

## Document Information

Client	Auckland Transport
Job Number	NZ1700 Auckland PT Development Plan
Title	Waitakere to Huapai - Public Transport Options Assessment
Prepared by	MRCagney Pty Ltd Auckland, New Zealand
Date	14 February 2013

## Quality Assurance Register

Issue	Description	Prepared by	Reviewed by	Authorised by	Date
1	Working draft	S Donovan	J Varghese	S Donovan	2/6/2012
2	Draft final	S Donovan	N Reid	S Donovan	10/6/2012
3	Final	S Donovan	Client	Client	29/7/2012
4	Final Draft	J Varghese	N Reid	S Donovan	01/02/2013
5	Final Report	J Varghese	N Reid	J Varghese	14/02/2013

This document and information contained herein is the intellectual property of MRCagney Pty Ltd and is solely for the use of MRCagney's contracted client. This document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied, without the written consent of MRCagney. MRCagney accepts no responsibility to any third party who may use or rely upon this document.

# Table of Contents

1.	Background.....	1
1.1	Introducing the Study Area.....	1
1.2	Strategic Planning and Policy Context.....	2
1.3	Public Transport Development Plan.....	4
2.	Defining the Options.....	7
2.1	Base Option.....	7
2.2	Option 1 - Extended Bus Services.....	8
2.3	Option 2 - Extended Rail Shuttle.....	9
2.4	Option 3 - Bus from Swanson to Waitakere only.....	10
3.	Cost Estimates.....	11
3.1	Base Scenario.....	11
3.2	Option 1 - Extended Bus Services.....	12
3.3	Option 2 - Extended Rail Shuttle.....	12
3.4	Option 3 - Waitakere to Swanson Tertiary Bus.....	13
3.5	Summary of Costs.....	14
4.	Evaluating the Options.....	15
4.1	Travel-time Analysis.....	15
4.2	Demand and Catchment Analysis.....	15
4.3	Park-and-Ride Surveys.....	18
4.4	Broader Strategic Considerations.....	19
4.5	Qualitative Benefit Cost Analysis.....	20
5.	Conclusions and Recommendations.....	21
5.1	Conclusions.....	21
5.2	Recommendations.....	22

# List of Figures

Figure 1: General Study Area.....	1
Figure 2: Auckland Plan - Project land use development areas.....	2
Figure 3: Auckland Plan - Project land use development areas.....	3
Figure 4: Regional Passenger Transport Plan 2010 - Swanson and Huapai Services.....	4
Figure 5: Public Transport Development Plan - Western/Upper Harbour Frequent Network.....	5
Figure 6: Base Public Transport Network.....	7
Figure 7: Base Case - Connections to Key Centres.....	8
Figure 8: Option 1 - Extended bus services.....	9
Figure 9: Option 2 - Extended Rail Service.....	9
Figure 10: Option 3 - Extended bus services with Waitakere to Swanson Tertiary Bus only.....	10
Figure 11: Annual bus resource requirements for Base Scenario.....	11
Figure 12: Annual bus resource requirements for Option 1.....	12
Figure 13: Annual bus resource requirements for Option 3.....	13
Figure 14: Summary of cost estimates for each option.....	14
Figure 15: Travel-time analysis between Kumeu-Huapai and other key destinations (minutes).....	15
Figure 16: Population Catchment Analysis.....	16
Figure 17: Results of Catchment Analysis.....	17
Figure 18: Cost and population catchment by option.....	18
Figure 19: Registered addresses of vehicles at park-and-ride.....	19

# 1. Background

MRCagney were commissioned by Auckland Transport to undertake an assessment of public transport options between Waitakere and Huapai. We understand that Auckland Transport is currently considering various options for operating a rail shuttle service between Swanson, Waitakere, and Huapai. The purpose of this study is to consider the merits of such a shuttle service and possible alternatives.

Key questions considered in this study include:

- How should we define “Base” public transport network in this area?
- What options existing for improving the Base public transport network?
- What are the costs associated with each option and which option delivers best value-for-money?

Following sections of this report attempt to answer these key questions.

## 1.1 Introducing the Study Area

The general study area extends from Swanson in the south to Huapai in the north, as illustrated in the figure below. The Western Rail Line and SH16 are also illustrated in orange and yellow respectively. Distances from Huapai to the City Centre are approximately 26km and 40km by road and rail respectively.

Figure 1: General Study Area



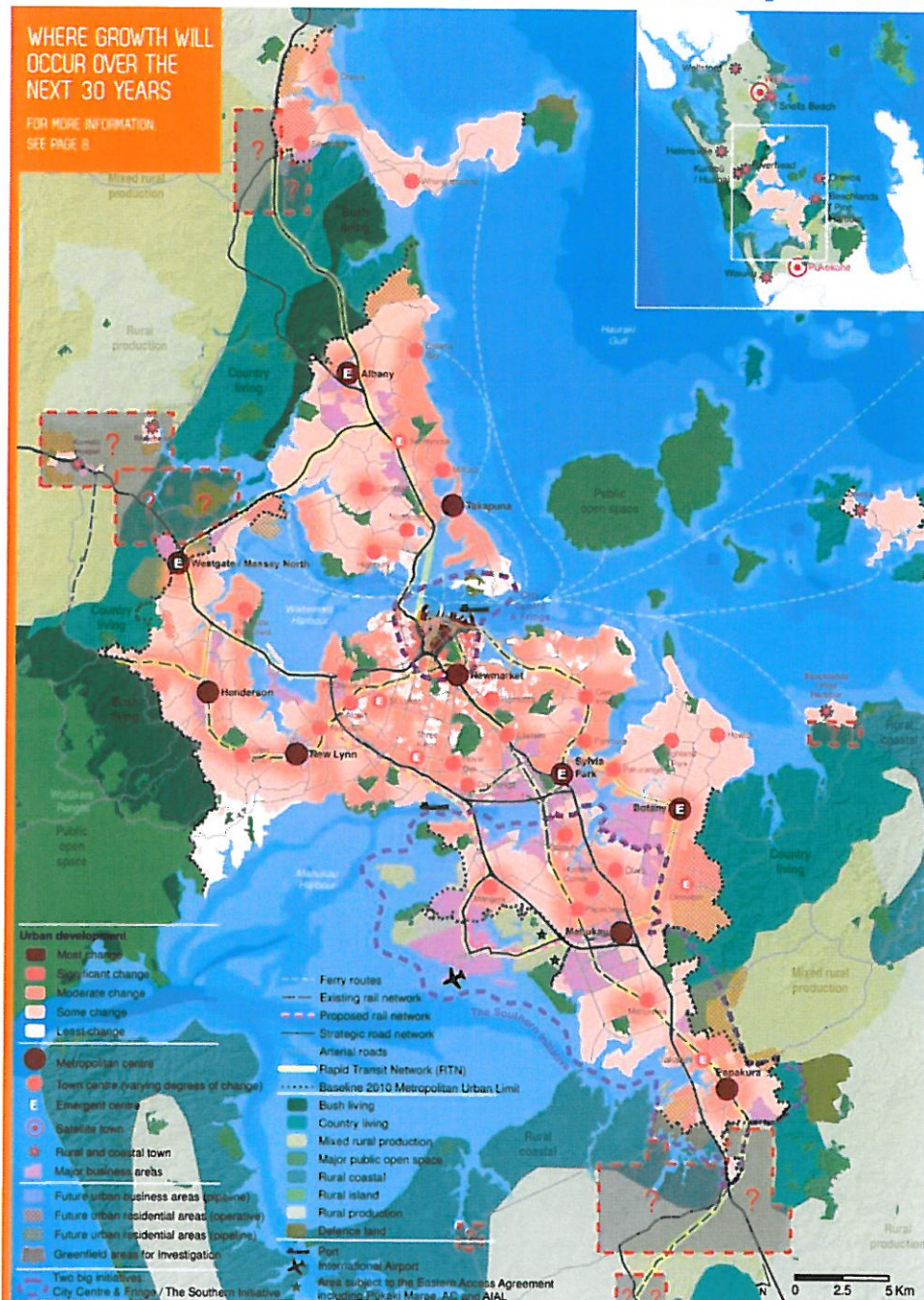
## 1.2 Strategic Planning and Policy Context

The planning and policy context for this study is informed by the following documents:

- The Auckland Plan;
- The Regional Land Transport Strategy (RLTS); and
- The 2010 Regional Public Transport Plan (RPTP).

