – route via Matapihi rather than via SH29A
- 401 – route to cover the Ohauiti catchment area
- 407 – route via Windermere Drive, and extend to serve St Mary's Primary, Tauranga Primary and Tauranga Intermediate (omit Tauranga Boys College)
- 552 – Combine with existing route 553 and omit Tauranga Boys College, Tauranga Girls College, operate via Fraser Street to Tauranga Intermediate and St Mary's Primary
- 559 – Omit Otumoetai Intermediate
- 659 – Extend to the Western Suburbs.

Potential Schoolhopper changes were put forward as part of public consultation in May 2017. Feedback from this consultation is being used to inform further consultations and decisions in regard to Schoolhopper bus provision going forward. Final decisions on Schoolhopper service changes have not been at this stage. The assessment of the recommended option includes sensitivity tests with and without Schoolhopper.

6.4 Regional Commuter/Shopper Service Changes

Whilst the PBC concluded that network upgrades should focus on the Tauranga urban area where the catchments are denser and travel distances shorter, all options include minor improvements to regional routes as follows:

- Katikati and Omokoroa – increased frequency of bus services in peak and off peak direct to Tauranga CBD.
- Te Puke – buses every 60 minutes between Te Puke and Bayfair (where users can connect with the high frequency city loop service) including a loop around the Te Puke township.

7 Assessment of the Network Design Options

This section provides more information on the shortlisted options and the findings of the MCA evaluation leading to a recommended option.

7.1 Operating Costs

Expected annual operating costs for the network options have been derived by applying estimated operator costs to the relevant components of the proposed network.

The operator costs applied are as follows:

- $1.50 per kilometre (applied to predicted length of proposed routes)
- $136 per peak vehicle required (calculated on proposed frequency and travel times)
- $35 per hour (based on proposed start and finish times).

Costs were calculated for each route and for weekdays and weekends / public holidays separately, and assume:

- 249 weekdays per annum
- 116 Weekends and Public Holiday days per annum.

The resulting cost estimates (per annum) for each of the four options are:

- Option 1 (higher frequency, full Papamoa and City Loop services) = **$20M to $21M**
- Option 2 (higher frequency, Papamoa and City Loops services truncated) = **$17M to $18M**
- Option 3 (lower frequency, full Papamoa and City Loop services) = **$15M to $16M**
- Option 4 ((lower frequency, Papamoa and City Loop services truncated) = **$14M to $15M.**

These costs include Schoolhopper service changes. If Schoolhoper service changes don't eventuate as possible there may be a variation on the above costs per annum. A sensitivity test is included in the economic analysis within this DBC to understand the effect of this.

Noting the existing service cost is approximately $12.5M (Bayhopper and Schoolhopper), the options represent an increase in spend of between $1.5M and $8.5M annually. This funding gap is the additional investment sought by the DBC.

The full cost calculation and economic assessment spreadsheets have been subject to a professional peer review process. The spreadsheets can be provided on request.

7.2 Demand and Revenue Impacts

7.2.1 Forecasting Method

Passenger demand forecasts were created for a base (Year zero) scenario and then for subsequent years out to the end of year nine of the operating contract.

For the base estimate, firstly existing passenger volumes were distributed to the proposed routes according to the route passengers would likely use in the new network, e.g. as route 2 is being replaced by the City Loop and route 55 services passenger volumes for route 2 were redistributed to these routes. Secondly demands for new bus routes e.g. the Western Connection were defined using TTM zonal demand forecasts of trips between zones served by the new route. It was assumed that approximately 2% of the current travel demand would use the new bus route which aligns with the existing mode share for bus travel in Tauranga.

Future passenger volumes were increased to account for service improvements[2], primarily these being due to:

- Frequency improvements,
- Shorter journey times,
- Promotional benefits.

It was estimated that demand increases due to the above improvements would build over the first two years of the contract, rather than happening immediately.

For Options 2 and 4, with the Papamoa routes truncated at Bayfair, an interchange penalty was included by applying a travel time dis-benefit of approximately 20%, i.e. a 20% increase in travel time compared with Options 1 and 3 which provide a continuous connection.

A growth rate of 3% per annum based on the historic ten year average was also applied which is consistent with the PBC evaluation. The DBC passenger forecasts exclude growth in demands attributed to the interventions in the PBC that are not specifically part of the DBC, e.g. bus priority measures.

Table 7-1 summarises the estimated passenger volumes on the Bayhopper and Schoolhopper (combined) network for the shortlisted options. For this analysis a 50% retention of Schoolhopper trips is assumed in all options.

Table 7-1: Estimated Annual Passenger Demands (millions)

	Base Demand	Year 2	Year 9
Existing	1.9	2.0	2.5
Option 1	2.0	2.98	4.08

[2] Ian Wallis ‘Growing Auckland PT patronage’ and NZTA Research Report 561.

Option 2	2.0	2.86	3.81
Option 3	2.0	2.77	3.68
Option 4	2.0	2.68	3.57

7.3 Fare Box Recovery

The indicative level of fare box recovery has been calculated based on the estimated costs and the patronage applied to average ticket prices for the various ticket categories.

Table 7-2: Estimated Fare Box Recovery

	Base Demand	Year 9
Existing	32%	32%
Option 1	15-20%	35-40%
Option 2	20-25%	40-45%
Option 3	20-25%	40-45%
Option 4	20-25%	40-45%

As shown above, fare box recovery reduces from existing levels with base demands, which indicates that the cost of the service in the early years of the contract may be higher than desirable. Commencing with lower frequencies than assumed could help limit any adverse impact on fare box recovery, as is discussed further in Chapter 8.

7.4 Summary

Table 7-3 summarises the estimated demand, revenue and fare box recovery of the options.

Table 7-3: Estimated Patronage and Revenue Projections (patronage and revenue in millions)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Patronage Option 1	2.5	2.98	3.14	3.29	3.45	3.61	3.77	3.92	4.08
Patronage Option 2	2.43	2.86	3.00	3.13	3.27	3.40	3.54	3.67	3.81
Patronage Option 3	2.35	2.77	2.90	3.03	3.16	3.29	3.42	3.55	3.68
Patronage Option 4	2.3	2.68	2.81	2.93	3.06	3.19	3.32	3.44	3.57
Revenue Option 1	$3.70	$4.32	$4.77	$5.21	$5.66	$6.11	$6.56	$7.00	$7.45
Revenue Option 2	$3.64	$4.28	$4.71	$5.14	$5.57	$6.00	$6.43	$6.86	$7.29
Revenue Option 3	$3.30	$3.88	$4.28	$4.69	$5.09	$5.49	$5.89	$6.30	$6.70
Revenue Option 4	$3.20	$3.75	$4.14	$4.53	$4.92	$5.31	$5.70	$6.09	$6.48
Fare box recovery Option 1	18%	21%	23%	25%	28%	30%	32%	34%	36%
Fare box recovery Option 2	21%	24%	27%	29%	32%	34%	37%	39%	42%
Fare box recovery Option 3	21%	25%	28%	30%	33%	35%	38%	41%	43%
Fare box recovery Option 4	22%	26%	29%	31%	34%	37%	39%	42%	45%

7.5 Multi Criteria Analysis

The options have been evaluated using a MCA. This focuses on considering the impact of each option on the following:

- Activity objectives, adapted for the DBC from the PBC programme level investment objectives,
- Achieving the design principles as set out in section 4,
- Implementability and assessment of effects criteria from the NZ Transport Agency guide to MCA.

