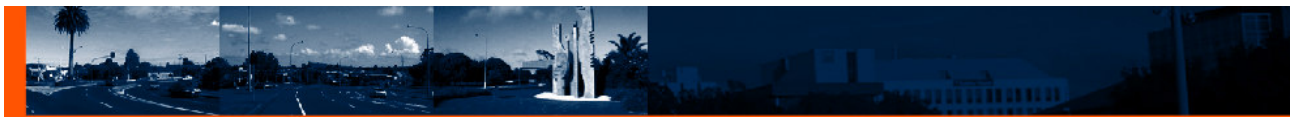

Te Kaunihera o
MANUKAU
City Council

Final

February 2006

Southern Sector Strategic Transport Study

Opus International Consultants Limited
Level 3, The Westhaven
100 Beaumont Street
PO Box 5848
Auckland, New Zealand
Telephone :+64 9 355 9500
Facsimile :+64 9 355 9580
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4	22/02/06	All	S McInnes	Final Report

Table of Contents

Figures

Tables

1 Executive Summary

This report sets out the basis for the development of a strategy for the transport networks in Auckland's Southern Sector, to accommodate the growth which is predicted to occur in the area.

1.1 Development in the Southern Sector

The manner of growth is set out in the Regional Growth Strategy and the Southern Sector Agreement. It is predicted that the southern sector will need to accommodate 52,000 more residents in Papakura by 2050, 178,000 more in Manukau and 43,000 more in Franklin. This gives a total population in 2050 of 601,000, compared with a current figure of 328,000. The intention is that the majority of growth takes place in growth centres, in order to reduce the extent of urban sprawl. Major growth nodes will include Papakura, Takanini, Flatbush, Pukekohe and Hingaia.

1.2 Context of Study

In general the Southern Sector Strategic Transport Study is a high level concept study designed primarily to outline possible "future transport schemes" that merit further more detailed investigation. The study has been undertaken with key consideration to the various tools and policies operating today at both a regional and national level, some of which are fairly new to the national and local planning scene. At a national level, all transport related projects need to consider the guidance and direction given by the:

- New Zealand Transport Strategy; and the
- Land Transport Management Act.

At a regional and more local level the study has been undertaken within the framework provided by the:

- Regional Growth Strategy;
- Regional Land Transport Strategy;
- Southern Sector Agreement;
- Other relevant local strategy documents, eg Manukau Cycling and Walking Strategy, Papakura Draft Walking and Cycling Strategy; and
- All appropriate District Plans.

In particular, the study is intended to identify the strategic transport network development implications of the land use development pattern envisaged for the southern part of the Auckland Region as detailed in the Southern Sector Agreement signed by the Auckland Regional Council, Franklin and Papakura District Councils and Manukau City Council. Consideration of alternative land use distributions, or possible land uses beyond the 2021 planning horizon of the Southern Sector Agreement, were outside the scope and resources of this study.

1.3 "Gap Analysis"

The report has noted the committed investments in the transport networks and the various proposals that have been or are being considered but not committed. A previous "scoping" report, prepared as part of this study, set out the existing and future travel patterns in the study area.

A future traffic model has been developed for the year 2021 in order to establish the likely deficiencies in the road network. These include:

- The Southern Motorway, both in terms of the number of lanes from north of Takanini to Drury and the pressure on a number of interchanges;
- The lack of a strategic alternative to the Southern Motorway and the low number of north south routes;
- Conflicts along Great South Road, where it seeks to provide a strategic north-south route, while at the same time passing through a number of growth centres. In these centres balance needs to be considered with regard to the needs of pedestrian/cycle activity, and to the needs of traffic (especially buses) serving the rail stations;
- A lack of arterial capacity serving key growth centres, such as Takanini.

It is difficult to accurately set out gaps in the future passenger transport network, as the level of bus services in particular will only be determined closer to the time when additional services are required. Furthermore, there are a number of ongoing studies which will address the provision of passenger transport services at a strategic level, namely:

- The Regional Passenger Transport Network Plan, a study which is being undertaken for Auckland Regional Transport Authority (ARTA); and
- The Rapid Transit Study, being undertaken for the Auckland Regional Council (ARC).

However, the study area would appear to be poorly served by passenger transport services, based on our understanding of future services identified to date:

- There is scope to improve north-south services between Papakura to East Tamaki and Botany Downs (ie along a route to the east of the Southern Motorway and Great South Road);
- The services proposed between the employment zone around the Airport and Manukau CBD are at this stage quite limited;
- There is as yet no commitment to the suggested services between Manukau CBD and Flatbush, nor to the bus lanes shown in the “high” passenger transport scenario, along Chapel Road;
- Although currently a lifestyle block with low population densities, Hingaia is a future growth area which appears to be poorly served by passenger transport;
- Passenger transport in Franklin is centred around Pukekohe, however, this future growth area is not currently well served by passenger transport services; and
- Local feeder bus services.

1.4 Identification of Schemes to be Evaluated

The study has therefore considered and reported on the following proposals:

- Improvements to the Southern Motorway, to provide additional lanes;
- Extra interchanges/interchange upgrades along the Southern Motorway, in order to provide relief to a number of existing interchanges or to redistribute traffic;
- Four laning of SH22, between Drury and Pukekohe;
- Upgrading of the status of Mill Road (Drury/Papakura to Flat Bush/Manukau), to provide an alternative north-south route to reduce pressure on the Southern Motorway and Great South Road. This route will also serve the growth area at Takanini;

- The provision of a link between State Highway 20 at Wiri and State Highway 22 at Karaka by way of a bridge linking Karaka and Weymouth (southern tip of Manukau) and Karaka (northern tip of Franklin), to reduce pressure on SH22 and the Southern Motorway. This could be an alternative to the option to upgrade SH22.

The report has also identified a number of issues to be addressed in the Southern Sector which have not been fully considered by this study, as follows:

- **Additional rapid transit links.** The examination of bus services for additional rapid transit links should be limited as ARTA needs to guide direction of the studies;
- **The implications of the implementation of the draft rail business plan.** As noted above, extensions of rapid transit are to be considered by other studies. However, the following issues are of relevance to this study:
  - Location of park and ride facilities;
  - Issues relating to grade separation at level crossings[1]; and
  - Issues relating to electrification.
- There is a need for an integrated bus network.
- **Gaps in bus networks.** These have not been examined in detail in the report as issues are likely to be resolved as they arise. However, the potential for each of the various road links to be evaluated to be incorporated within the future bus network have been considered.
- **Pedestrian and Cycle Issues.** This is a strategic study, and pedestrian and cycle links will generally form "local" connections will be accommodated principally through TLA walking/cycling strategies. However, the following issues are of relevance to this study:
  - A significant proportion of movements are short distance trips, which have the potential to be made on foot or by cycle;
  - Walking/cycling should be encouraged by land use/ transportation integration, and pedestrian/cycle needs should be at the forefront of future infrastructure planning; and
  - The needs of pedestrians and cyclists are an important consideration within growth centres.
- The report has noted that the Southern Sector is currently over-dependant on the Southern Motorway. This will be eased north of Manukau by the southern extension of SH20, and to a certain extent either the Mill Road link or the Weymouth to Karaka Link.

  However, the concept of a long term need to provide a "proper" alternative to the Southern Motorway, maybe linking into SH2 toward Maungatawhiri, or SH1 south of Bombay, has been raised during the course of this study. This has been suggested primarily for the strategic reason of providing "network resilience", to reduce the impact of apparently minor incidents on the accessibility between the Auckland and Waikato regions, rather than to accommodate the predicted travel demands. It has been agreed with the project group that this is an issue that is beyond the scope of this study.

[1] Reference Pakuranga Transportation Study and Level Crossing Study currently being prepared by Opus

1.5 Evaluation of Schemes

The study has evaluated a number of variants around three "packages" of schemes in the Southern Sector. Some of the projects within each of these packages have been tested in conjunction with projects within other packages. This has been undertaken in order to determine the relative impact of, and need for, implementing a project as well as, rather than instead of, another project.

It is noted that the evaluation process was based on the principles of the Land Transport Management Act, in addition to the guidance and direction of the Regional Growth Strategy.

1.6 Evaluation Criteria

The table below sets out the criteria used within this study to assess the merits of each proposal against the principles and objectives of the Land Transport Management Act.