The Auckland Plan identifies major urban growth areas in the Upper Harbour sub-region, especially around the town centres of Westgate and Hobsonville, as illustrated below.

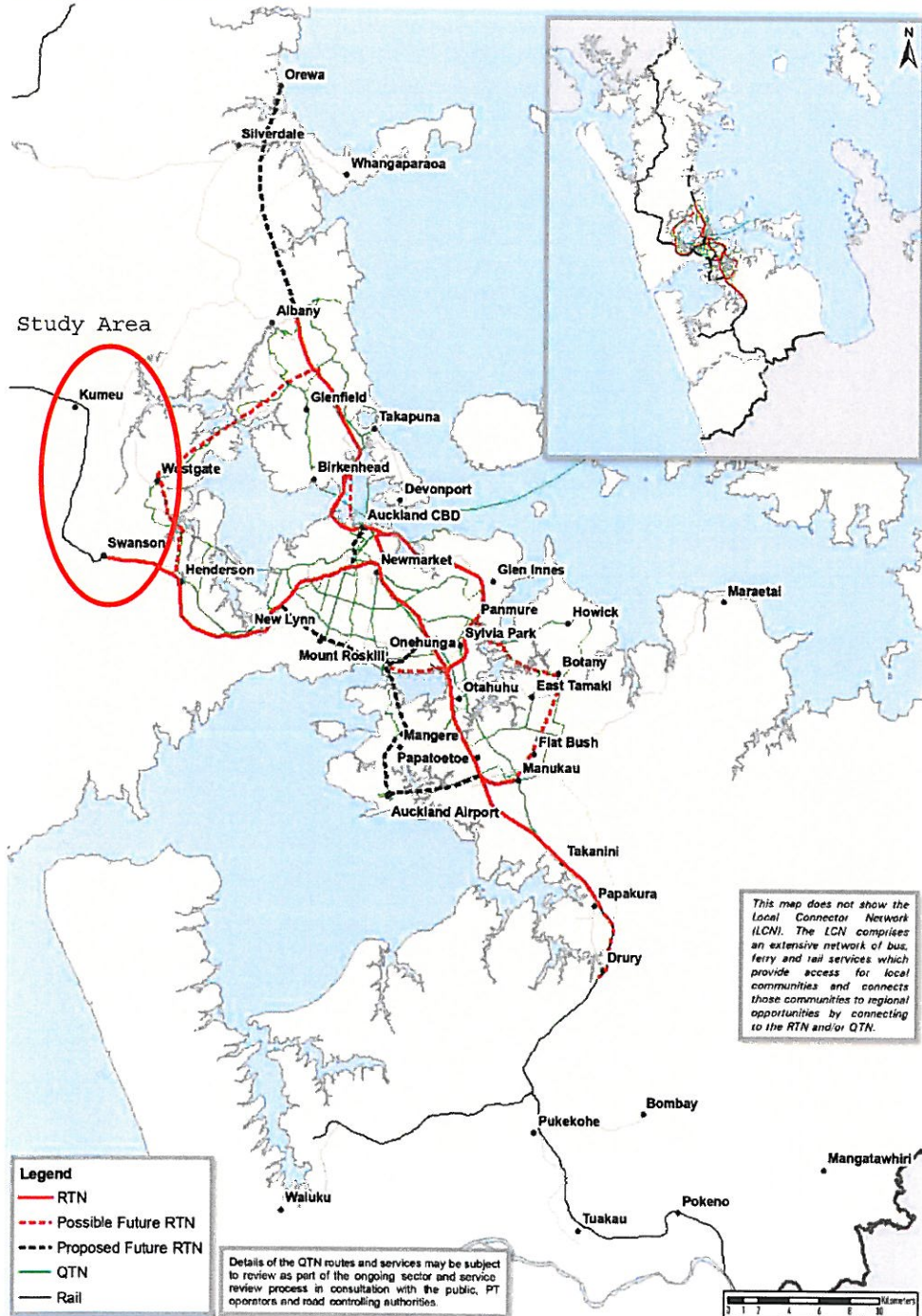
Figure 2: Auckland Plan - Project land use development areas



Beyond Westgate, the Auckland Plan identifies "Country living" areas and "greenfields area for further investigation". As such, we do not expect major urban development north or west of Westgate in the foreseeable future. Similarly, no expansion in the metropolitan urban limit is expected west of Swanson.

The RLTS outlines the strategic regional transport network, as illustrated below. Most relevant to this study is the strategic importance of the Rapid Transit Network (RTN)/Quality Transit Network (QTN) from Henderson-Albany via Constellation Station (this is the dashed red line running around the Upper Harbour sub-region through Westgate).

Figure 3: Auckland Plan - Project land use development areas



The RPTP 2010 identifies several planned changes that are of relevance to our study, namely the potential for a park-and-ride at Swanson and the configuration of local bus services, as summarised below.

Figure 4: Regional Passenger Transport Plan 2010 – Swanson and Huapai Services

Service Group Number: 45				Service Group Name: Ranui & Swanson										
Route description					Frequency (approx mins)							Service Period		
Service type	Mode	From	To	Via	Direction	Early Morning	Peak	Interpeak	Evening	Saturday	Sunday	Weekday	Saturday	Sunday
All Stops	Bus	Midtown	Henderson	Wellesley Street, Mayoral Drive, Vivinet Street, Pitt Street, Karangahape Road, Great North Road, New Lynn Transport Centre, Great North Road, Henderson Transport Centre, Ratanui Street, Alderman Drive, Edmonton Road & Te Atatu Road	Outbound	-	-	-	-	120	120	-	0130-0300	0130-0300
All Stops	Bus	Swanson	Henderson Transport Centre	Swanson Road, Luanda Drive, Universal Drive & Lincoln Drive	Inbound	30	30	60	60	60	60	0600-2200	0700-2200	0800-2100
All Stops	Bus	Henderson Transport Centre	Swanson	Lincoln Drive, Universal Drive, Luanda Drive & Swanson Road	Outbound	60	30	60	60	60	60	0600-2200	0700-2200	0800-2100
All Stops	Bus	Ranui	Henderson Transport Centre	Pooks Road, Hetherington Road, Metcalfe Road, Larnoch Road, Rathgar Road, Universal Drive & Lincoln Road	Inbound	30	30	60	60	60	60	0600-2200	0700-2200	0800-2100
All Stops	Bus	Henderson Transport Centre	Ranui	Lincoln Road, Universal Drive, Rathgar Road, Larnoch Road, Metcalfe Road, Hetherington Road & Pooks Road	Outbound	60	30	60	60	60	60	0600-2200	0700-2200	0800-2100
All Stop	Bus	Henderson Transport Centre	Henderson Transport Centre	Henderson Valley Road, Forest Hill Road, Palomino Drive, Sturges Road, Chadlington Road, Summerland Drive, Harvest Drive & Swanson Road	Loop	60	30	30	60	60	60	0630-1830	0900-1700	1000-1700