The activity objectives (50%) and design principles (30%) were weighted higher than the assessment of effects criteria (20%) as they are considered to be more critical to the success of the new service.

The activity objectives are as follows:

- Improve bus travel times on key corridors through shorter frequencies
- Target a bus passenger mode share of 10% by 2026
- Increase the fare box recovery ratio to 45% by 2026
- Improve the competiveness of journey times by bus. Target a reduction in bus journey time between key destinations of 20% over existing schedules by 2026 (e.g. more direct routes).
- 95% of bus services will operate within five minutes of schedule during the 7am to 9am AM peak by 2026 during normal operating conditions.

The approach to the MCA was agreed with the NZ Transport Agency prior to the assessment taking place. The MCA found that all options achieve a very similar score against the criteria with Option 2 (high frequency service with Papamoa routes truncated at Bayfair and the city loop service truncated at the CBD) achieving the highest total score. The completed MCA table is provided on the following page.

Table 7-4: Multi Criteria Assessment

			Scoring (+3 positive impact to -3 negative impact)								
			Option 1		Option 2		Option 3		Option 4		
Activity Objectives	**Weighting**		**Score**	**% Achieved**	**Score**	**% Achieved**	**Score**	**% Achieved**	**Score**	**% Achieved**	**Considerations**
Improve bus travel times on key corridors through shorter frequencies.	50%	10%	3	10%	3	10%	1	7%	1	7%	Options 1 and 2 have higher frequencies, option 3 and 4 have lower frequencies (but higher than existing)
Target a bus passenger mode share of 10% by 2026		10%	2	8%	2	8%	1	7%	1	7%	Options 1 and 2 attract higher passenger numbers achieving a mode share of 6-8%. Additional measures as described in the PBC are necessary to achieve 10%.
Increase the fare box recovery ratio to 45% by 2026		10%	0	5%	3	10%	3	10%	3	10%	Options 2, 3 and 4 most likely to achieve fare box recovery target.
Improve the competiveness of journey times by bus.		10%	3	10%	1	7%	2	8%	1	7%	Options 1 and 3 have highest coverage, option 1 also has higher frequencies
95% of bus services will operate within five minutes of schedule during the 7am to 9am AM peak		10%	0	5%	1	7%	0	5%	1	7%	Shorter Papamoa routes may be more likely to achieve schedule, although largely an operational matter
Design Principles											
Provide sufficient slack time	30%	6%	1	4%	1	4%	2	5%	2	5%	Options 3 and 4 have slightly higher slack time
Meet existing demands and attract additional users		6%	2	5%	2	5%	1	4%	1	4%	All options increase demands, options 1 and 2 are more attractive due to higher frequencies
Serve growth areas to provide long term PT stability		6%	3	6%	3	6%	3	6%	3	6%	All options serve growth areas with express buses
Incorporate an easily understood service hierarchy		6%	3	6%	3	6%	3	6%	3	6%	Same across all options
Reflect decentralised urban form whilst supporting growth in CBD		6%	2	5%	1	4%	2	5%	1	4%	Options 1 and 3 (services to the Hospital) possibly better support travel to/from and within the CBD
Implementability											
Operational / Maintenance	20%	3%	0	1.7%	0	1.7%	1	2.2%	1	2.2%	Less likelihood of operational risk with lower frequency
Financial		3%	0	1.7%	0	1.7%	1	2.2%	2	2.8%	Higher cost options (1,2) have higher risk
Implementation risks		3%	0	1.7%	0	1.7%	0	1.7%	0	1.7%	Considered equal across all options
Stakeholders / Customers		3%	3	3.3%	2	2.8%	0	1.7%	0	1.7%	Higher frequency routes with greater coverage will rate well with customers
Assessment of Effects											
Social		3%	3	3.3%	2	2.8%	1	2.2%	0	1.7%	Higher frequencies and coverage will improve access
Economics (potential BCR)		3%	0	1.7%	1	2.2%	2	2.8%	2	2.8%	Cheaper options may have slightly better BCR
Weighted Score	100%	100%		**78%**		**79%**		**75%**		**74%**	
Ranking				**2**		**1**		**3**		**4**	

In summary, Option 2 is preferred, but in considering the likely fare recovery in the early years of implementation it is may be sensible to begin with lower frequencies (and thus costs) on some routes and increase frequencies over time as patronage increases.

Option 2 was presented for public feedback.

8 Engagement on Proposed Network

8.1 Initial Engagement

An extensive engagement process was undertaken on the proposed changes to the Bayhopper and Schoolhopper bus networks with over 1,500 responses received on various aspects of these networks. Whilst the feedback on the Byahopper networks were largely well received the Schoolhopper changes were in the first instance almost universally opposed.

The majority of the feedback received was through the Drivechange.co.nz website specifically setup for this project and for ongoing use as a platform for receiving feedback for transport projects in the western bay sub-region. Full details of the engagement and responses are included in **Appendix B.**

Table 8-1: Consultation Feedback Summary

Feedback through drive change website		
	Unique Visitors	**Survey Responses**
School Hopper	1,800	536
Bus operating hours	1,083	265
New bus features	1,066	244
Katikati/Ōmokoroa	168	22
Te Puke	133	21
Papamoa and Munt Maunganui	1009	159
Tauranga Southern Suburbs	662	75
Tauranga Western Suburbs	435	48
Total	**6,356**	**1,370**

Key issues identified on the Bayhopper networks were around the removal of service in some areas and service operating hours.

Issues identified around the SchoolHopper network largely related to student safety be it due to the need to share services with adults, walk across busy streets, or making interchanges in locations not deemed to be safe. There was also dissatisfaction with the inconvenience factor for students with longer walk distances, interchanges, and possibly longer travel times.

There was also a much stronger response from some schools in particular and as a result of this additional consultation with the schools was undertaken to identify specific solutions for these schools.

9 Network Changes Due to Public Feedback

9.1 Public Bus Network

Through the public feedback process minor adjustments to the preferred network were made to deliver a better user experience and to deliver long term behaviour change in the community.