Objective	Performance Indicator
Assisting economic development	Accessibility to employment opportunities Accessibility to, between and within key economic and knowledge centres General accessibility Reliability and transport network resilience
Assisting safety and personal security	Accidents, injuries and deaths Actual and perceived levels of security Affect on vulnerable users
Improving access and mobility	Connectivity Availability of travel choices to key destinations General accessibility Impact on those without access to a car Share of trips by public transport Consideration of people with disabilities
Protecting and promoting public health	Share of trips by active modes: walking; cycling Emissions to air and water Noise and vibration
Ensuring environmental sustainability	Emissions to air, water and land Use of non-renewable resources Impact on heritage, cultural, visual, landscape and ecological sites Energy efficiency and greenhouse gas emissions Community severance

Objective	Performance Indicator
Supporting the Growth Strategy	Relative accessibility to, within and between key RGS growth centres Community coherence Level of fixed PT as pre condition for centre growth
Cost effectiveness	Affordability Benefit/cost analysis

1.7 Options Evaluated

Option 1 – Upgrading the Southern Motorway: Comprises widening of the Southern Motorway, such that three lanes are provided per direction as far south as Drury. In addition, new or upgraded interchanges have been considered along the Motorway at Alfriston Road, Papakura, Park Estate Road, Drury and Quarry Road, along with four laning of SH22 between Drury and Pukekohe.

The study has concluded that this package of works will offer significant benefits in terms of travel time savings and therefore economic efficiencies. The adverse effects of the investment are fairly modest, in that they generally concentrate the effects along the Motorway corridor which is already subject to the effects of traffic.

This option is relatively simple and a significant amount of investigations has already been undertaken. This scheme could be implemented relatively quicker than other options and is also included in Transit's 10 year plan.

Option 2 – Eastern Link Options: Comprises improvements to Mill Road between Flat Bush and Papakura and south to Drury. This scheme was devised as a route which would serve an important north-south role, linking a number of the growth centres (Papakura, Takanini and through to Manukau CBD, East Tamaki and Flatbush, and bypassing Manurewa).

The study has considered a number of variants for this option:

- Firstly it could operate as a fairly low speed route, with frontage access along its length, or a higher speed route with limited access, with existing properties served by service roads. The local effects of these two variants will be very different: a low speed route could "embrace" local land uses and the corridor could become an intensified area, which could become a major passenger transport route with suitable pedestrian/cycle activity along and across it. By comparison, an "expressway" type of road would allow quicker access between the major growth centres but it would sever land uses on either side and would be a predominantly car based solution;
- Secondly, this option could be considered as well as or instead of the Option 1 proposals to upgrade the Southern Motorway. However, the study has found that the Mill Road route offers fairly modest relief to the Southern Motorway, to the extent that both options are considered to be required;
- Thirdly, options for the southern termination of the scheme have been considered. It was initially assumed that the route would pass round Papakura and tie back into the Southern Motorway at Drury. However, a variant would be for the route to continue to a new interchange at Quarry Road, south of Drury.

The study has concluded that a Papakura/Drury to Flat Bush/Manukau link would perform an important role in the future, including for both commercial and PT. There is a need to undertake more detailed assessment of the transportation function and capacity requirements as well as route and alignment options.

Option 3 – Weymouth to Karaka: Comprises a route between SH20 at Wiri and SH22 at Karaka by way of a bridge linking Weymouth and Karaka. This scheme was devised as a route which could reduce pressure on SH22, Karaka Road and the Southern Motorway between Drury and Manukau.

The analysis indicates that the route would offer significant accessibility benefits between Franklin and Manukau. It would reduce flows along SH1 and parts of SH22 and would therefore offer significant benefits, particularly if the Southern Motorway is not upgraded. However the traffic assessment indicates that the scheme would not be sufficient to obviate the need for widening of sections of the Southern Motorway. Furthermore, it is noted that the scheme would have significant environmental effects, particularly on the Weymouth community within Manukau City, the crossing of the Papakura Channel and on the rural area of Karaka. However, the provision of an upgraded Southern Motorway will in turn reduce the need for a Weymouth – Karaka Link.

Recognising that the scope of this study is to provide a transportation strategy to support the expected growth as set out in the Southern Sector Agreement, it has been noted that the implementation of the Weymouth – Karaka link is likely to place considerable pressure to urbanise the rural zoned land in Karaka. This is not consistent with the growth strategy, Local Government (Auckland) Amendment Act or Plan Change 6 to the Regional Policy Statement, and is not supported by the Southern Sector Agreement.

The Draft Strategy recommends that the level of protection for this route is kept at an appropriate level to not preclude its potential implementation and that the position with regard to its progression is reviewed in the context of any future land use planning changes should they occur.

The provision of a Weymouth – Karaka Link could therefore be considered to be a long term solution which could be pursued if changes are made to the growth strategy and land use planning strategies. We note that it is becoming more and more difficult to implement significant transport projects of this nature and there is, therefore, a need to protect long term solutions. However, in the absence of an identified need under current land use assumptions, it is the view of this study that the level of protection currently in place is likely to be sufficient, although this should be reviewed to ensure that the future option for this link is not compromised.

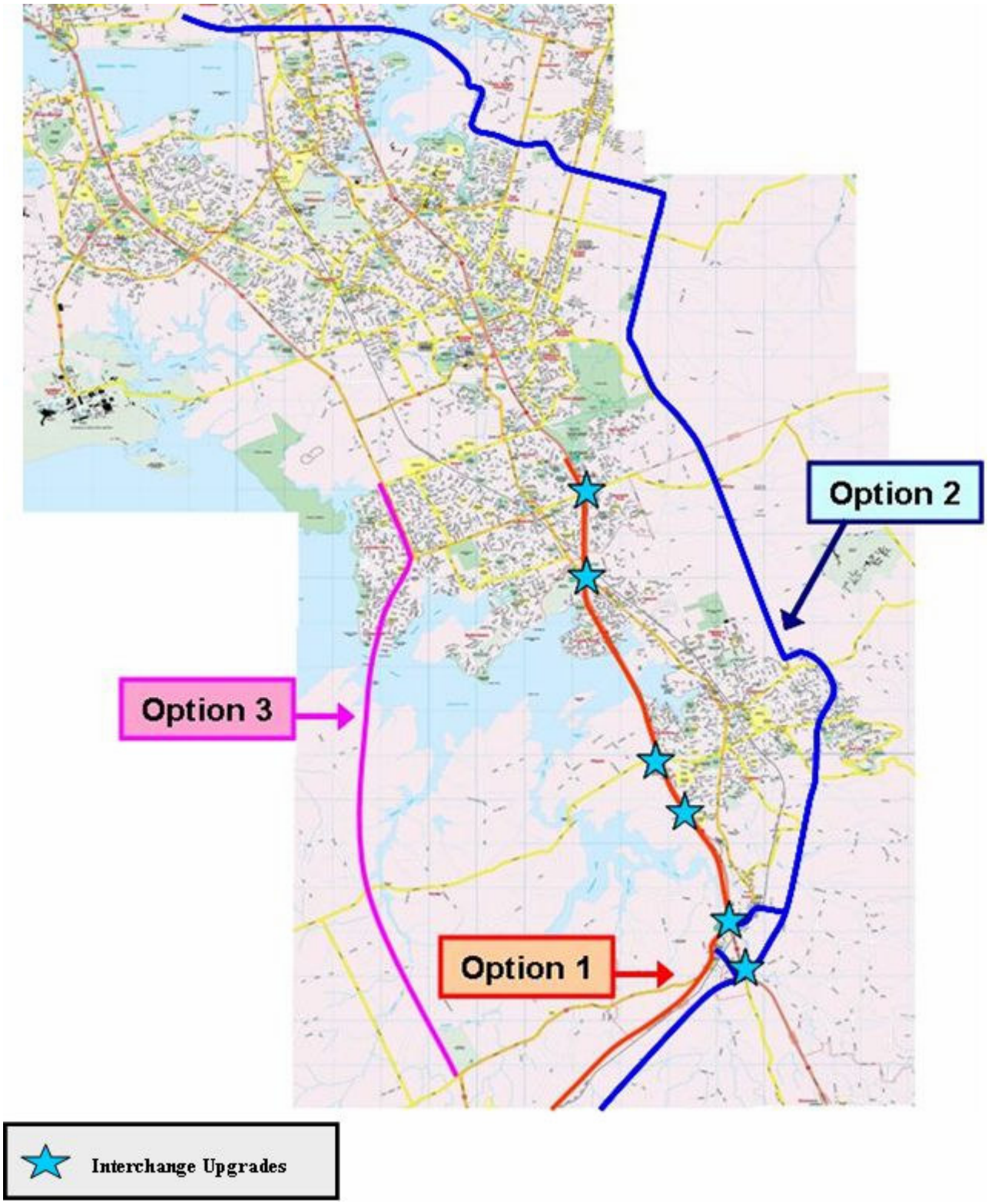


Figure 1-1 : Option Concepts

1.8 Conclusions for Transport Modes

The conclusions of the study are as follows:

1.8.1 Roads

- The traffic modelling indicates that the Southern Motorway will come under increased pressure and should be upgraded as a matter of priority. Widening to three lanes per direction will be required south from Manurewa, first to Takanini and as far as Drury by about 2021. Interchange upgrades should be pursued at Papakura and Drury, with possible additional interchanges at Alfriston Road and Quarry Road, with the latter influencing the need for an upgrade at Drury;

- The Mill Road route between Drury, Papakura and Manukau/Flatbush will need to be upgraded. The form of the upgrade should be examined further as part of a corridor study. This link is likely to be needed in addition to the above works proposed on the Southern Motorway. The link can be developed in a way which is supportive of passenger transport;

- The opportunity to implement the Weymouth – Karaka Link would provide a significant new regional link and improve network resilience but it should only be progressed if there are changes to current land use strategies. The need for the increased capacity will be deferred by the proposed upgrade of the Southern Motorway which will be needed within the short term.

- An upgrade of the SH22 route from Drury to Pukekohe is needed, either in the form of providing a new four lane route alongside the railway corridor, as previously proposed or by providing a link from any new motorway interchange at Quarry Road across to the railway corridor. The decision regarding the relative merits of these two broad options needs to be taken in the context of the conclusions of the suggested Mill Road corridor study, which will determine whether that route terminates at Drury or Quarry Road. Under current land use assumptions, the provision of such an improved SH22 route will defer the need for a Weymouth – Karaka route.

1.8.2 Passenger Transport

Rapid transit in the area currently consists only of the rail link as far as Papakura, although rail services to Pukekohe are provided on a limited frequency. The upgrade of this route should be progressed in accordance with the Draft Rail Business Plan. Additional rapid transit links need to be fully considered as follows:

- Extension of the rapid transit rail services to Drury and increased services to Pukekohe in tandem with growth in the area;
- Rapid transit between the Airport and Manukau CBD;
- Rapid transit between Flatbush and Manukau CBD.

A number of other passenger transport requirements have been noted, including:

- Hingaia to Papakura, and Papakura to Flatbush;
- Mill Road – one option variant is seen as a potential major passenger transport corridor;
- Great South Road – requires continual improvement and development as a pivotal passenger transport corridor, particularly in light of the potential it has to interact Mill Road;
- Future road developments within the region need to be protect passenger transport. Imposing Right of Ways on development is considered the most stringent means to employ, where appropriate.

1.8.3 Walking and Cycling

The report has stressed the importance of walking and cycling, especially within the growth nodes, and as an important mode for short-medium distance trips. This then dictates the need for careful design for through traffic in these areas, suggesting the need for complementary measures to manage the effects of through traffic within these growth centres.

The design of new transport corridors within the region, and the re-design of existing corridors, will seek to incorporate walking and cycling facilities, where practical, with due regard to enhancing the safety of these vulnerable users.

Manukau City Council will actively promote and implement walking and cycling facilities as identified in its adopted, Walking and Cycling Strategy (December 2004).

1.8.4 Travel Demand Management

The study has noted the various tools available to manage the demand for travel, rather than simply seek to accommodate the predicted demands which then become self-fulfilling. The most significant way this will occur in the Southern Sector will be by influencing the form of land use change, including a suitable emphasis on development within growth centres, and generally to ensure the suitable location of complementary land uses. Further measures to encourage use of passenger transport, walking and cycling by appropriate means will reduce the car dominated culture of the Southern Sector. The important role of travel planning initiatives is acknowledged.

1.9 Recommendations of the Study

As a result of the above conclusions, it is recommended that:

- ARTA and MCC, with the support of ARC, investigate and protect rapid transit links between Manukau CBD and Flatbush and between the Airport and Manukau CBD;
- ARC and ARTA and MCC, and ONTRACK with the support of ARC, continue to investigate and implement the proposed upgrade of the North Island Main Trunk Line, with improvements to rapid transit services and facilities (such as the Manukau Rail Link, station upgrades, Park and Ride bus interchange, and electrification). Extension of rapid transit services, initially to Drury and subsequently to Pukekohe, should be investigated;
- ARTA's Passenger Transport Network Plan should address the potential issues identified in the gap Analysis, in particular:
  - north-south services between Papakura to East Tamaki;
  - services between the employment zone around the Airport and Manukau CBD;
  - services between Manukau CBD and Flatbush;
  - future growth in Hingaia;
  - future growth in Pukekohe.
- New road corridors must, where practical, provide for passenger transport facilities. ARC, ARTA and MCC, in accordance with the Regional Land Transport Strategy, are required to continually develop passenger transport service levels and supporting infrastructure.

- Transit include proposals to upgrade the Southern Motorway in its next 10 year plan. These improvements would comprise an additional lane in each direction, starting with the section from south of Manurewa to Takanini and subsequently extending the six lane section to Drury. The following interchange proposals require full investigation:
  - Alfriston Road: new interchange
  - Papakura: interchange upgrade
  - Quarry Road: a possible new interchange at Quarry Road, at a suitable distance from the Drury interchange, or alternatively
  - Drury: interchange upgrade
- Transit recommence investigations into options to upgrade SH22, between Drury and Pukekohe. Options to be pursued should be those considered in the previous study, plus a possible new route from the proposed Quarry Road interchange (see above), as a southern extension of the Mill Road route (see below);
- Manukau City and Papakura District undertake a corridor study for a route from Flat Bush to Papakura, and possibly on to Drury (termed in this report the "Mill Road" route). This corridor study should acknowledge the advantages of a multi modal corridor which integrates well with land use;
- Manukau City, Auckland City and possibly Transit investigate the concept of an "Allens Road Link" between the Waiouru Peninsula and Mount Wellington Highway, with a possible extension to Neilson Street;
- Manukau City Council and Franklin District Council should examine the current level of protection for a future Karaka to Weymouth crossing to ensure that the opportunity to implement this link is not precluded, noting that this link does not support the Regional Growth Strategy and is inconsistent with the Local Government (Auckland) Amendment Act and Plan Change 6 to the Regional Policy Statement and will only be considered in the context of possible changes to current land use strategies;
- The territorial local authorities and Transit monitor land use developments, changes in travel demands and network conditions over time, to reconfirm that the above recommendations remain valid. In particular, it needs to be confirmed that the transport networks develop to support land use developments in a particular area;
- Emphasis continue to be placed on land use developments that minimise the need for travel and on the whole variety of travel demand management measures that encourage travel by modes other than the private car;
- The conclusions and recommendations of the study be revisited if any key assumptions in the report change.

2 Introduction

The Southern Sector Strategic Transport Study is a joint, collaborative project involving Franklin District Council, Papakura District Council, Manukau City Council, Transit New Zealand, Auckland Regional Transport Authority and the Auckland Regional Council.

Transport planning and implementation is undertaken by a number of agencies within the study area. It is important that a combined strategic view is developed for the transport future of the southern sector of the Auckland Region.

The Southern Sector Strategic Transport Study is intended to identify the strategic transport network development implications of the land use development pattern envisaged for the southern part of the Auckland Region as detailed in the Southern Sector Agreement signed by the Auckland Regional Council, Franklin and Papakura District Councils and Manukau City Council. This agreement is one component in a suite of methods to give effect to the Regional Growth Strategy. Consideration of alternative land use distributions, or possible land uses beyond the 2021 planning horizon of the Southern Sector Agreement, were outside the scope and resources of this study. To be credible, additional land use scenarios would need to be consistent with the Southern Sector Agreement, undertaken within an agreed regional framework, and would require skills and resources beyond those available to this study.

The study is also intended to identify future strategic transport projects in a framework consistent with the requirements of the Land Transport Management Act (LTMA). This will assist the progression of route planning or projects through further, more detailed planning and implementation phases.