Service Group Number: 51				Service Group Name: Massey & Hobsonville										
Route description					Frequency (approx mins)							Service Period		
Service type	Mode	From	To	Via	Direction	Early Morning	Peak	Interpeak	Evening	Saturday	Sunday	Weekday	Saturday	Sunday
All Stops	Bus	Westgate Shopping Centre	Westgate Shopping Centre	Hobsonville Road, Kauri Road, Herald Island, Whenuapai & Trig Road	Loop service	-	120	120	-	-	-	0630-1800	-	-
All Stops	Bus	Helensville	Westgate Shopping Centre	State Highway 16, Waimauku, Huapai & Kumeu	Inbound	-	-	60	60	120	120	0800-2000	0700-2100	0800-2000
All Stops	Bus	Westgate Shopping Centre	Helensville	State Highway 16, Kumeu, Huapai & Waimauku	Outbound	-	-	60	60	120	120	0700-2000	0800-2100	0900-2000
Express	Bus	Helensville	Britomart	State Highway 16, Waimauku, Huapai, Kumeu, Westgate Shopping Centre, North Western Motorway, Great North Road, Karangahape Road & Albert Street	Inbound	30	30	-	-	-	-	0530-0800	-	-
Express	Bus	Britomart	Helensville	Albert Street, Karangahape Road, Great North Road, North Western Motorway, Westgate Shopping Centre, State Highway 16, Kumeu, Huapai & Waimauku	Outbound	-	30	-	-	-	-	1600-1830	-	-
All Stops	Bus	Westgate Shopping Centre	Henderson	Onel Avenue, More Road, Colwill Road, Royal Road, Triangle Road, Central Park Drive & Lincoln Road	Inbound	60	60	60	60	60	60	0600-2300	0700-2200	0800-2100
All Stops	Bus	Henderson Shopping Centre	Westgate Shopping Centre	Lincoln Road, Central Park Drive, Triangle Road, Royal Road, Colwill Road, More Road & Onel Avenue	Outbound	60	60	60	60	60	60	0600-2300	0700-2200	0800-2100

The following bus services identified in the RPTP 2010 are considered most relevant to our study:

- Swanson – Henderson operating at 30-60 minute intervals, all week, and with a span of at least 8am to 9pm.
- Helensville – Westgate via Huapai operating at 60-120 minute intervals, all week, and with a span of at least 9am to 8pm.
- Helensville – Britomart via Huapai operating at 30 minute intervals in peak morning and afternoon periods on weekdays from 5.30am to 8am and 4pm to 6.30pm.

### 1.3 Public Transport Development Plan

Auckland Transport has recently commissioned MRCagney to develop a “Public Transport Development Plan” (PTDP) for Auckland Transport. The purpose of the PTDP was to take a clean-slate look at what could be achieved with

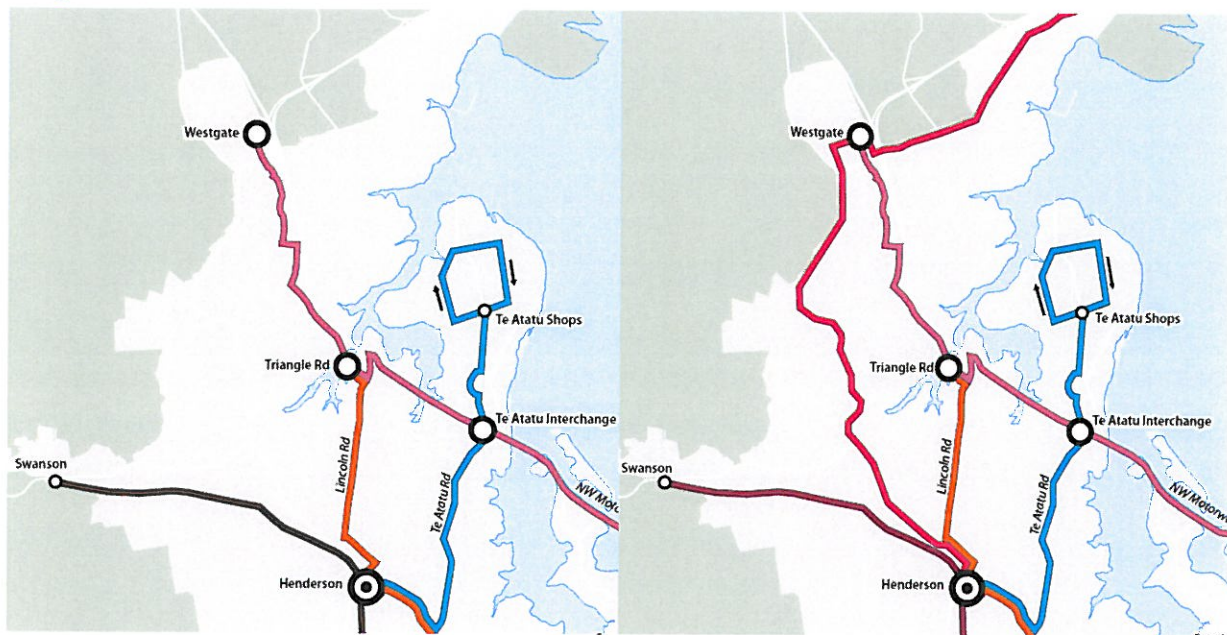


Auckland's public transport network by 2016 and also consider how the network should adapt to the City Rail Link. A key proposition of the PTDP is that "frequency is freedom"; a network of simple, frequent lines enables spontaneous use of public transport.

The relevant part of the network developed in the PTDP for 2016 and 2022 is illustrated in the figures below. In 2016 (left hand figure) the PTDP has frequent lines on the Western Rail Line to Swanson; Westgate via SH16 to the City Centre; Te Atatu Peninsula via Te Atatu Rd to Henderson; and Triangle Interchange via Lincoln and Great North Roads to New Lynn.

In 2022 the only significant change is the introduction of the new frequent line from Henderson via Don Buck Drive, Helensville Road, and SH18 to Constellation (and eventually onto Albany).

Figure 5: Public Transport Development Plan - Western/Upper Harbour Frequent Network



The PTDP assumes that the frequent network would operate 15 minutes or better all-day, every-day. In addition to the frequent network the PTDP delivers:

- **Secondary services** that operate at least every 30 minutes over a similar span to the frequent network. Higher frequencies are operated during peak periods.
- **Local, Peak and Targeted services** that add coverage and capacity where these needs are not met by the frequent and secondary networks, such as peak, coverage, and school services.

In these categories, the PTDP identifies

- A secondary service operating through Kumeu-Huapai to Westgate via SH16;
- A Local service operating from Waitakere to Swanson Road and Henderson; and

- ↳ Peak services operating from Helensville/Huapai to Westgate and on to the City Centre.

The PTPD assumes that EMUs operate from Swanson to the City while a diesel shuttle operates from Waitakere to Swanson. The PTDP therefore proposes a similar network structure to that found in the RPTP, although with slightly more service in some places, such as from Westgate to the City. Secondary bus services connect Huapai to Westgate (and in the peak these services travel direct to the city), while tertiary bus services connect Waitakere to Swanson and onto Henderson. The diesel shuttle service also connects to Swanson direct. No services, however, connect Huapai to Waitakere. Options for providing such a service are discussed in more detail in the following section.

## 2. Defining the Options

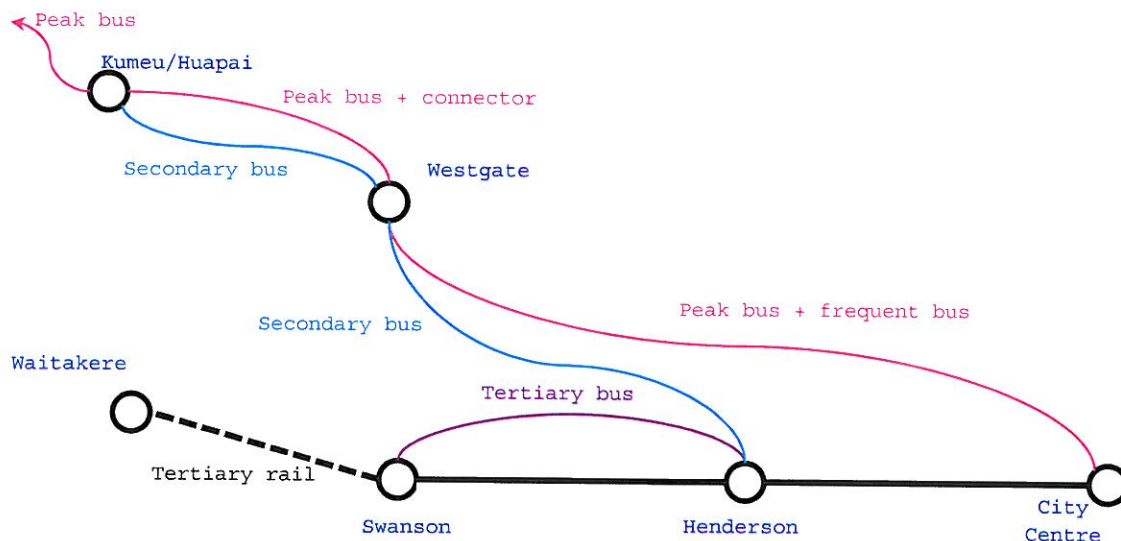
### 2.1 Base Option

Our Base option is defined primarily by the services identified previously in the PTDP. This consists of two relevant rail lines and three bus lines, namely:

- ↘ Rail:
  - Frequent EMU service operating between Swanson and the City; and
  - Tertiary DMU service between Waitakere and Swanson.
- ↘ Bus:
  - Secondary service between Huapai and Westgate via SH16;
  - Tertiary service between Swanson and Henderson;
  - Peak service between Helensville, Kumeu/Huapai, Westgate and onto the City Centre.
  - Connector service between Kumeu/Huapai and Westgate

These services are illustrated schematically in the figure below.