Changes include:

- New Gold Line service to provide an off-peak, day time, coverage service in Papamoa and Mount Maunganui to maintain coverage that would otherwise be lost;
- Extension of operating hours on all urban service to 7pm weekdays and weekends;
- Extension of operating hours on City loop, Otumoetai, Route 30, Route 40, and Route 55 to 9pm Sunday to Thursday;
- Extension of operating hours on City loop, Otumoetai, Route 30, Route 40, and Route 55 to 11pm Friday and Saturday;
- Change of route for Crosstown Connector to Ohauiti Road and Poike Road from SH29a;
- Saturday services for Katikait, Ōmokoroa, and Te Puke;
- Extension of City Loop service to the Tauranga Hospital; and
- Increased weekend frequencies on urban service to every 30min.

These changes will add materially to the cost but will deliver long term benefits for the community through the delivery of a product that meets more of the needs of existing and future users. In order to reflect these changes in the assessment, new financial figures have been developed reflecting the additional costs. Additional benefits have not been assessed as these are likely to be small relative to the cost under the assessment method being used.

The changes are being made to enhance the user experience and introduce a higher level of availability of services making public transport a realistic choice for a wider range of trips.

9.2 Gold Line Service

The Gold Line service has been added as a result of responses largely opposed to the removal of services from areas of Mount Maunganui and Papamoa, and in response to the disability and elderly community who were opposed to the lack of access to the Mount Hot Pools. This service will fill both of these needs and due to the flexibility users have in for trip timing this can be accommodated with an off-peak, low frequency service utilising buses that operate express services during peak periods. This service will operate hourly from 9:30 am to 4:00pm or as can be accommodated with bus availability. The anticipated cost of this service is approximately $250,000 per annum.

9.3 Crosstown Connector Diversion

In order to accommodate residents on Ohauiti Road the Crosstown connector will be moved from a section of SH29a to Ohauiti Road and Poike Road. This will prevent some loss of service in this area at the expense of a slightly slower travel time on the service.

9.4 SchoolHopper Network Changes

As mentioned previously the changes to Schoolhopper services are not yet finalised and subject to ongoing consultation with Schools and other stakeholders. This DBC has shown that the proposed public bus service changes can be implemented with an acceptable assessment profile with or without Schoolhopper changes.

9.5 Final Network and Service Frequencies

Final route network maps with adjustments made as a result of the public consultation described above are provided in **Appendix C**.

The final service frequencies are summarised in the following table.

Table 9-1: Service Frequencies

Route	Frequency (minutes between buses)							
	Weekdays				Weekends			
	6am to 7:30am	7.30am-6pm	6pm to 8pm (unless stated otherwise)	8pm to 11pm (unless stated otherwise)	6am to 8am	8am to 7pm	7pm to 8pm	8pm to 11pm
30 - Papamoa - Bayfair	30	30	20 (to 9pm)	30 (from 9pm Friday only)	60	30	30	30 (Sat only)
33 - Papamoa – Bayfair	30	30	30	-	60	20	-	-
33X - Papamoa - CBD Express	30 min frequencies in 2 hour AM and PM peak periods 6:30am to 8:30am and 4pm to 6pm.				-	-	-	-
New - City Loop Clockwise	30	15	15 (to 9pm)	30 (from 9pm Friday only	30	30	30	30 (Sat only)
New - City Loop Anticlockwise	30	15	15 (to 9pm)	30 (from 9pm Friday only	30	30	30	30 (Sat only)
70 - Matua	30	20	30	-	60	30	-	-
New – Otumoetai Loop	30	20	20 (to 9pm)	30 (from 9pm Friday only)	60	30	30	30 (Sat only)
62 - Bethlehem Carmichael Road	30	20	30	-	60	30	-	-
60 - Bethlehem Cambridge Road	30	20	30	-	60	30	-	-
52X - Tauriko Express	30 min frequencies in 2 hour AM and PM peak periods 6:30am to 8:30am and 4pm to 6pm.				-	-	-	-
1- Pyes Pa	30	20	30	-	60	30	-	-
59 - Greerton	60	60	60	-	60	60	-	-
New - Cross Town Connection	30	30	30	-	60	30	-	-
55 - Ohauiti	30	15	15 (to 9pm)	30 (from 9pm Friday only)	60	30	30	30 (Sat only)
40 - Welcome Bay Waikite Road	30	20	20 (to 9pm)	30 (from 9pm Friday only)	60	30	30	30 (Sat only)
New – Gold Line	-	60 (from 9:30 to 4pm)	-	-	-	60	-	-
Katikati Commuter	7am to 8am and 5pm to 6pm (two services each way)							
Omokoroa Commuter	7am to 8am and 5pm to 6pm (two services each way)							
Katikati & Omokoroa	9am to 3pm (two services each way)							

Route	Frequency (minutes between buses)							
	Weekdays				Weekends			
	6am to 7:30am	7.30am-6pm	6pm to 8pm (unless stated otherwise)	8pm to 11pm (unless stated otherwise)	6am to 8am	8am to 7pm	7pm to 8pm	8pm to 11pm
Shopper								
Te Puke Commuter to Bayfair	-	60	-	-	-	60 (Sat only)	-	-

The changes due to public feedback result in the annual cost of the recommended option increasing to **$18.5M.**

The network and frequencies agreed following public consultation is evaluated further in the following economic and financial assessments.

10 Economic Case

10.1 Evaluation Methodology

The methodology undertaken for the economic assessment has followed, where possible, with the full procedures for the evaluation of Transport Services, as documented in Section 4.4 of the NZ Transport Agency Economic Evaluation Manual (EEM) 2016.

Where the evaluation of benefits or costs were not performed, the rationale as to why is explained. **Table 10-1** summarises the benefit streams that the EEM suggests can be monetarised for public transport projects, and indicates whether they were evaluated as part of this assessment.

Table 10-1 – Benefit Streams Assessed

Benefit Type	Benefit Description	Quantified?
Transport Service User	Improved Reliability	Yes
Transport Service User	Fare/Price Changes	No
Transport Service User	Journey Time	Yes
Transport Service User	Improved Service Frequency	Yes
Transport Service User	Interchange Time	No
Transport Service User	Quality of Service	No
Road Traffic Reduction	Travel Time Costs	Yes
Road Traffic Reduction	Congested Travel Time Costs	Yes
Road Traffic Reduction	Vehicle Operating Costs	Yes
Road Traffic Reduction	CO_2 Reductions	Yes
Road Traffic Reduction	Crash Cost	No
Implementation/Construction	Disruptions	No
Other benefits	Social/Environmental	No
National Strategic	Wider Economic and Agglomeration	No

There is not expected to be any capital expenditure (CAPEX) costs associated with the proposed network changes. The rationale being that fleet is provided by private operators and no infrastructure is proposed as part of this DBC. The costs associated with the network changes are related to the operational expenditure (OPEX) through the 40 year analysis period.