This study has a strategic focus. One key output is the identification of priorities for future transport network development so that the multiple transport planning and implementation agencies can most efficiently plan and develop the transport network.

2.1 Scoping Report

The Southern Sector Scoping Report provided a summary of the main transportation issues facing the area. It started with a "situational analysis", setting out the existing situation in the study area. It then went on to identify future commitments to changes in the transport network, compared with the anticipated changes in travel demands that will result from the changes in the transport network, land use, and people's changes in travel patterns and behaviour. This then led to an assessment of the future needs of the area, and a preliminary consideration of the possible range of solutions to be considered by the study.

The study area for this project is shown at Figure 2-1. It covers an approximate east-west line from just north of the Manukau CBD, south to include that area of Franklin District that was formerly defined as part of the Auckland Region. This definition of the Auckland region was redefined under the legislation that established the Auckland Regional Transport Authority (ARTA), but it was agreed by the project control group that the study area for the project would remain as previously defined.

The Scoping Report highlighted where it is considered that further transportation improvements are required in the Southern Sector. It also identified key travel characteristics and demands, particularly from the southern area to points north. The Scoping Report made reference to the Regional Growth Strategy and highlighted future growth areas.

The report considered various possible transportation responses in terms of compliance with the New Zealand Transport Strategy and other legislative documents, and identified a variety of constraints. As a result, the following mix of measures were recommended to be taken forward and examined in the main report:

- New or improved road links are necessary in order to provide for the movement of persons, goods and services, particularly in order to serve areas of low density development, and to provide for essential trips, both inter and intra regional;

- New or improved passenger transport links are necessary to provide for efficient movement of persons between the areas of key, intensive developments;
- Walking and cycling should be maximised, particularly within the intensive growth nodes;
- Travel demand management measures have a significant role to play in the future of Auckland. At one level, the Southern Sector Agreement seeks to limit the need to travel by encouraging development within intensive nodes, while other measures may further affect the nature and form of travel demands.

Transport characteristics in intensified urban areas are fundamentally different to low density residential or commercial areas. Intensified nodes need high amenity pedestrian and cycling streets to encourage internal accessibility and passenger transport usage. Whether vehicular traffic in these nodes should be concentrated in bypasses or dispersed in local roads will be an important consideration in defining the strategy.

Conversely, rapid transit and even bus services struggle in low-density areas. The question is whether to maintain the current pattern of development or can some medium density residential and business corridors be developed around structured local bus services.

Land use and transport integration is an iterative process. The Southern Sector Strategic Transport Study needs to be cognizant of land use changes but, equally, if there are some compelling decisions for transport corridors, then the study should contain recommendations for supportive land use patterns. The railway lines are already established so the likely areas of investigation are bus rapid transit corridors.

The Scoping Report led to the identification of packages of options for improvements to the transport networks, which will be developed by Opus in this report. The effects of each of the identified packages of options will need to be assessed as part of the next phase of this study. The study will consider the costs, benefits and the effects of the options on the environment, community and the transportation effects. Further consideration will also be given of the extent to which each option meets the requirements of the Land Transport Management Act.

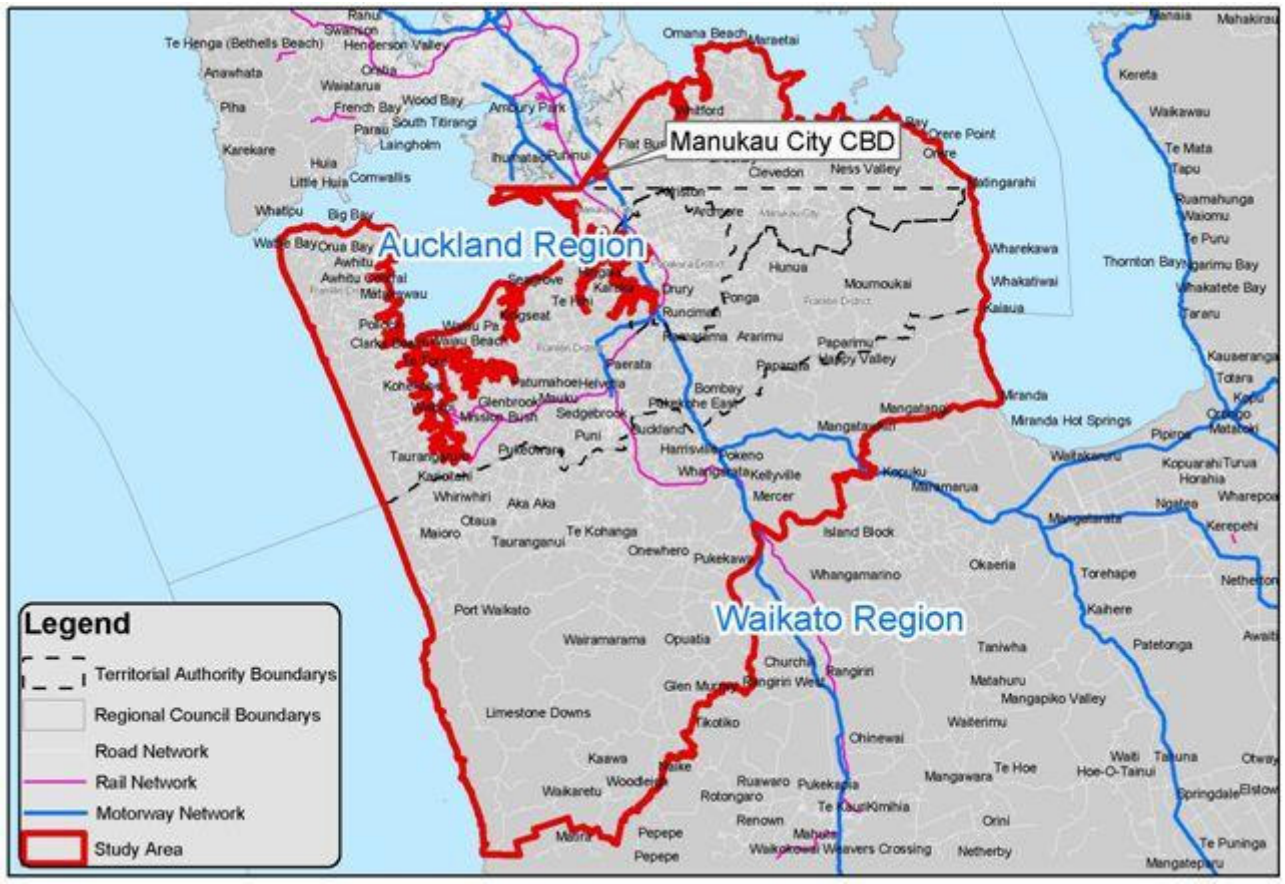


Figure 2-1 : Study Area

2.2 Scope of Main Report

This report is set out in the following structure:

- Examination of the current planning and legislative framework;
- Assessment of land use changes;
- Assessment of changes to transport networks and travel patterns;
- Other items relevant to the options and future transport provision;
- A "gap analysis";
- Transport options for the Southern Sector;
- A description of the option evaluation criteria;
- The option evaluation;
- Land use and public transport issues; and
- Some travel demand management considerations.

3 Planning and Legislative Background

3.1 Where does the Southern Sector Study Fit In?

In general the Southern Sector Strategic Transportation Study is a high level concept study designed primarily to identify "future transport schemes" that merit further more detailed investigation. The study has been undertaken with key consideration to the various tools and policies operating today at both a regional and national level, some of which are fairly new to the national and local planning scene. At a national level, all transport related projects need to consider the guidance and direction given by the:

- New Zealand Transport Strategy (2002); and the
- Land Transport Management Act (2003).

At a regional and more local level the study must be undertaken under the auspices of the:

- Auckland Regional Growth Strategy (1999);
- Regional Land Transport Strategy (2003);
- Southern Sector Agreement (2001);
- Other relevant local strategy documents, eg Manukau Cycling and Walking Strategy; and
- All appropriate District Plans.

3.1.1 The New Zealand Transport Strategy

The New Zealand Transport Strategy was published in December 2002. It stated the government's overall vision for transport and includes broader objectives of a healthy nation and economic, social, environmental and cultural sustainability. The vision states that "by 2010 New Zealand will have an affordable, integrated, safe, responsive and sustainable transport system."