Figure 6: Base Public Transport Network



Connections that are facilitated in the base case are summarised in the following table. Note that where the trip between origins/destinations cannot be made without having to transfer at least twice then we have entered "N/A".

Figure 7: Base Case - Connections to Key Centres

	Huapai	Westgate	Waitakere	Swanson	Henderson	City Centre
Huapai	-	Secondary, direct	N/A	N/A	Secondary, connect	Peak, direct + all day connector
Waitakere	N/A	N/A	-	Tertiary, direct	Tertiary, connect	Tertiary, connect.
Swanson	N/A	Tertiary, connect	Tertiary, direct	-	Frequent direct	Direct

From this we can see that:

- ↘ **Huapai** has direct, all-day secondary service to Westgate and direct, peak service to the City. Travel to Henderson is possible with a secondary-to-secondary connection required at Westgate. It is not possible to travel between Huapai and Waitakere or Swanson.
- ↘ **Waitakere** has direct, all-day tertiary bus and rail service to Swanson with the bus service continuing to Henderson. All-day travel to the City is possible via the tertiary bus/rail to frequent rail connection at Swanson. It is not possible to travel between Waitakere and Huapai or Westgate.
- ↘ **Swanson** has the same service as Waitakere, except that a direct frequent service to the City Centre is available via the Western Rail Line. Again, it is not possible to travel from Swanson to Huapai under the base network.

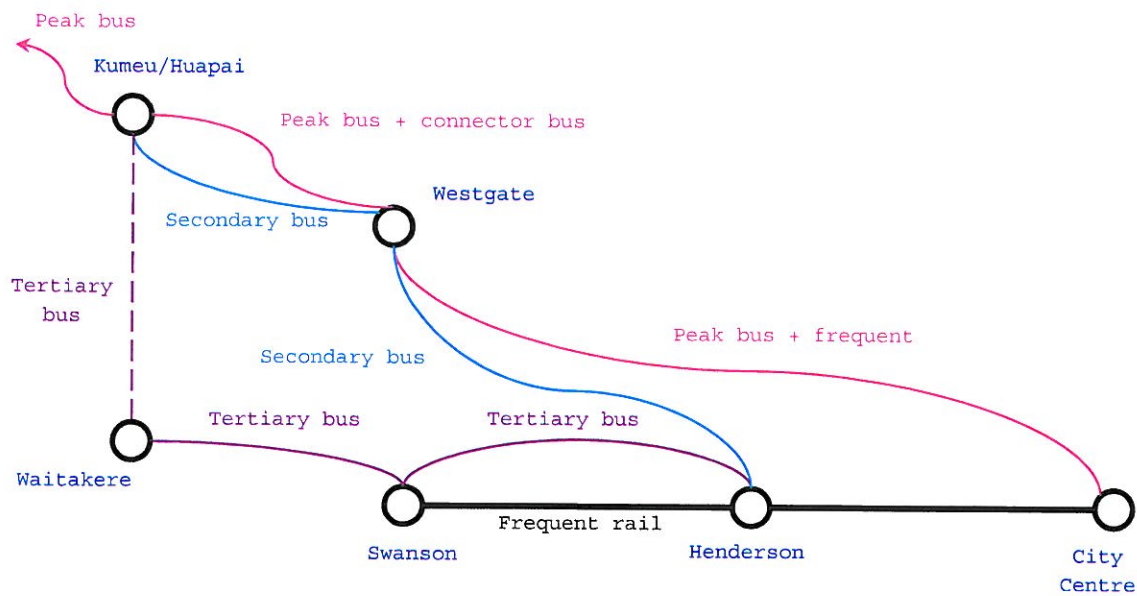
From this analysis we conclude that the public transport connection not met by the Base network is between Huapai and either Waitakere or Swanson. It is this connection that the alternative options attempt to address, as discussed in the following sections.

## 2.2 Option 1 - Extended Bus Services

The first option is to expand on the bus services to provide the additional connections. The most logical way to provide the connection between Huapai, Waitakere, and Swanson is to extend the tertiary service that currently terminates at Waitakere to instead terminate in Huapai, as illustrated in the figure below.

This provides a direct connection between Huapai, Waitakere, Swanson, and onto Henderson, while all other public transport services (secondary and peak routes) remain the same, except that the tertiary rail shuttle between Swanson and Waitakere is now redundant and has subsequently been dropped.

Figure 8: Option 1 - Extended bus services

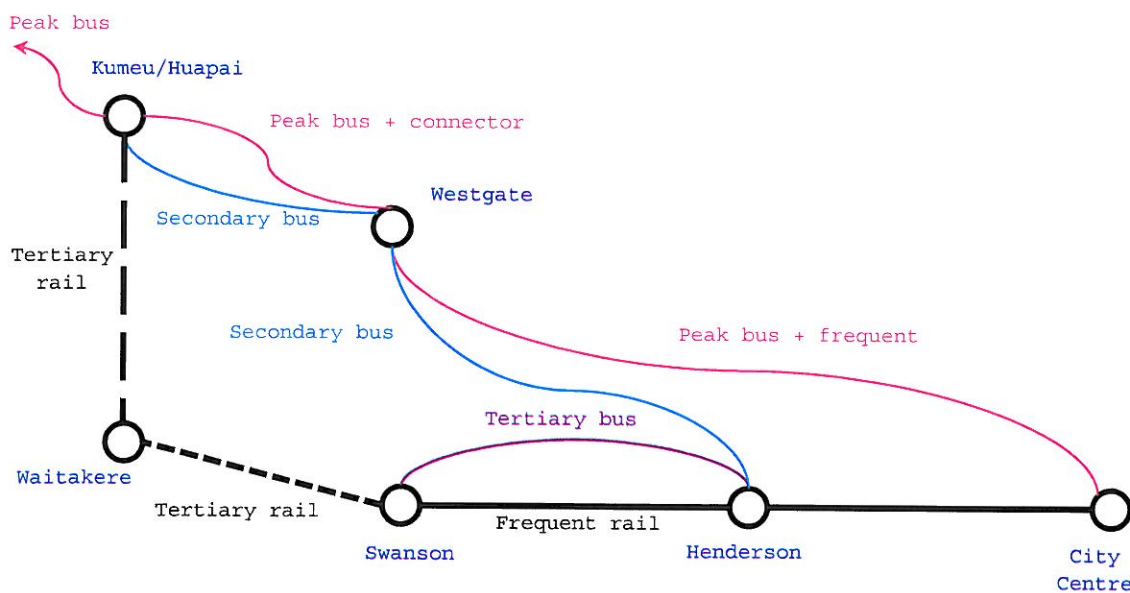


We have assumed that the tertiary bus service between Kumeu/Huapai, Waitakere, Swanson, and Henderson operates every 30 minutes in peak periods and 60 minutes in off-peak periods and on weekends respectively.

### 2.3 Option 2 - Extended Rail Shuttle

The second option is to extend the rail shuttle from Waitakere Station to Kumeu/Huapai, as illustrated below. The shuttle could operate at either 60 or 30 minute intervals.