10.1.1 General Economic Assumptions

General economic assumptions adopted as part of this assessment, and in accordance with the requirements of the EEM include:

- Base Year – 1 July 2016, incorporating the 2016/17 financial year
- Time Zero – 1 July 2018, incorporating the 2018/17 financial year
- 40 year analysis period
- 6% discount rate.

10.1.2 Options Considered

For this assessment, the following options were assessed:

- Do Minimum – retain existing services
- Option 2 – enhanced existing and new services.

10.1.3 Public Transport Demand

Demand for existing and proposed bus services was derived as outlined in Chapter 7. An agreed with the BoPRC, a demand growth rate of 3% between year 1 and year 10 has been assumed for both the existing and proposed bus services. Beyond year 10, passenger volumes have been capped at year 10 levels.

A number of additional factors contribute to increased demand with the new services such as increased frequencies. Additionally a journey time dis-benefit has been applied to Routes 30, 33 and City Loop Services to reflect the need to interchange between these services.

Table 10-2 lists the assumed demand for the existing and proposed bus network in year 1 and year 10.

Table 10-2 – Demand Forecasts

Scenario	Year 1 Demand	Year 10 Demand
Existing service provision (Total Annual)	1,876,000	2,488,000
New service provision (Total Annual)	2,582,000	3,453,061
New Passengers (Total Annual)	706,000	965,061

A 30/70 split between peak and off-peak demand has been assumed in this assessment which is based on analysis of annual boarding data.

10.2 Costs

10.2.1 Capital Expenditure (CAPEX)

As discussed previously, no CAPEX is expected as a result of the proposed changes. Fleet procurement is assumed to be the responsibility of the contracted bus operator.

10.2.2 Operating Expenditure (OPEX)

OPEX associated with the existing and proposed service previsions is set out in Chapter 7.

Table 10-3 lists the expected OPEX associated with the existing and proposed scheme.

Table 10-3 – Operating Expenditure (OPEX)

	OPEX – NPV ($)
Existing Services	$183,010,000
Proposed Services	$296,643,000
Additional OPEX	$113,633,000

Over the 40 year analysis period, the proposed services are expected to have an additional OPEX of **$93 Million**.

10.2.3 Revenue

As with OPEX, forecast revenue associated with the proposed bus routes is set out in chapter 7. **Table 10-4** lists the anticipated revenue associated with the existing and proposed service structure.

Table 10-4 – Service Revenue

	Revenue – NPV ($)
Existing Services	$68,780,000
Proposed Services	$95,525,000
Additional Revenue	$26,745,000

Over the 40 year analysis period, the proposed services are projected to generate an NPV revenue of **$38 Million** above the current service provision.

10.2.4 Funding Gap Analysis

The analysis summarised above indicates that with the proposed service provision, there is going to be a funding gap associated with offsetting the OPEX from the revenue. This DBC seeks to bridge this funding gap through an application for additional funding from the National Land Transport Fund (NLTF). The funding gap over the 40 year analysis period is documented in **Table 10-5**.

Table 10-5 – Funding Gap Analysis

	NPV ($)
Additional OPEX	$113,633,000
Additional Revenue	$26,745,000
Funding Gap	$86,888,000

10.3 Benefits

10.3.1 Improved Reliability

Appendix A18.2 of the EEM outlines the process for quantifying improved reliability benefits associated with public transport. These are seen as affecting customers in two ways:

- As delay when picking up customers
- As delay when the passenger is on the services.

Within the PBC, an improved reliability of four minutes was applied, i.e. where buses were running five minutes late on average they would be one minute late in future. This were associated with improvements to the running of services where bus priority would be provided and with increased frequencies. Bus priority is not assumed to be implemented, and therefore this level of reliability is not claimed.

However, with improved frequency, the re-negotiation of operating contracts and the general reduction in road traffic, it is conceivable that some degree of improved reliability of service will occur. Therefore, for this assessment, an improvement of one minute has been applied, i.e. where buses were five minutes late on average they will be four minutes late in future and likewise for other average late times.

It is assumed that these benefits only apply to peak hour passengers.

Other assumptions used to calculate the improved reliability of the proposed changes:

- EL (equivalent minute to late ratio) – Table A18.1 EEM = 4.8 (Combined – Bus)
- VT (Vehicle travel time ($/hour)) - Table A4.2 EEM = $17.10/hour (Bus) - $2002
- AML (Average minutes late) reduction = one minute (assumption)
- NPT (Number of passengers) = All, i.e. 2,462,000 (year 1), 3,187,000 (year 9), benefits halved for new customers
- Update factor = 1.45 (from Table A12.2 EEM).

Based on this these assumptions, the undiscounted and discounted NPV benefits associated with improved reliability are summarised in **Table 10-6**.

Table 10-6 – Improved Reliability Benefits for Existing and New Customers

	Improved Reliability ($)
NPV Benefits – Existing Customers	$21,858,000
NPV Benefits - New Customers	$4,389,000

Price Change Benefits

Price change benefits for existing and new customers, as discussed in Appendix A18.3 of the EEM were not assessed as part of this evaluation as there are no proposed changes to the fare structures that will alter customer travel behaviour as part of the DBC.

10.3.2 Improved Journey Time

The proposed amendments to the bus network include the rerouting of existing routes to provide a more direct faster route. These changes generally apply to longer distance commuter trips to the Tauranga CBD.

As the duration of a trip is dependent on when a boarding occurs relative to the CBD alighting, trips on the extremity of the route have a longer duration than those closer to the CBD. To compensate this, and due to the limitations of only boarding data being available, an average journey time has been estimated.

Table 10-7 lists the existing routes where a journey time improvement is anticipated.

Table 10-7 – Projected Travel Time Improvements on Existing Routes

Route	Existing Travel Time (mins)	Proposed Travel Time (mins)	Proposed Travel Time Saving (mins)
33X. Papamoa to CBD Express	50	40	10
70. Matua	30	16	14
62. Bethlehem via. Carmichael Road	37	23	14
60. Bethlehem via Cambridge Road	25	20	5

These journey time improvements have only been estimated for existing bus users, as these passengers will benefit directly from the improvements. Additionally, route 33X is a more direct route for route 30 and 33 customers who will divert on this service. Therefore, for this assessment, it assumed that the benefits will be applied to a half of the customers using route 33X.

Other parameters used in the derivation of journey time improvement benefits include:

- Peak bus customer value of time - $4.70/hr (commuting to/from work) – Table A4.1(a) EEM ($ 2002)
- Off-peak bus customer value of time - $3.05/hr (other non-work travel purposes) – Table A4.1(a) EEM ($ 2002)
- Update factor – 1.45.

Table 10-8 lists the total NPV benefits associated with improved journey time.