The objectives for transport (and therefore key criteria in the option evaluation process for this study) are:

1 Assisting economic development;

2 Assisting safety and personal security;

3 Improving access and mobility;

4 Protecting and promoting public health; and

5 Ensuring environmental sustainability.

3.1.2 The Land Transport Management Act

The purpose of the Land Transport Management Act (LTMA) is to contribute to the aim of achieving an integrated, safe, responsive and sustainable land transport system. There are a number of elements to the Act where it contributes to that purpose. Two main elements are providing an integrated approach to land transport funding and management and improving social and environmental sustainability.

The body responsible for funding and promoting within schemes the objectives of the LTMA is Land Transport New Zealand (LTNZ). LTNZ is the new central government agency formed in December 2004 from the merger of Transfund New Zealand and the Land Transport Safety Authority as a result of the Land Transport Management Act.

As such LTNZ's objective is to contribute to an integrated, safe, responsive and sustainable land transport system. LTNZ is committed to the government's vision for transport, as set out in the New Zealand Transport Strategy.

3.1.3 Auckland Regional Land Transport Strategy Draft 2005

The Regional Land Transport Strategy (RLTS) is a statutory document that details the way forward for the region's transport for the next 10 years. The draft 2005 strategy outlines the requirements under the Land Transport Management Act 2003 for achieving an integrated, safe, responsive and sustainable land transport system.

The strategy also outlines plans for spending the additional funding for transport in the Auckland region raised from petrol tax in the Auckland Region and a contribution of $900M, from the consolidated fund. In total, $1.62B of additional funding is expected to be available over the 2005-2015 period.

The vision for the draft RLTS is Aucklanders being proud of their transport system, where:

- People and goods are able to move without delay;
- Transport supports vibrant town centres;
- Streets are important civic spaces;
- Getting around by all modes is integrated, safe and effective;
- People have choices which enable them to participate in society;
- The environment and human health and protected.

The RLTS outlines a comprehensive series of transport objectives, policies and methods to be actioned within the Auckland region to achieve these objectives.

The work undertaken to assist the development of the preferred strategy included development of a number of scenarios, termed low, medium and high investment, each for roads, passenger transport and travel demand management. The Regional Land Transport Committee's preferred strategy for transport investment included the high investment scenario for passenger transport, and medium investment in roads and travel demand management. The RLTS is currently in a consultation phase.

This strategy equates to a total investment of approximately $6.540 billion over the next 10 years on roading-related infrastructure and $10.68 billion allocated to passenger transport ($3.750 billion) and travel demand management measures ($420 million).

Public consultation on the strategy is currently being undertaken with expected decision on the strategy direction by September 2005.

3.1.4 Regional Growth Strategy

The anticipated growth for the Auckland region is set out in the Auckland Regional Growth Strategy (RGS), released in November 1999. The concept plan and further explanation is contained within the Scoping Report.

3.1.5 Southern Sector Agreement

As part of the implementation process of the Regional Growth Strategy, a number of "sector agreements" have been developed. The Southern Sector Agreement was signed by Manukau City, Papakura and Franklin District Councils, along with the Auckland Regional Council in March 2001 and it defines and agrees responsibilities for the area.

The Agreement identifies a need to accommodate an increase in population within the sector of 275,000 people by 2050. Some 44% of this growth is to be achieved through intensification of town centres and corridors in existing residential areas. This has been a key feature behind the transport option selection and evaluation process within this entire study.

3.2 The Southern Sector Transport Strategy

This strategy has to fit in with all of the above but schemes will often perform well because they meet general transport needs that may not necessarily mean they link or serve identified growth centres or other specific directives from documents such as the Regional Growth Strategy. Therefore schemes are also judged on whether they meet required transport outcomes and are fit for purpose.

This study has a long-term vision, in some cases arguably beyond current planning policy frameworks and beyond what could generically be termed as "current thinking." No one can predict at this time what the New Zealand Transport Strategy will be promoting in 2050. It may well be that the predicted (in some quarters) demise of fossil fuels, combined with greater technologies and home-working will significantly reduce travel demands and in 40 years time the car/public transport mode splits will be significantly more aligned to public transport use.

If this is the case, then road-building may not be as relevant then as it is now, and more of a focus will be given to providing alternatives to the private car on existing links. The truth of the matter is that no one knows and this study is not really about pre-guessing "the state of the world" in 2050, it is about identifying and evaluating current appropriate transport projects that will gain support and momentum in today's policy and legislative framework, whilst not dismissing those that could be applied in a more supportive policy environment in the future.

Given the above, this strategy will identify and prioritise a set of schemes, some already proposed, that merit further investigation. It will justify why such schemes are appropriate, not just because it is policy compliant, but because in terms of moving people as part of an overall transport network for southern Auckland, implementing these schemes make sense.

4 Land Use Changes

A significant analysis of land use and predicted changes to social demographics in the study area was presented in the Scoping report. Key features in the southern sector include:

- 52,000 more residents in Papakura by 2050, 178,000 more in Manukau and 43,000 more in Franklin; a predicted 601,000 in 2050 from today's figure of 328,000;
- Major growth nodes include Papakura, Takanini, Flatbush, Pukekohe and Hingaia;

The details regarding the locations of predicted growth in employment and households, based on information from the ARC's Auckland Regional Transport model, is set out in Table 4-1. This model reflects the changes currently anticipated by the territorial local authorities, and it is therefore generally consistent with the Southern Sector Agreement. However, the model does not extend to Franklin District. Growth in Franklin is therefore considered separately on the following pages.

The levels of growth indicated at Table 4-1 are illustrated at Figure 4-1 and Figure 4-2. The definition of the zones is indicated at. Further details on the locations of growth are provided at Section 6.