Figure 9: Option 2 - Extended Rail Service



Option 2 thus provides only a direct connection from Huapai to Waitakere and Swanson, although passengers travelling to destinations on the rail network further to the east would have to transfer at Swanson. We note,

however, that it is unlikely that such a shuttle service would attract many passengers travelling between Huapai and the City Centre, because buses have such a large the travel-time advantage compared to the rail network for these journeys (which would take approximately 30-40 minutes by bus, compared to 1-1.5 hours by train).

We have assumed that a 30-minute rail frequency operates in peak periods, with hourly frequencies operated in off-peak periods and on weekends. These frequencies are the same as assumed in Option 1.

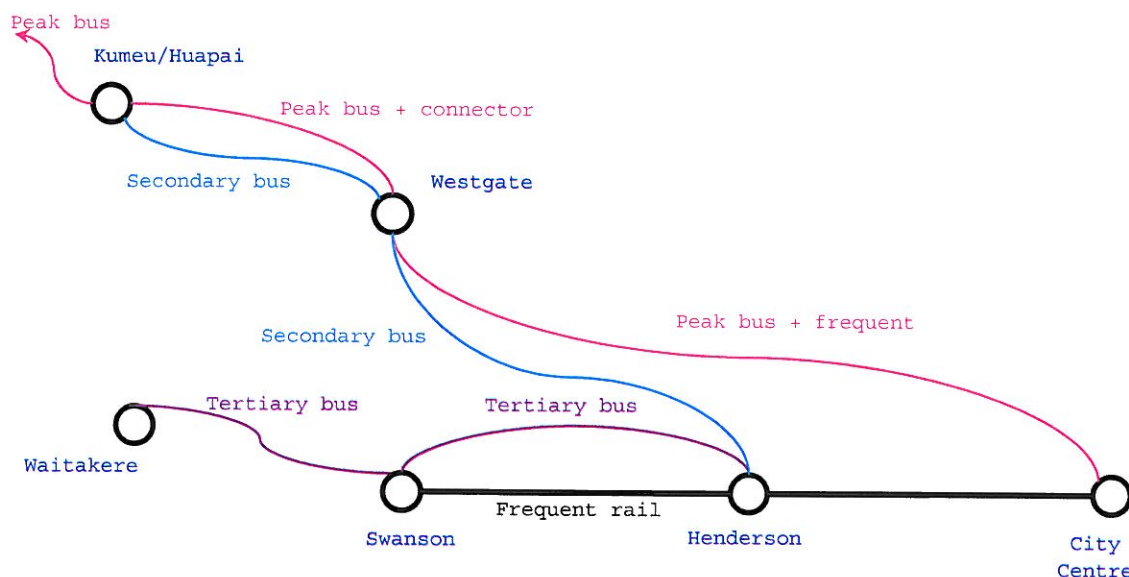
## 2.4 Option 3 - Bus from Swanson to Waitakere only

There is currently tertiary rail between Waitakere and Swanson so an additional option was developed to answer the following questions:

- Will there be cost savings of retaining the tertiary rail as per the Base Option?
- How many passengers currently utilise the Waitakere Train Station?

To answer these questions, we developed the following variation of the Option 1 where tertiary rail between Waitakere and Swanson is replaced with a tertiary bus service as presented in the following figure:

Figure 10: Option 3 - Extended bus services with Waitakere to Swanson Tertiary Bus only



We have assumed that the tertiary bus service between Waitakere, Swanson, and Henderson operates every 30 minutes in peak periods and 60 minutes in off-peak periods and on weekends respectively.

## 3. Cost Estimates

In this section we present the capital and operating cost estimates for each option. A discounted cash flow model is used to reconcile differences in timing of capital and operating costs, in which we have assumed a 25 year project life and 8% discount rate.

### 3.1 Base Scenario

Rail costs incurred in the Base scenario are summarised in the following table. Estimates of rail capital costs were sourced from KiwiRail, whereas estimates of operating costs and rolling stock refurbishment were sourced from Auckland Transport.

Description	Cost
Swanson Station upgrade <sup>1</sup>	\$1,399,460
Waitakere Station upgrade	\$1,727,880
Swanson - Waitakere operating costs <sup>2</sup>	\$1,571,170 p.a.
Rolling stock refurbishment <sup>3</sup>	\$2,833,000

The total annual bus resource requirements associated with the Base Scenario were estimated as per the following table.

Figure 11: Annual bus resource requirements for Base Scenario

Route	Hours	Km	PVR	Cost
Swanson to Henderson (Tertiary)	5,734	83,258	2	\$429,866
Huapai to Westgate (Secondary)	8,528	173,971	2	\$681,142
Huapai to City (Peak)	4,500	87,300	3	\$467,100
Helensville to City (Peak)	3,000	103,500	2	\$402,000
<i>Total annual operating costs</i>	<i>26,746</i>	<i>497,800</i>	<i>10</i>	<i>\$1,980,108</i>

We estimated the total costs per route using the following unit cost rates:

- ↳ \$25 per in-service hour;
- ↳ \$2 per in-service kilometre; and
- ↳ \$60,000 per peak vehicle requirement (PVR).

Based on these resources inputs and cost assumptions we have estimated that the net present value (NPV) of Base scenario costs is estimated at \$46.9 million over 25 years.

<sup>1</sup> This excludes the cost of upgrading the park-and-ride, which we have assumed proceeds even in the "do nothing" scenario.

<sup>2</sup> We have assumed a 30 minute peak frequency with 60 minute frequencies in off-peak periods.

<sup>3</sup> We have assumed that the Waitakere to Swanson rail shuttle could be operated with only two x two-car sets.

### 3.2 Option 1 – Extended Bus Services

The primary changes in Option 1 involve the extension of the tertiary bus service from Swanson on to Waitakere and Kumeu/Huapai, which replaces the previous DMU shuttle service between Waitakere and Swanson.

The extension to the tertiary bus service adds approximately \$600,000 in annual bus operating costs, or a 25% increase over that estimated in the previous section for the Base scenario, whereas other costs remain the same, as summarised below.

Figure 12: Annual bus resource requirements for Option 1

Line	Hours	Km	PVR	Cost
Waitakere to Henderson	17,202	244,268	6	\$1,278,586
Huapai to Westgate	8,525	173,971	2	\$681,067
Huapai to City	4,500	87,300	3	\$467,100
Helensville to City	3,000	103,500	2	\$402,000
<i>Total</i>	<i>33,227</i>	<i>609,039</i>	<i>13</i>	<i>\$2,828,753</i>

The extension of the bus service is also likely to incur additional capital costs associated with forming new bus stops on the route between Waitakere and Huapai (where no bus service currently operates); these costs were estimated as per the following assumptions:

- ↘ 10km of additional route-km will be operated between Waitakere and Huapai;
- ↘ If a bus stop is required every 1km on average, then this equates to 10 additional stops; and
- ↘ If the up-front cost of forming a rural bus stop is estimated to be \$40,000, then this equates to an additional infrastructure cost of \$400,000.

We have also assumed ongoing infrastructure maintenance costs of 1% of the total upfront capital costs, which equates to an additional maintenance cost of \$4,000 per year.

The removal of the DMU shuttle service between Waitakere and Swanson was estimated to save approximately \$6.26 million in capital works and \$1.57 million per annum in operating costs.

Based on these assumptions the total NPV costs for Option 1 is estimated to be \$33.1 million over 25 years. This represents a saving of \$13.8 million compared to the Base scenario, or approximately 30% of the total costs expected to be incurred.

### 3.3 Option 2 – Extended Rail Shuttle

In Option 2 the key change is the extension of the Diesel shuttle from Waitakere to Huapai. KiwiRail and Auckland Transport supplied the following



estimates of the costs of operating a rail shuttle between Huapai and Swanson:

- ↳ **Capital costs** of \$4.25 million for rolling stock refurbishment (3 x two-car sets) and \$8.98 million for necessary works to stations, track, and signalling; and
- ↳ **Operating costs** of \$3.0 million per year, this provides for 30 and 60 minute peak and off peak frequencies respectively.

We assumed that the bus services provided in the Base scenario are retained in Option 2, which yields bus operating costs of \$1.98 million per annum. Using these assumptions we find that Option 2 has total NPV costs of \$70.7 million over 25 years, which is approximately \$23.8 million more than the Base Scenario and more than twice the costs of Option 1.