Table 10-8 – Improved Journey Time Benefits

	Value of Improved Journey Time ($)
Route 33X – NPV Benefit	$4,039,000
Route 70 – NPV Benefit	$2,386,000
Route 62 – NPV Benefit	$3,061,000
Route 60 – NPV Benefit	$836,000
Total NPV Benefit	**$10,322,000**

10.3.3 Improved Service Frequency

The proposed option includes improved frequency on a number of existing routes. The frequency changes proposed as part of the project are detailed in **Table 10-9**.

Table 10-9 – Proposed Change in Frequency

Route	Current Frequency (buses per hour)	Proposed Frequency (buses per hour)
30. Papamoa to Bayfair	1 per hour (60 minute headway)	2 per hour (30 minute headway)

33. Papamoa to Bayfair	2 per hour (30 minute headway	2 per hour (30 minute headway)
70. Matua	2 per hour (30 minute headway)	3 per hour (20 minute headway)
71. Otumoetai	2 per hour (30 minute headway)	3 per hour (20 minute headway)
62. Bethlehem via Carmichael Road	2 per hour (30 minute headway)	3 per hour (20 minute headway)
60. Bethlehem via Cambridge Road	2 per hour (30 minute headway)	3 per hour (20 minute headway)
1. Pyes Pa	2 per hour (30 minute headway)	3 per hour (20 minute headway)
59. Greerton	1 per hour (60 minute headway)	3 per hour (20 minute headway)
55. Ohauiti	2 per hour (30 minute headway)	4 per hour (15 minute headway)
40. Welcome Bay via Waikite Road	2 per hour (30 minute headway)	4 per hour (15 minute headway)
80. Katikati Commuter	1 per day (24 hour headway)	1 per hour in peak (12 hour headway)
81. Omokoroa Commuter	1 per hour (60 minute headway)	2 per hour (30 minute headway)
221. Te Puke Commuter to Bayfair	5 per day (~5 hour headway), 1 per peak	2 per hour (30 minute headway)

The quantification of improved frequency benefits were calculated for both existing and new customers using the procedure documented in Section A18.4 of the EEM. Existing customers receive full benefits, whereas new customers receive half as per the 'rule of half'.

Benefits have been derived for both peak and off-peak customers applying the 30/70 split explained previously.

Specific parameters used within the calculation of benefits include:

- Wait time benefit (WTf), values from Table A18.2 of EEM calculated on difference in minutes of headway. For the routes with a significant improvement in frequency (i.e. 60 minutes to 30 minutes) an average of the headways has been applied, as per the recommendations in the EEM.
- Value of travel (VOT) - $7.80/hour (commuting to/from work) for peak customers and $6.90/hour (other non-work travel purpose) for off-peak customers – Table A4.1(b) EEM.
- Update factor of 1.45.

Table 10-10 below list the NPV frequency improvement benefits associated with each of the routes discussed previously in **Table 10-10**.

Table 10-10 – Improved Frequency Benefits

Route	Wait time benefit (minutes) – Table A18.2 EEM	NPV Improved Frequency Benefit ($)
30. Papamoa to Bayfair	8.5	$10,874,000
33. Papamoa to Bayfair	6.0	$13,331,000
70. Matua	6.0	$4,764,000
71. Otumoetai	6.0	$4,306,000
62. Bethlehem via Carmichael Road	6.0	$6,272,000

60. Bethlehem via Cambridge Road	6.0	$4,784,000
1. Pyes Pa	6.0	$7,506,000
59. Greerton	8.5	$3,522,000
55. Ohauiti	5.5	$13,322,000
40. Welcome Bay via Waikite Road	5.5	$7,362,000
80. Katikati Commuter	11.9	$573,000
81. Omokoroa Commuter	9.4	$450,000
221. Te Puke Commuter to Bayfair	11.9	$1,152,000
Total Improved Frequency NPV Benefit		**$76,175,000**

10.3.4 Interchange

Benefits associated with improved interchange between services was not quantified as part of this assessment. It is likely that the proposed service changes will provide improved interchange. However, only boarding data is available and therefore link trips cannot be determined and hence benefits quantified.

An interchange dis-benefit was applied through a reduction in passenger demand for Option 2 due to the need for Papamoa routes to now interchange at Bayfair.

10.3.5 Road Traffic Travel Time Costs

Road traffic travel time improvements (TTC) were quantified by modelling within TTM a reduction in overall vehicle demand of 2% across the Tauranga road network where bus routes exist. The actual volume of vehicle trips removed from the network in the traffic model was also compared with the forecast additional bus patronage to ensure the model was not over estimating benefits and the volumes align closely. TTM outputs were provided for the 2016, 2026 and 2043 AM, IP and PM peak periods. Intermediate years were interpolated.

The following parameters have been used for the assessment of TTC benefits:

- Annualisation of one AM peak, one PM peak and 6.6667 IP peak periods (same split as bus demand) over 245 workdays
- Update factor of 1.45
- AM Peak Cost = $15.13/hr – Table 4.3 of EEM (Urban Arterial)
- IP Peak Cost = $17.95/hr – Table 4.3 of EEM (Urban Arterial)
- PM Peak Cost = $14.96/hr – Table 4.3 of EEM (Urban Arterial).

Using these parameters, the scheme was calculated as having an NPV net TTC benefit of **$108.9 Million** over the 40 year analysis period.

10.3.6 Road Traffic Congested Travel Time Costs

As with base travel time costs, incremental congested travel time cost (CRV) have been determined modelling a 2% reduction in overall traffic demand within TTM across the Tauranga Network.

The following parameters were used within the calculation of CRV benefits:

- Annualisation of one AM peak, one PM peak and 6.6667 IP peak periods (same split as bus demand) over 245 workdays
- Update factor of 1.45
- AM Peak Cost = $3.88/hr – Table 4.3 of EEM (Urban Arterial)

- IP Peak Cost = $3.60/hr – Table 4.3 of EEM (Urban Arterial)
- PM Peak Cost = $3.79/hr – Table 4.3 of EEM (Urban Arterial).

Using these parameters, the scheme was calculated as having an NPV net CRV benefit of **$9.7 Million** over the 40 year analysis period.

10.3.7 Road Traffic Vehicle Operating Costs

Road traffic vehicle operating costs have been determined from TTM modelling of 2% reduction in overall traffic demand on the Tauranga Network. VOC were determined within TTM for the AM, IP and PM peak in 2016, 2026 and 2043.

The following parameters were used to determine VOC benefits:

- Annualisation of one AM peak, one PM peak and 6.6667 IP peak periods (same split as bus demand) over 245 workdays
- Update factor of 0.98.

Using these parameters, the scheme was calculated as having an NPV net VOC benefit of **$54.4 Million** over the 40 year analysis period.

10.3.8 Road Traffic Carbon Dioxide Reduction Benefits

CO_2 emission reduction benefits have been quantified as 4% of the reduction in VOC benefits, as outlined in A9.7 of the EEM.