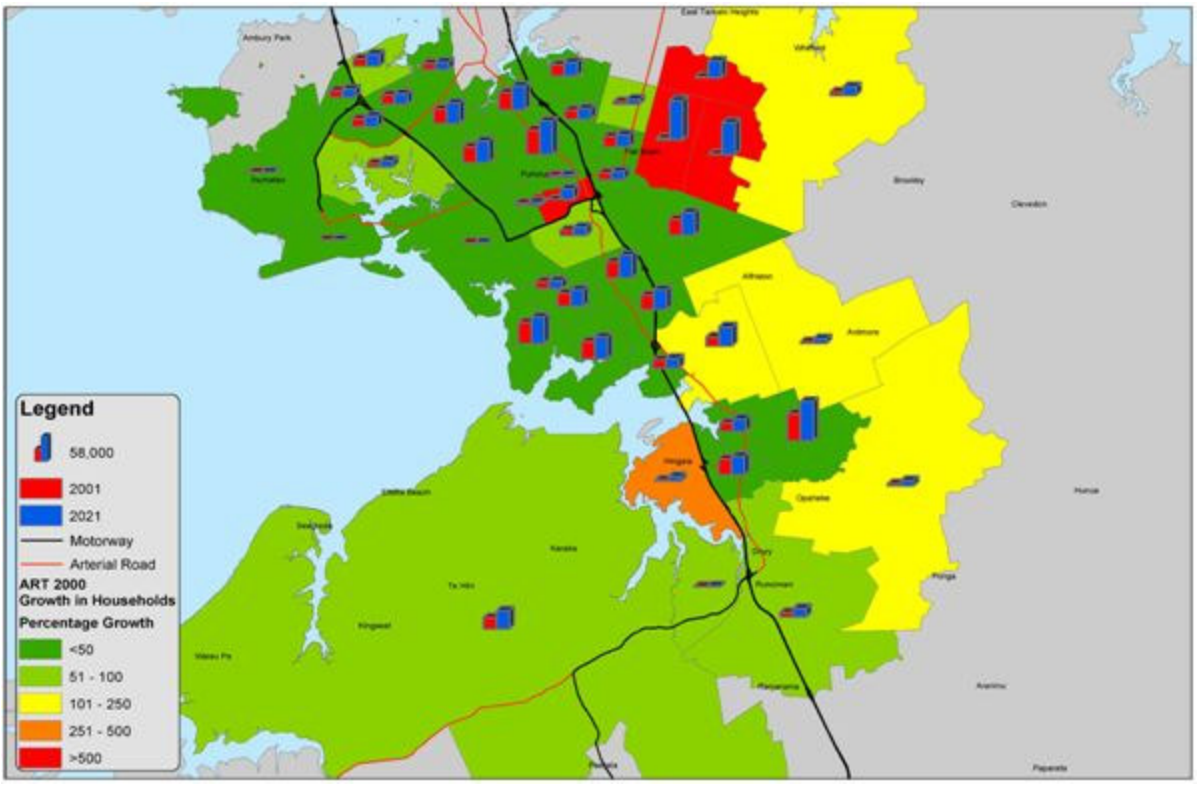


Figure 4-1 : Changes in Households

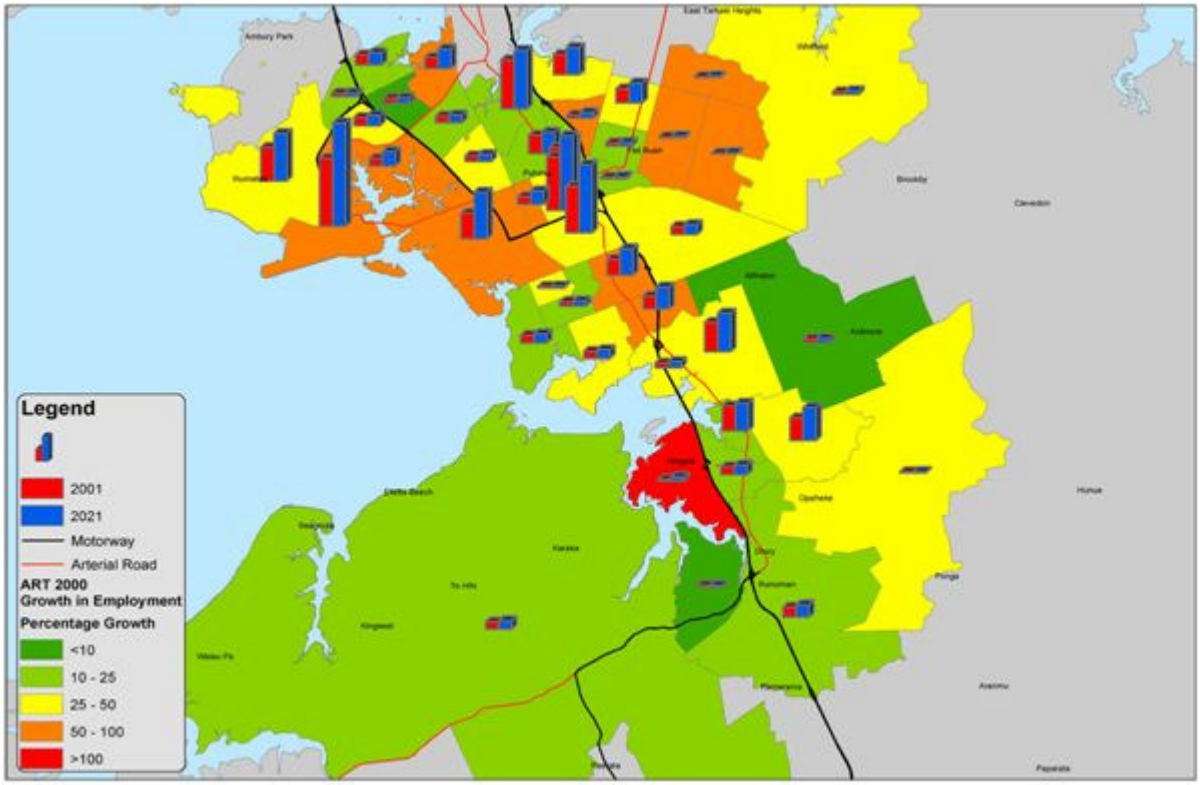


Figure 4-2 : Changes in Employment

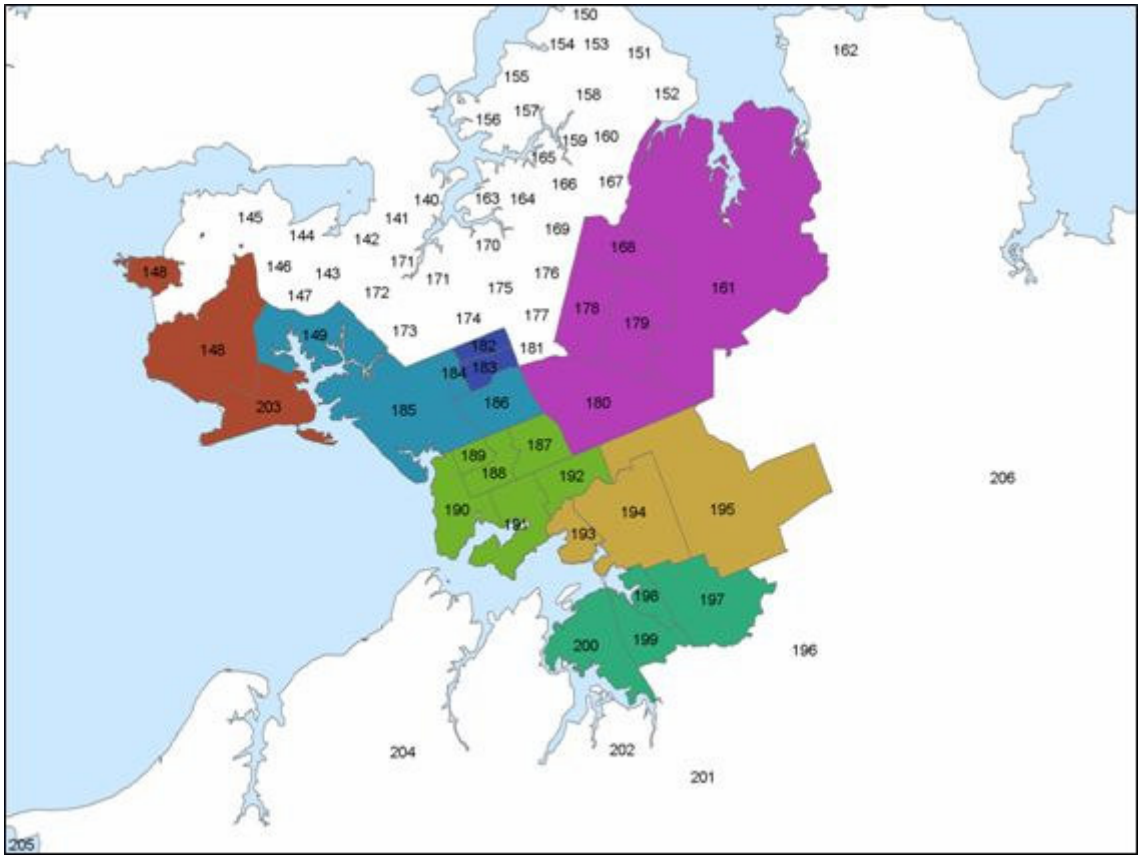


Figure 4-3 : ART Model Zones

Table 4-1 : Changes in Household and Employment Numbers between 2001 and 2021

Zone Description	ART #	Households 2001	Households 2021	Employment 2001	Employment 2021
Ihumatao	148	141	143	4050	7444
Mangere South	149	636	1264	933	2787
Whitford	161	624	2127	333	484
East Tamaki Heights	168	150	2786	116	217
Mangere East	173	2700	3676	691	928
Papatoetoe	174	4188	6311	2243	2697
Otara South	175	1533	1833	379	708
East Tamaki	176	459	832	1724	2334
Flatbush	177	1806	2095	390	469
Chapel Downs	178	306	6619	132	269
Chapel Downs East	179	96	5376	74	161

Zone Description	ART #	Households 2001	Households 2021	Employment 2001	Employment 2021
Manukau Heights East	180	2718	3857	966	1292
Clover Park	181	1227	1463	231	304
Manukau North	182	405	487	3505	4731
Manukau Central	183	9	1767	6492	9313
Puhinui	184	372	527	922	1591
Tidal Road	185	108	142	3118	6506
Totara Heights	186	927	1489	5635	8464
Manurewa East	187	2763	4119	1954	3137
Hill Park	188	2292	2888	523	663
Homai	189	1203	1355	207	278
Weymouth	190	3582	4515	950	1181
Wattle Downs	191	2973	3741	848	1131
Pandwick Park	192	2481	3584	1588	2635
Conifer Grove	193	1473	1676	573	783
Takanini	194	1521	6922	3546	4872
Alfriston	195	291	1356	495	557
Ardmore/Ponga/Clevedon	196	366	1015	133	183
Papakura	197	4614	6927	2730	4477
Pahurehure	198	1416	2375	3029	3410
Opaheke	199	2724	3171	995	1235
Hingaia	200	204	2087	218	453
Drury East	201	786	1494	1223	1568
Drury	202	114	212	196	216
Airport	203	0	0	8231	15277

The above figures do not extend to Franklin District. Population projections for Franklin District have been provided separately, as set out in Table 4-2and Table 4-3 respectively.