The comparative performance of the individual options is considered in more detail in the following section.

### 3.4 Option 3 - Waitakere to Swanson Tertiary Bus

The primary change in Option 3 involves replacing the DMU shuttle service between Waitakere and Swanson with a tertiary bus service.

The removal of the Waitakere to Huapai service reduces the annual bus operating costs by approximately \$560,000 or a 20% decrease over that estimated for Option 1, whereas other costs remain the same, as summarised below.

Figure 13: Annual bus resource requirements for Option 3

Line	Hours	Km	PVR	Cost
Waitakere to Henderson	10,718	133,029	3	\$714,008
Huapai to Westgate	8,528	173,971	2	\$681,142
Huapai to City	4,500	87,300	3	\$467,100
Helensville to City	3,000	103,500	2	\$402,000
<i>Total</i>	<i>26,746</i>	<i>497,800</i>	<i>10</i>	<i>\$2,264,250</i>

The removal of the DMU shuttle service between Waitakere and Swanson was estimated to save approximately \$6.26 million in capital works and \$1.57 million per annum in operating costs, as compared to the Base scenario.

Based on these assumptions the total NPV costs for Option 3 is estimated to be \$26.1 million over 25 years. This represents a saving of \$20.8 million compared to the Base scenario, or approximately 44% of the total costs expected to be incurred.

### 3.5 Summary of Costs

The following table summarises and compares the cost of each option:

Figure 14: Summary of cost estimates for each option

Option	Description	Cost (over 25 years)
Base	Tertiary rail between Waitakere and Swanson, no connection between Waitakere and Huapai	\$46.9 million
Option 1	Extended bus services to Huapai	\$33.1 million
Option 2	Extended rail services to Huapai	\$70.7 million
Option 3	Tertiary bus between Waitakere and Swanson, no connection between Waitakere and Huapai	\$26.1 million

## 4. Evaluating the Options

### 4.1 Travel-time Analysis

We conducted a travel-time analysis from Kumeu/Huapai under Option 1 and Option 2 presented in the previous section (the two options directly connecting Kumeu/Huapai to Waitakere). Such analyses are useful for understanding the potential for public transport to attract passengers. Results of this analysis are summarised in the following table, where we have also presented the travel-time for cars (according to Google Maps).

Figure 15: Travel-time analysis between Kumeu-Huapai and other key destinations (minutes)

Mode	Waitakere	Swanson	Henderson
Private vehicle	10	15	15 <sup>4</sup>
Option 1 - Bus	12	19	34
Option 2 - Rail	12	17	31

Assumptions:

- ▼ Option 1 - Bus:
  - Kumeu/Huapai to Waitakere average speed of 60 km/hr
  - Waitakere to Swanson average speed of 35 km/hr
  - Swanson to Henderson average speed of 30 km/hr
- ▼ Option 2 - Rail:
  - Kumeu-Huapai and Waitakere running-times estimated by Auckland Transport
  - Waitakere to Swanson running times estimated based on current timetable
  - At Swanson 5 minutes is required for connection, plus 9 minutes running-time to Henderson.

This analysis suggests that the rail shuttle option is approximately 2 minutes faster between Waitakere and Swanson and 3 minutes faster between Swanson and Henderson. Both options are approximately 20% slower than travelling by car between Kumeu and Swanson, and more than twice as long when travelling to Henderson (primarily because of the direct route available via SH16 and Lincoln Road).

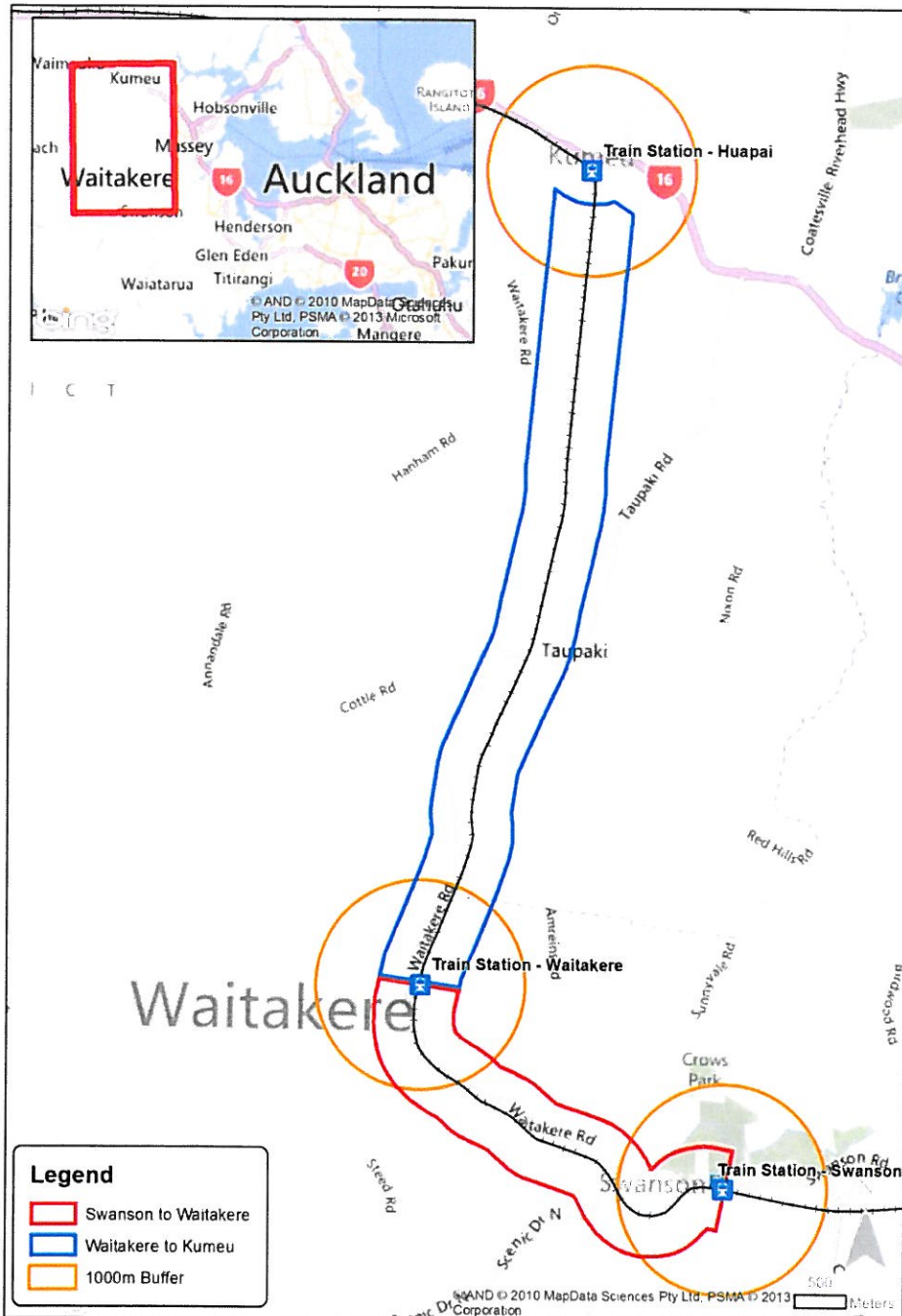
### 4.2 Demand and Catchment Analysis

We assessed the population catchments for the Swanson to Waitakere to provide an indication of the potential patronage or number of people which

<sup>4</sup> The fastest route when travelling by vehicle from Kumeu to Henderson is via SH16 and Lincoln Road.

may be affected. To do this, we created a 400m buffer along the proposed bus routes and assessed the population (2011 Statistics New Zealand mesh blocks) within this buffer. We also looked at the population within a 1km buffer from the Swanson train station. This is illustrated in the following image.

Figure 16: Population Catchment Analysis



Note that the 400m buffer stops short of State Highway 16 as it is assumed this catchment will be served by the peak and off-peak bus services travelling along the state highway.

The following table summarises the results of the population catchment analysis.