The CO_2 emission reduction benefits associated with the scheme were quantified as **$2.2 Million** over the 40 year analysis period.

10.3.9 Road Traffic Crash Cost Savings

Road traffic crash cost savings benefits due to reduced crashes associated with the assumed 2% reduction in traffic volumes across the network have not been quantified as part of this assessment. This is due to the computational effort to do so on a network and that crash occurrence is not isolated to traffic volume changes and therefore the claiming of these benefits would not be realistic.

10.3.10 Implementation/Construction Disruptions

The implementations of these service changes will not result in any disruptions to existing public transport users or other general traffic

10.3.11 Other Monetarised Benefits

Although potentially able to be quantified, other monetarised benefits including social willingness to pay and environmental benefits have not been quantified. These benefits will have societal benefits, but are not of relevance to the government.

National Strategic Factors

The project is not of a scale or significance to generate wider economic or agglomeration benefits.

Economic Analysis Outcomes

Table 10-11 documents the outcome of the economic assessment.

Table 10-11 – Economic Analysis Outcomes

	NPV Benefits (S) Opt 2 /DM
Improved Reliability Benefits $NPV	$26,247,000
Improved Journey Time Benefits $NPV	$10,322,000
Improved Frequency Benefits $NPV	$78,218,000
Road Traffic Travel Time Cost Saving Benefits $NPV	$108,932,000
Road Traffic Congested Travel Cost Benefits $NPV	$9,714,000
Road Traffic Vehicle Operating Cost Benefits $NPV	$54,446,000
Road Traffic CO_2 Benefits $NPV	$2,178,000
Total Benefits $NPV	**$290,057,000**
Funding Gap (OPEX – Revenue) $NPV	**$86,888,000**
Benefit Cost Ratio (BCR)	**3.3**

The economic evaluation has indicated that the proposed network changes achieve a BCR of 3.3, achieving a Medium efficiency rating. It has a first year rate of return (FYRR) of 12.5%.

The BCR achieved through this assessment is similar to the indicative BCR that was estimated in the PBC stage of 3.5.

10.3.12 Sensitivity Tests

In order to establish the influence that key assumptions and parameters have on the economic evaluation, a number of sensitivity tests were undertaken. These include:

- Improved reliability average minutes late assumption of one minute: sensitivity test with 0.5 minutes and 1.5 minutes was undertaken - this is to reflect the effect of potential over or under assuming improved reliability
- Changes in road user costs: +/- 20-% of road user benefits, to establish the effect road user benefits have on the economics
- Changes in operating costs: +/- 20% OPEX to establish the effect of changes to this cost
- Changes in revenue: +/- 20% to establish the effect of changes in revenue
- Changes to the discount rate: 4% and 8% discount rate tested to establish the influence of varying discount rates.
- With and without Schoolhopper to evaluate changes if Schoolhopper services are not modified.

Improved Reliability Sensitivity Test

Table 10-12 lists the results of the sensitivity test into the assumption around assumed average minute late improvements.

Table 10-12 – Improved Reliability Sensitivity Test

	BCR
Base Assessment	3.3
AML = 0.5 minutes	3.2
AML = 1.5 minutes	3.5

The results of this sensitivity test indicate that the assumed average minute late reduction value used in the economics has a minor impact on the economic outcomes.

Changes in Road User Costs Sensitivity Test

Table 10-13 list the results of the sensitivity test into the effect of changes to road user costs.

Table 10-13 – Changes in Road User Cost Sensitivity

	BCR
Base Assessment	3.3
-20% Road User Benefits	2.9
+20% Road User Benefits	3.7

The results of the sensitivity test indicate that the economics is not sensitive to changes in road user costs.

Change in Operating Cost Sensitivity Test

Table 10-14 lists the results of the sensitivity test associated with changes to operating costs.

Table 10-14 – Changes in Operating Cost Sensitivity

	Funding Gap	BCR
Base Assessment	$60,120,870	3.3
-20% Operating Costs	$44,027,939	4.5
+20% Operating Costs	$76,213,801	2.6

The sensitivity test indicates that that BCR is not particularly sensitivity to changes in the operating costs.

Changes in Revenue Sensitivity Test

Table 10-15 lists the results of the sensitivity test associated with changes to revenue.

Table 10-15 – Changes to Revenue Sensitivity

	BCR
Base Assessment	3.3
-20% Revenue	3.1
+20% Revenue	3.6

The results of the sensitivity test indicate that the economics is moderately sensitive to changes in revenue.

Changes in Discount Rate Sensitivity Test

A 6% discount rate was utilised to align with the contract period associated with the bus operating framework. **Table 10-16** lists the results of the sensitivity test associated with changes to the discount rate.

Table 10-16 – Changes to Discount Rate Sensitivity

	BCR
Base Assessment	3.3
4% Discount Rate	4.4
8% Discount Rate	2.6

The results of the sensitivity test indicates that the economics is sensitive to the discount rate used. This is due to the effect it has on the operating cost and revenue differences.

10.3.13 Impact of a Ten Year Assessment Period

Table 10-17 summarises the economic evaluation outcome based on a ten year assessment period.

Table 10-17 – Economic Evaluation Outcomes for 10 Year Assessment

	NPV Benefits (S) Opt 2/DM
Improved Reliability Benefits $NPV	$11,770,455
Improved Journey Time Benefits $NPV	$4,649,715
Improved Frequency Benefits $NPV	$35,236,601
Road Traffic Travel Time Cost Saving Benefits $NPV	$45,098,370
Road Traffic Congested Travel Cost Benefits $NPV	$3,548,597
Road Traffic Vehicle Operating Cost Benefits $NPV	$23,096,094
Road Traffic CO_2 Benefits $NPV	$923,844
Total Benefits $NPV	**$124,323,676**
Funding Gap (OPEX – Revenue) $NPV	**$35,832,933**
Benefit Cost Ratio (BCR)	**3.5**

With a ten year assessment, the scheme is found to have a BCR of 3.5. It also has a FYRR of 30%.

10.3.14 Impact of Not Changing Schoolhopper Services

Table 10-18 summarises the economic evaluation outcome based on a scenario where Schoolhopper services are retained as per the existing arrangement. This increases operating cost and reduces revenue slightly but still achieves a BCR of 3.

Table 10-18 – Economic Evaluation Outcomes for No Schoolhopper Changes

	NPV Benefits (S) Opt 2 /DM
Improved Reliability Benefits $NPV	$24,135,549
Improved Journey Time Benefits $NPV	$9,088,703
Improved Frequency Benefits $NPV	$72,162,262
Road Traffic Travel Time Cost Saving Benefits $NPV	$108,932,063
Road Traffic Congested Travel Cost Benefits $NPV	$9,713,741
Road Traffic Vehicle Operating Cost Benefits $NPV	$54,445,661
Road Traffic CO_2 Benefits $NPV	$2,177,826
Total Benefits $NPV	**$280,655,805**
Funding Gap (OPEX – Revenue) $NPV	**$102,717,052**
Benefit Cost Ratio (BCR)	**2.7**

11 Assessment Profile

The Strategic Fit and Effectiveness of the programme were both rated as High in the PBC. The recommended options aligns well with the PBC programme and therefore these ratings are considered to still be an accurate assessment of the project.