Table 4-2 : Predicted Population Growth in Franklin

Area	2001	2021	2051
Pukekohe	16,122	25,666 (+9,544)	37,081 (+20,959)
Waiuku	6,860	10,921 (+4,061)	15,778 (+8,918)
Existing Settlements	7,533	11,993 (+4,460)	17,326 (+9,793)
New Settlements	0	4,000 (+4,000)	7,999 (+7,999)
Rural	22,765	32,242 (+9,477)	44,362 (+21,596)
Totals	**53,280**	**84,822 (+31,542)**	**122,545 (+69,265)**

Table 4-3 : Predicted Number of Households in Franklin

Area	2001	2021	2051
Pukekohe	5,427	8,640	12,482
Waiuku	2,332	3,713	5,364
Existing Settlements	2,673	4,255	6,148
New Settlements	0	1,274	2,547
Rural	7,250	10,268	14,128
Totals	**17,682**	**28,150**	**40,569**

This section concludes that transport outcomes can dramatically influence land-use.

5 Changes to Transport Networks and Travel Patterns

The following changes are currently planned to existing transport networks in or intersecting the study area.

5.1 Road Network Changes

5.1.1 State Highways

SH1

A number of schemes are proposed along the length of the Southern Motorway (within the study area for this project):

- SH1 to Waiouru Peninsula Link: under construction, to be completed by 2007/8. This will provide a direct connection to the motorway from the developing business park, and will reduce pressure on East Tamaki Road and the SH1/East Tamaki Interchange. The scheme also includes the upgrade of the Otahuhu Interchange and the provision of auxiliary lanes on the motorway between the two interchanges.
- Southern Motorway Travel Demand Management (TDM): Transit's draft 10 year programme for 2005/06 – 2014/15, circulated for consultation in early 2005, stated that this project had an indicative national prioritisation of 1 (ie it was considered to be the highest priority project in New Zealand). The subsequently confirmed 10 year plan, including the August 2005 update, did not include details of the priority for each project, but construction of the TDM project is expected to commence this financial year (2005/06) . This scheme includes proposals for ramp metering on each on-ramp, along with Intelligent Transport System measures to improve the flow along the motorway.

The draft 10 year plan also noted the following projects, although the timing was indicated as "to be reviewed" following the completion of this Southern Sector Strategy study:

- Papakura Interchange Upgrade, indicative national prioritisation of 79, construction due to start after 2015/16. This could replace the existing layout with a "standard" diamond interchange;
- Takanini Interchange Upgrade, indicative national prioritisation of 80, construction due to start after 2015/16;
- Hill Road to Takanini southbound three laning; indicative national prioritisation of 81, construction due to start after 2015/16;
- Takanini to Papakura 6 laning: indicative national prioritisation of 85, construction due to start after 2015/16; and
- Papakura to Drury 6 laning: indicative national prioritisation of 112, construction due to start after 2015/16.

The draft plan also listed the following "potential activities" under the list of schemes with no current prioritisation, nor indicative construction start:

- Takanini Interchange Northbound three laning; and
- Takanini Southbound auxiliary lane.

The subsequently confirmed 10 year plan, with August 2005 update, includes the following projects along the Southern Motorway

- Papakura South off intersection Safety Improvement: construction committed for this financial year;
- Drury Interchange Traffic Signals: construction expected in 2007/08;
- East Tamaki to Te Irirangi bus lanes: the timing of these will depend on progress with higher priority projects.

SH22

Transit completed a draft scheme assessment into SH22, between the SH1 interchange at Drury and Pukekohe, in 2003. This recommended the development of a new route which would follow the railway corridor.

This scheme was included in the draft 10 year plan within the list of "potential activities" with no current prioritisation, nor indicative construction start. The Transit Auckland office indicated in early 2005 that it was hoping to reinstate the scheme further up the list of priorities in the fairly near future.

The scheme does not appear in the confirmed 10 year plan (August 2005 update). However, the Plan refers to the following projects:

- Wesley College northbound passing lanes: construction expected in 2007/08;
- Glenbrook Road Intersection improvement: construction expected in 2007/08

SH20

Plans are underway to develop the SH20 motorway as part of the "Western Ring Route" around Auckland. This route would run from the proposed SH1/SH20 interchange at Manukau to the North Western Motorway, then via the proposed Upper Harbour Highway to rejoin SH1 at Albany. Progress on each section of the SH20 route is as follows:

- ***SH20/SH1:*** A tender is expected to be let this year. This scheme will "bypass" Wiri Station Road, providing a direct route from SH1 through to the existing section of the South Western motorway, south of Puhinui;
- ***SH20 Manukau Harbour Crossing:*** with the August update to the 10 year plan, construction is due to start in 2009/10. This will include widening of the motorway to three lanes per direction, between the Coronation/Walmsley Interchange through to the Mount Roskill extension (see below), including duplication of the bridge across Manukau Harbour;
- ***SH20 Mount Roskill Extension:*** A tender has recently been let for this project, which will provide a northern extension to the South Western Motorway, from Hillsborough to Richardson Road/Maioro Street, skirting around Mount Roskill; and
- ***SH20 Avondale Extension:*** with the August update to the 10 year plan, construction is due to start in 2009/10. This would extend the South Western Motorway to tie into the North Western Motorway.

The August 2005 update indicated that borrowing and tolling is expected to help meet the costs of the Manukau Harbour Crossing and Avondale Extension projects.

In addition, improvements to the Roscommon Road/Wiri Station Road intersection are programmed for later this year.

5.1.2 Local Authority Road Proposals

Manukau

The roading section of the Eastern Transport Corridor largely lies outside the study area for this commission. However, the recommended scheme, as published in March 2004 included what was termed the "Allens Road Route" as a long term concept. As shown, this would have terminated at Te Irirangi Drive, but there was the suggestion that it could form part of a future link which could pass further into the Southern Sector.

The revised proposals for the Eastern Transport Corridor, published in August 2004, included a more modest version of the Allens Road route. The predicted benefits of this modified proposal are more local, relieving the proposed SH1 to Waiouru Peninsula Link, and to a lesser extent, Ti Rakau Drive.

The recommendation of this second study was still that it should form a separate, later stage of the Eastern Transport Corridor, and a western extension (toward Neilson Street) or a southern extension (toward Papakura) could be considered.

The concept of a link between Weymouth and Karaka has been identified previously. We understand that it is favoured by private developers, but opposed by the majority of local residents.

The council is currently undertaking transport studies into a Whitford town bypass and a Clevedon Road study.

The council is also considering the road network required to serve the Flatbush development. This includes Ormiston Road as a Regional Arterial route, with Chapel Road, Stancombe Road and Murphys Road being all District Arterials.

Papakura

Major Papakura roading projects under consideration as part of a wider transportation study include:

- A Papakura bypass – linking of Boundary Road to Opaheke and Fitzgerald Road;
- A bypass connecting the southbound carriageway of SH1 with Tegal Road and a link from Quarry Road to the southbound carriageway of SH1;
- An on and off-ramp before and after the Quarry Road Bridge at SH1 Northbound;
- A new road connection between Flanagan Road and Tegal Road;
- The suggestion of a new link to the Eastern Transport Corridor;
- A programme of works is proposed in the Papakura town centre, including signalisation of a number of intersections, plus improvements to pedestrian amenity;
- Papakura has multiple rail level-crossings located in the area, that would be affected by potential schemes to be considered by this study. The need for further investigation into the effects and extent of works required to work these crossing points into future projects is noted in the conclusions and recommendations.

Franklin

In Pukekohe there are several new road links that are proposed to service future development and to ease congestion on the main road corridors.

These projects include:

- The extension of Reynolds Road from Valley Road through to Pukekohe East Road. This will then complete the construction of the collector road linking Paerata Road and Pukekohe East Road;

- The provision of a new road access into Pukekohe from the east which would connect East Street or Pukekohe East Road directly to Manukau Road and therefore relieve East Street;
- The extension of Crosbie Road through from the existing end of the road through to Manukau Road. This route is designated and will be constructed in conjunction with business development in this area;
- Council is also investigating the feasibility of extending Crosbie Road to the north to link with Subway Road so as to provide an alternative access to the proposed business park which does not require the use of Manukau Road.