Figure 17: Results of Catchment Analysis

Catchment Area	Buffer	Population Catchment
Between Waitakere to Swanson	400m	903
Between Huapai to Waitakere	400m	507
Surrounding Waitakere Train Station	1,000m	624
Surrounding Swanson Train Station	1,000m	962
Surrounding Huapai Train Station	1,000m	317

The population catchment analysis indicates that Huapai to Waitakere segment has a catchment which is only about 56% of the Waitakere to Swanson segment. This analysis has also identified that only 624 people are living within walking distance (1km) from the Waitakere Train Station. Huapai Train Station has a population catchment which would be a third of the Swanson train station catchment.

This significant difference in train station walk-up catchment between Waitakere and Swanson is generally consistent with the 2012 AT Rail Station surveys which show the Swanson Train Station having almost three times more AM peak boardings than Waitakere Train Station. Whilst the higher frequencies available at Swanson are a key factor, the 'local' demand is also important. This is presented in the following table:

Station	2012 AM Peak Boarding
Waitakere Train Station	65
Swanson Train Station	187

#### 4.2.1 Summary of costs and catchments

The following table shows the Swanson to Waitakere catchments for each option together with the respective costs. This shows that Option 1 has a higher option population catchment than all other options. Option 2 and Option 3 have similar population catchments despite Option 2 costing almost three times as much. Option 3 has approximately 50% greater population catchment than the Base scenario while costing \$21 million less.

Figure 18: Cost and population catchment by option

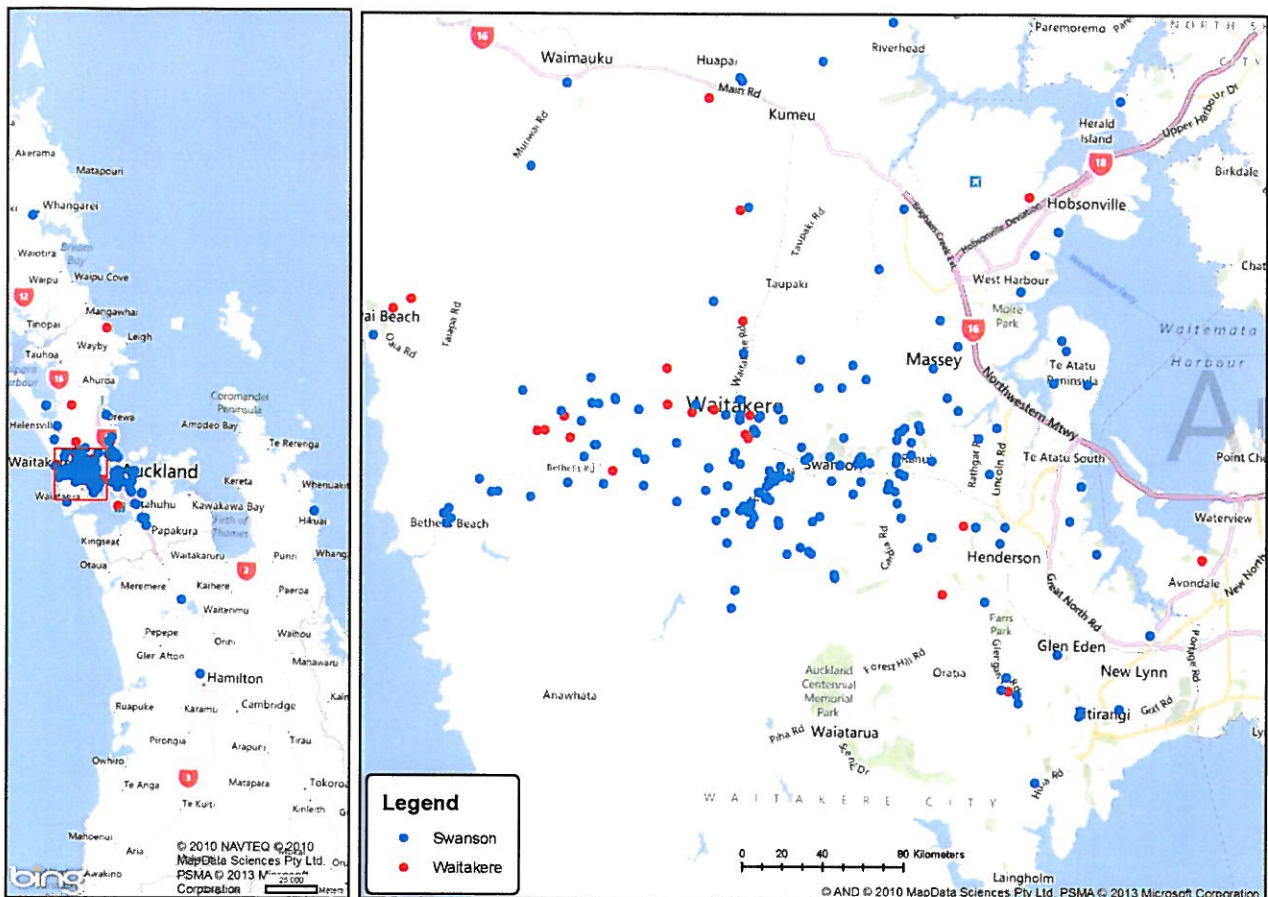
Option	Description	Cost (over 25 years)	Population Catchment
Base	Tertiary rail between Waitakere and Swanson, no connection between Waitakere and Huapai	\$46.9 million	624
Option 1	Extended bus services to Huapai	\$33.1 million	1410
Option 2	Extended rail services to Huapai	\$70.7 million	941
Option 3	Tertiary bus between Waitakere and Swanson, no connection between Waitakere and Huapai	\$26.1 million	903

### 4.3 Park-and-Ride Surveys

Option 3 proposes to remove the tertiary rail connection between Swanson and Waitakere. To investigate the impact of this on patrons currently utilising the Waitakere Train Station, we undertook parking surveys at both the Waitakere and Swanson Train Stations from 9am to 12pm on Monday to Friday. In this survey, the license plates of vehicles parked in the park-and-ride were recorded. The registered addresses associated with each license plate were mapped to develop an understanding of where people were driving from to use the park-and-ride.

The results are summarised in Figure 19 below. This shows both station park-and-rides have a very similar distribution, that is, currently people are travelling from similar locations to the Waitakere and Swanson park-and-rides. We note that the registered address of a vehicle may not be where the vehicle trip originated from but it still provides a strong indication that users of the Waitakere park-and-ride will have a viable alternative of using the Swanson park-and-ride. Given the proposed expansion of the Swanson park-and-ride and the increase in service as a result of electrification, it is our opinion that Swanson train station would be a more attractive alternative for patrons currently utilising Waitakere.

Figure 19: Registered addresses of vehicles at park-and-ride



#### 4.4 Broader Strategic Considerations

There are several broader strategic considerations that are of relevance to this study. First, we note that Auckland Transport is advancing plans to improve park-and-ride facilities at Swanson and Westgate. Indeed, appropriately located and managed (i.e. priced) park-and-ride is well-suited to the low-density development patterns that prevail in this part of Auckland. In our professional opinion, park-and-ride is likely to be a more cost-effective way to extend public transport to Waitakere and Kumeu/Huapai.

Second, we note several other possible expansions to the rail network are currently being considered by Auckland Transport, namely:

- Double-tracking the Manukau Connection to the NIMT;
- Electrification extended south from Papakura to Pukekohe; and
- Completing unfunded station upgrades, such as Pukekohe.

As far as we know these projects are currently unfunded. In our opinion the above projects represent a more worthy use of funds than either the Base scenario, Option 1 or Option 2. Indeed, the cost savings associated with Option 3 (\$27.1 million compared with the Base) would go a long way towards helping to fund these other projects. Moreover, were Option 3 implemented

and electrification was also extended to Pukekohe, then Auckland Transport would be in the rather envious position of being able to operate an entirely consistent fleet of EMUs. Achieving such a position would have much wider operational efficiencies for Auckland's rail network, which could in turn be reinvested into providing additional service elsewhere on the network.