The economic evaluation in the previous chapter indicates that the recommended option is estimated to have a BCR of between three and five which indicates a Medium efficiency rating. Although we understand the NZ Transport Agency will review this in accordance with the Public Transport Programmes benefits and cost appraisal process, we consider it unlikely that this will significant change the efficiency rating.

Therefore the assessment profile is considered to be H/H/M.

12 Investment Objectives

The PBC set our six SMART investment objectives which if achieved will realise benefits identified in the SBC. These investment objectives and the corresponding evaluation of the recommended option against each objective is outlined below.

Table 12-1: Evaluation of Recommended Option against Investment Objectives

Investment Objective	Evaluation
Improve bus travel times on key corridors through shorter frequencies and bus priority measures to reduce the effect of distance on the attractiveness of bus travel.	The option delivers shorter frequencies on most routes and many routes are more direct. Bus priority measures will be subject to separate DBC(s). The option therefore performs well against this objective.
Increase the fare box recovery ratio to 45% by 2026. Progress will be monitored annually.	Fare box recovery is expected to increase to 42% which is slightly below this target but above current levels. The option performs reasonably well in this regard, additional promotion / marketing to increase patronage could be considered in future to lift the fare box recovery toward the target.
Improve the competiveness of bus travel times. Target a reduction in bus journey time between key destinations of 20% over existing schedules by 2026.	Four routes (33X, 70, 60 and 62) offer more direct services from key origins / destinations than currently provided for. Averaging 30% reductions in journey times. Travel times on other services are similar to existing but higher frequencies will enable shorter journey times.
95% of bus services will operate within five minutes of schedule during the 7am to 9am AM peak by 2026 during normal operating conditions.	More buses operating on the network at higher frequencies should make any delays shorter and the target should be achievable. Monitoring of operations and addressing areas of delay as they arise in future will be necessary to ensure continuous achievement of this objective.
Implement at least 50% of the projects identified in the PBC by 2021 and 100% by 2026. This may include part projects, i.e. initial phases of larger projects.	This objective relates to stakeholder investment in the PBC programme. Investment in the recommendations of this DBC is progress toward achieving this objective.
The organisations responsible for investing in PT as guided by the PBC will commit 100% of the necessary funding as defined in the PBC by 2026.	As above this relates to the wider PBC programme but funding of the recommendation in this DBC contributes toward achieving this investment objective.

13 Financial Case

The financial case for the preferred option (Option 2) is largely set out in Chapter 8 and summarised In **Table 13-1**. These figures include both Bayhopper and Schoolhopper demand and revenue.

Table 13-1: Estimated Patronage and Revenue Projections (revenue in millions)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Cost ($)	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Patronage (millions)	2.43	2.86	3.00	3.13	3.27	3.40	3.54	3.67	3.81
Revenue ($)	$3.64	$4.28	$4.71	$5.14	$5.57	$6.00	$6.43	$6.86	$7.29
Fare box recovery	21%	24%	27%	29%	32%	34%	37%	39%	42%

The BCR of the recommended option is Medium and the service will provide a wide range of quantifiable and non-quantifiable benefits, therefore the additional investment is considered to be justified.

Some minor network improvements such as extended operating hours and weekend regional services will be introduced between years 1 and 4 of the plan resulting in no material change to the economics of the business case but will result in slightly lower claims being made through the RLTP in these years. This has largely been done to allow BOPRC to manage cashflow more effectively as the cost of these improvements can be offset by increased fare take as patronage increases. Adjusted figures will be included in RLTP and Transport Investment Online and is expected to be a reduction in operating expenditure of up to $800k between 2018/19 and 2020/21. Also note that the claim for Year 1 will be significantly lower due to a recent Council decision to extend existing contracts to December 2018 which will result in reduced operating costs for the 2018/19 financial year

The following table breaks down the cost estimate to funding partner and NLTF periods.

Table 13-2: Costs by Funding Partner and NLTF Period (millions)

	NLTF 18/21			NLFT 21/24			NLFT 24/27		
Total Cost ($)	$18.5	$18.5	$18.5	$18.5	$18.5	$18.5	$18.5	$18.5	$18.5
NZ Transport Agency (51%)	$9.44	$9.44	$9.44	$9.44	$9.44	$9.44	$9.44	$9.44	$9.44
BOPRC	$9.07	$9.07	$9.07	$9.07	$9.07	$9.07	$9.07	$9.07	$9.07

PART B – READINESS AND ASSURANCE

14 Commercial Analysis

14.1 Public Transport Operating Model Unit Structure

Unit establishment is a core component of the transition to the PTOM. Units are a public transport service or a group of public transport services that a region identifies as integral to the region's public transport network. A unit will include all public transport services, operating to a timetable, along an entire route or routes specified for the unit. The contracting units are a legislative requirement required to be stipulated in the Regional Public Transport Plan (RPTP) and therefore a variation to this Plan is required.

14.1.1 Principles

The BoP PTPM 2013 states that "Units will be established using the following principles:

- A "marketable whole" servicing key destinations, targeting certain demographics including the transport disadvantaged
- Establishing units in a manner that maintains a competitive and attractive market with a range of unit sizes across the region
- Emphasis on financial returns generated by services and innovation
- Exclusivity of operation
- Economic efficiency and operational efficiency".

Five alternative unit structures were considered, as described below.

14.1.2 Two Units each Consisting of Urban, School and Regional Networks (Option 1)

This option maintains at least two sizeable operators in Tauranga providing a more competitive environment. It also maintains a reasonable scale of contract to encourage operators not currently in the region to tender for services. This option reduces the overall number of contracts that are managed by the BoPRC in the Western Bay from six to three (these figures include Ōmokoroa/Katikati unit which is not included in the variation). It also provides some competition in the market for ancillary services (i.e. coach hire) and future tender rounds.

14.1.3 All Networks included in One Unit (Option 2)

This option would likely attract the most attention from external parties to the market but could result in the departure of operators offering ancillary services. It would also be harder for smaller operators in the region to compete for this scale of tender. Future tender rounds may become less competitive with one operator holding such a large market share for bus services.

14.1.4 Three Units - One for School Services and two for Urban and Regional Services (Option 3)

This option maintains a reasonable scale of contract within the three units. It is expected that this will allow smaller operators to competitively tender for a single unit whilst a combination of units would offer incentive for operators outside the region to compete.

Arranging contracts in this manner may result in the loss of vehicle efficiencies that could result in combining school and urban services within in a single contract.

This option also provides competition in the market for ancillary services and future tender rounds.

14.1.5 Five Units - Two for School Services, Two for Urban Services and One for Regional Services (Option 4)

This could produce small school contracts ideally suited to smaller operators whilst combined urban or urban and school units would allow for larger operators to tender.

Arranging contracts in this manner may result in the loss of vehicle efficiencies that could result from combining school and urban services within in a single contract. It would also result in less opportunity for school services to be combined or modified to improve efficiency and there would be a minor increase in the administration required of the BoPRC staff.

14.1.6 Four Units Based on Geographic Areas (Option 5)

This would allow for small operators to compete for single units that combine both school and urban services. Agglomeration of units would provide scale for larger market competitors. This could result in six separate contracts that would be less efficient to manage from the BoPRC's perspective.

Having large number of operators in the market would potentially make operation of pulse timetables (where buses need to meet at a given location and time to facilitate passenger transfers) less feasible due to the coordination required between operators. There would also be less ability to improve the efficiency of the networks as combining routes would become more difficult.

14.1.7 Preferred Option

Following initial feedback from bus operators from around the country, a preferred option for the unit structures has been identified by the BoPRC. This is to have two units, each consisting of urban, school and regional routes and an additional unit to accommodate future deployment of new services and changing technology (i.e. Option One).

The variation would see the existing Tauranga Urban and three Schoolhopper units (and therefore contracts) combined and then split geographically into an eastern unit and a western unit. This would be effective for the upcoming service tenders in the sub-region.

In order to enact the variation and meet legislative requirements, a formal consultation process is required and will be entered into should the BoPRC's Transport Committee adopt Option 1. Any final decision to vary the Regional Public Transport Plan in line with the preferred option will require a decision from the BoPRC's Transport Committee.

14.2 Implementation and Review Strategy

There are a number of important dependencies related to implement the recommended network design. In order to ensure the most efficient delivery and implementation of the design, it will be important to ensure that there is effective coordination between the various stakeholders (BoPRC, NZ Transport Agency, TCC, WBoPDC). The organisations will need to work together to develop an optimal approach to sequencing and integrating the implementation of the future network design.

As suggested previously starting with lower off peak frequencies would be sensible until demand increases. It is recommended that the service is reviewed very three years to assess frequency improvements.

14.3 Risk Assessment

The key risks to the success of the service are financial and perception base, as summarised below:

14.3.1 Financial

The key financial risk is that passenger uptake is lower than predicted and this results in less fare box recovery than anticipated and a lower than expected return on investment. There are a number of factors that drive public transport use and not all are within the control of the investors (e.g. petrol prices). Other cities have shown that provision of quality public transport services going places that people want to go in a timely manner can bring about the level of mode shift anticipated in the DBC. The risk can be monitored through passenger demands and the proposed ticketing system will enable more real time monitoring of passenger demands. If demands are below expectations mitigation activities such as promotion and marketing could be considered.

It is also possible that operating costs will be higher than expected in this DBC and this will impact on the benefit / cost ratio of the option and the feasibility of delivering the activities. Costs will become certain when the services are tendered. Mitigation can be considered at this stage. It should also be noted that it is possible that passenger growth will be higher than expected and costs lower than the current estimates, resulting in a more favourable outcome.

14.3.2 Stakeholders / Public Perceptions

There is a risk that stakeholders or the public will not support the proposed option and this will reflect negatively on the investors. There are four key risks in this regard:

- Some existing passengers may find that the bus service they currently use do not follow the same routes in future and may not pass as close to their origin / destination as it does currently. This will be a negative experience for some people. The benefits of providing more direct services with shorter travel times should however provide a better overall service for customers.
- Carrying more school passengers on the public service (if Schoolhopper changes eventuate as expected) may be perceived negatively by some schools and school stakeholders (board of trustees, parents, students). Clearly communicating the changes and the reasons for change will be important to ensure that schools do not overly object to the new service.
- Users of urban bus services may be deterred at peak times by additional school pupils using these services as school bus services are optimised

Many of these risks could lead to the recommended network design not being fully implemented. However, in our view these risks can be adequately managed by the BoPRC by monitoring feedback and consultation such as the regular user survey. Service changes can be made if warranted at the time.

14.3.3 Risk Register

The risks identified above are summarised in the following risk register.

Table 14-1: Risk Register

Risk	Likelihood	Consequence	Mitigation	Owner
Financial – patronage remains below forecast and as a result fare box recovery does not meet expectations.	Medium	Medium	Continually monitor ticket sales and customer feedback to be aware of potential future patronage. Increase marketing and promotion other measures to encourage more people to use the bus if necessary.	BoPRC
Financial – operator costs are higher than expected in this DBC.	Medium	Medium	Review costs as part of tender process and review service design should actual costs be unacceptably high.	BoPRC
Customer – negative public feedback on new routes impacts on patronage.	Low	Low	Public engagement on new public bus routes has been relatively positive but feedback can be continuously monitored and any issues addressed relatively easily if necessary.	BoPRC
Customers – negative feedback from school community on proposed changes	Low	Low	Following public consultation schools have been consulted with directly and a plan put in place to serve each school appropriately however this can be continuously monitored and changes made if necessary.	BoPRC
Customers – negative feedback from public bus users due to more school students on public bus services.	Low	Low	Schoolhopper design will seek to accommodate students appropriately however this can be monitored through user feedback and service changes made if necessary.	BoPRC

15 Delivery Framework

15.1 Funding

The DBC seeks additional funding to cover the gap arising from the existing service provision and the recommended option. Operational costs, following fare recovery, will be split between BoPRC and the NZ Transport Agency in accordance with the FAR.

15.2 Consultation

Public consultation was carried out by BoPRC in 2017. No further consultation is planned but there will be promotion and marketing of the changes prior to implementation of the new service.

15.3 Procurement Strategy

The Procurement Strategy for implementation of the service changes is being prepared separately for the BoPRC and will be circulated to partners for review and agreement.

15.4 Management

BoPRC is the project sponsor and leads delivery and monitoring of the recommend option. Reporting on results will continue through the Public Transport Committee and direct liaison between the BopRC and the NZ Transport Agency.

16 Next Steps

This DBC has developed the recommended programme in the PBC and identified the preferred route network and frequency option to take forward. The case for change was set out in the Strategic Case and the PBC and remains valid. The DBC has confirmed through the assessment profile for the recommended option that the option is expected to perform well in regard to financial performance over the term of the contract and against other performance targets such as mode shift and fare recovery. The next steps in regard to the public bus service will be approvals, finalising timetables, tendering for new contacts and implementation of service changes. Schoolhopper consultation is ongoing and these changes are to be confirmed separately.

Appendix A

Existing Schoolhopper Routes

Appendix B

Public Consultation Report

Appendix C

Final Public Bus Route Maps