## 4.5 Qualitative Benefit Cost Analysis

We suggest Option 3 (i.e. bus services from Waitakere to Swanson) is the preferred option because it:

- ↳ Provides a direct service between Waitakere, Swanson, and Henderson.
- ↳ Saves \$21 million compared to the Base scenario, \$7 million compared with Option 1, and \$44 million compared to Option 2.

Option 2 is considerably more expensive than Option 3, with costs of approximately \$70 million over 25 years. We suggest that these costs are extremely high given the relatively low-density catchments being served. Moreover, Option 2 will require all rail passengers to transfer to EMUs at Swanson, whereas Option 3 provides a direct connection right through to Henderson. The primary advantage of Option 2 is that rail offers slightly faster travel-times between stations, although this advantage is small given the relatively uncongested road environments.

Option 1 will cost \$7 million more than Option 3 to provide a tertiary bus service between Swanson and Waitakere. Given the low-density catchments in this area and the peak bus services available to Westgate from Kumeu/Huapai, we do not think this additional investment in a tertiary bus service is justified at this stage. However, we recognise that this may become a viable option in the future.

Looking forward, proposed improvements to the public transport network, including park-and-ride at Westgate and Swanson, as well as improved bus services, are likely to reduce the relative attractiveness of Waitakere Station even further than its current level (where it only carries 200 passengers per day). As such, the impacts of truncating rail services at Swanson, as proposed in Option 1 and Option 3, are likely to be relatively small. Affected passengers can readily switch to the expanded bus services and/or park-and-rides.

In selecting Option 3 Auckland Transport will have also freed up considerable financial resources to potential fund capital and operational improvements that have been proposed elsewhere on the network, such as electrification to Pukekohe, which are in turn likely to deliver considerably greater benefits than would accrue from the provision of a DMU rail shuttle to Waitakere or beyond.



# 5. Conclusions and Recommendations

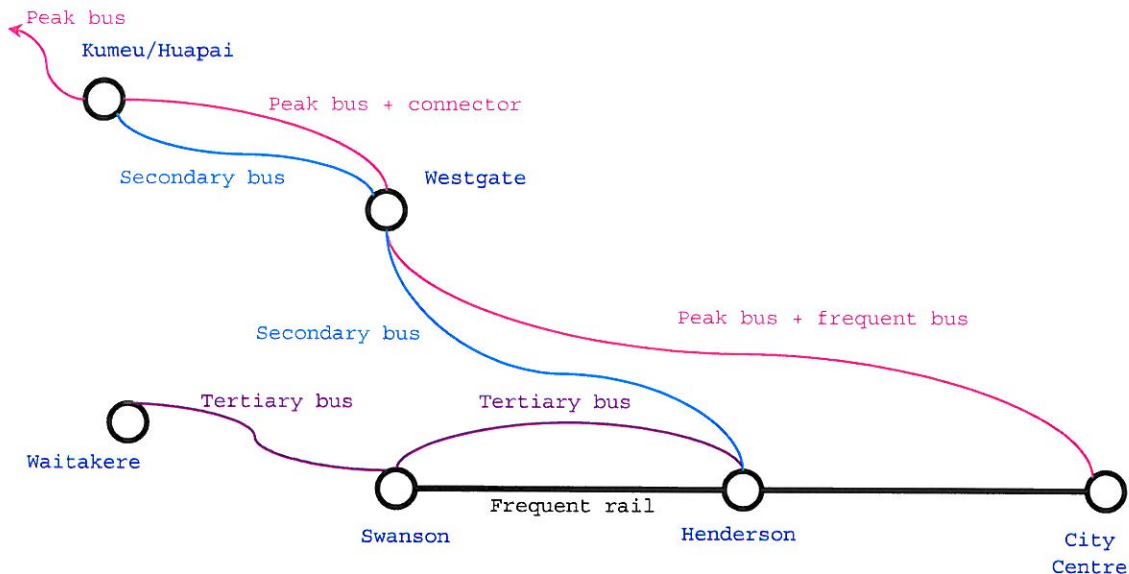
## 5.1 Conclusions

Based on this analysis we conclude:

- ↳ The Base public transport option presented in the PTDP will cost approximately \$47 million over 25 years. We have also considered three alternatives, namely:
  - Option 1 provides expanded bus services between Huapai and Waitakere and onto Swanson and Henderson. This option would be expected to cost \$33 million over 25 years;
  - Option 2 provides an additional DMU rail shuttle between Huapai and Waitakere. This option costs \$70 million over 25 years; and
  - Option 3 provides expanded bus services between Waitakere and Swanson and onto Henderson without services between Waitakere and Huapai. This option would be expected to cost \$26 million over 25 years;
- ↳ Option 3 is preferred because it:
  - Provides a direct service between Waitakere, Swanson, and Henderson.
  - Saves \$21 million compared to the Base scenario, \$7 million compared to Option 1, and \$44 million compared to Option 2.

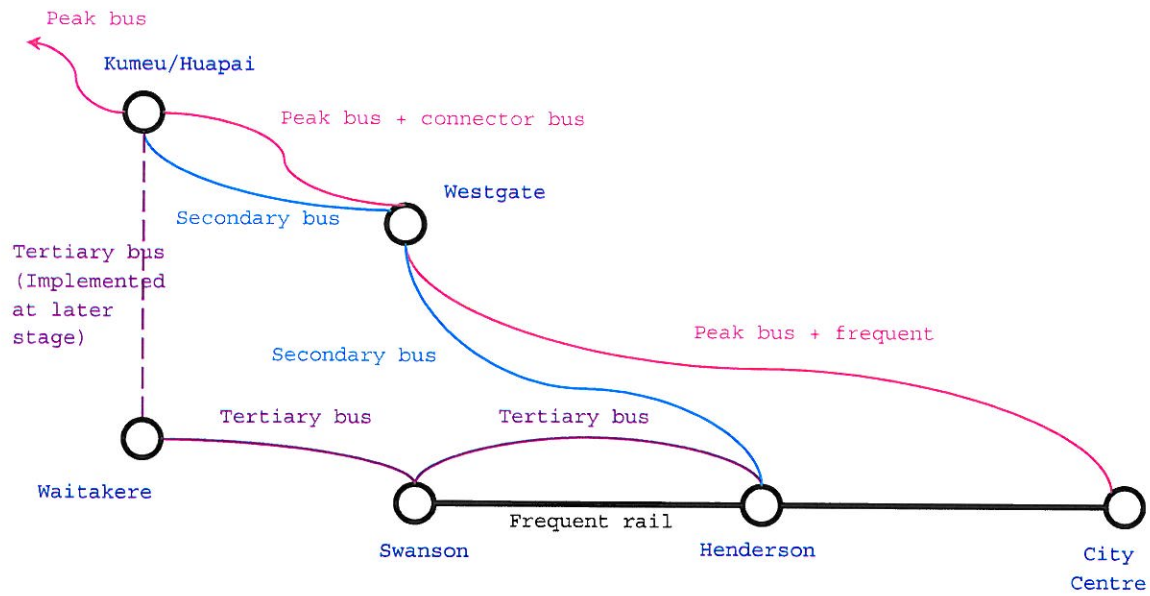
## 5.2 Recommendations

On this basis, we recommend that Auckland Transport initially implement Option 3, bus services from Swanson to Waitakere, as illustrated in the figure below.



While terminating rail services at Swanson will require passengers currently using rail from Waitakere to travel via alternative means, proposed expansions in bus services and park in ride (at Swanson and Westgate) should offer an attractive alternative. Indeed, the trend towards declining rail patronage at Waitakere suggests that existing passengers are already making this choice voluntarily. In our professional opinion the cost savings associated with truncating rail services at Swanson can be redeployed to better effect by funding other improvements elsewhere on Auckland's rail network.

Given the low-density catchments between Kumeu/Huapai and Waitakere, we feel that the infrastructural investment and operational costs associated with running services from Waitakere to Huapai is not justified at this stage. Should the expected demand for bus services increase significantly over time, then AT may wish to re-investigate extending a tertiary bus service between Waitakere and Kumeu/Huapai as shown below.



We do not recommend that rail services be extended from Swanson to Waitakere or Kumeu/Huapai, given the low catchments, declining rail patronage at Waitakere and the high costs associated with maintaining the existing tertiary rail line.