Other projects that have some significance include alterations to the Stadium Drive/Manukau Road and Stadium Drive/East Street intersections which will most likely involve the signalisation of these intersections and the upgrading of the Subway Road Underpass to provide a greater vertical clearance.

5.2 Passenger Transport

5.2.1 Rail

A Draft Rail Business Plan was published by the Boston Consulting Group in 2002, on behalf of the ARC and ARTNL. While this has no legal status, it indicates an intention by all the parties responsible to commit significant sums of money to the rail infrastructure in the Auckland Region.

The main infrastructural improvement to the rail network in the Southern Sector will be the construction of the rail link into the Manukau CBD, expected to be under construction in the next few years. In addition, the following proposals are of relevance:

- Frequencies;
- Improved rolling stock;
- Electrification of the route;
- Signalling improvements; and
- Stations (including park and ride).

The measures that are already programmed:

- Increases in frequency of services;
- New rolling stock, to match the above service improvements; and
- Station upgrades, which are already being undertaken, with a rolling programme.

5.2.2 Rapid Transit

The development of a fast, frequent and reliable rapid transit network for Auckland is seen as key to achieving outcomes of the Auckland Regional Growth Strategy (RGS) and Auckland Regional Land Transport Strategy (RLTS) 2003.

Rapid transit is defined as a fast, high frequency passenger transport service, operating in a way that is, as far as possible, unaffected by traffic congestion. This can be provided by heavy rail, light rail or buses. The improved journey speed, reliability, comfort and convenience offered by rapid transit provides an attractive alternative to the private car and is intended to increase the passenger transport mode share. This in turn will reduce demand for limited road capacity and deliver environmental and social benefits. The rapid transit network will be integrated with the rest of the transport system, including both public transport and private modes.

The RLTS promotes the Rapid Transit Network as the backbone of the passenger transport network and contains area wide and corridor policies that aim to protect rights of way for future development of the network.

The Auckland Regional Passenger Transport Plan (RPTP), a component of the RLTS, describes how the passenger transport polices of the RLTS will be implemented, and sets out the current proposals for the development of the Rapid Transit Network.

Figure 5-1 shows the current and future proposed rapid transit network, based around integrated bus, rail and ferry services operating in defined corridors. The current focus for development includes:

- Upgrade of the existing heavy rail network infrastructure and services, with potential electrification, providing rapid transit in the Western, Southern, Isthmus and Eastern corridors;
- Construction of the Northern Busway, providing bus rapid transit in the Northern corridor between Albany and the CBD; and
- Improvements to ferry services and infrastructure serving inner harbour suburbs and Auckland City.

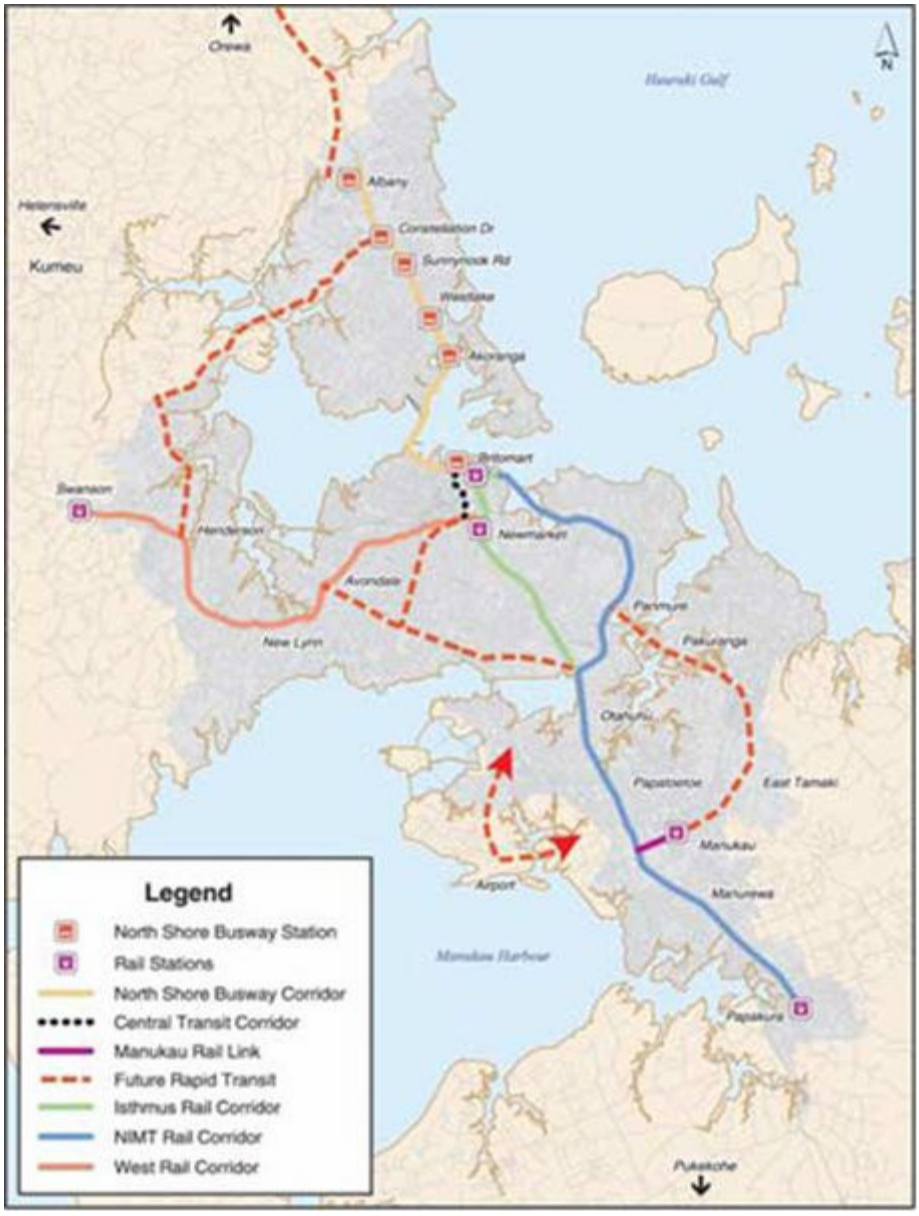


Figure 5-1 : Future Rapid Transit Network (including future extensions) from Auckland Regional Council's Regional Passenger Transport Plan, 2003)

Identified future expansions, with alignments and modes under investigation, or yet to be finally determined, include:

- Development of a Central Transit Corridor, linking the Britomart Transport Centre through sections of the CBD to Newmarket;
- Extension of the Northern Busway north to Orewa;
- Development of a connection between the Western Rail Corridor and the Northern Busway at Constellation Drive using the Upper Harbour Corridor;
- Connection of the Western Rail Corridor to the Southern Rail Corridor through Avondale (Avondale Southdown link/South Western Corridor);

- Connection of the South Western Corridor to the CBD through the isthmus in the vicinity of Dominion Road;
- Connection of the Southern Corridor at Manukau to the CBD via the east (Eastern Corridor); and
- Provision of connectivity between the Airport and Manukau, and Onehunga that will provide onwards connections to the CBD, west, east and southern suburbs.

5.2.3 2005 Rapid Transit Study

Two reports on rapid transit have recently been submitted to the ARC. The purpose of the first report was:

- To identify the future role of rapid transit in Auckland within the context of medium to long term growth projections;
- To review the future rapid transit corridors identified in the RLTS; and
- To draw conclusions about the potential future development of the rapid transit network beyond the core elements currently being implemented, as the basis for more detailed analysis in Phases Two and Three.

The conclusions of this report (of relevance to this study) were:

- The operational requirements of the Manukau Rail Link should be determined;
- Options and timing for further service extensions to Drury and Pukekohe should be examined;
- The future alignment between Te Irirangi Drive and Manukau City Centre should be determined and protected; and
- A preference for future rapid transit links to the Airport should be determined and incorporated into current corridor planning and the Airport master plan.

The purpose of the second report was to outline the potential medium to long term development of Auckland's rapid transit system, and to address the impact of rapid transit development on rail electrification.

The study therefore included the following steps:

- Determined which of the potential future rapid transit routes are "heavy rail capable";
- Assessed the likelihood that these routes will be developed as heavy rail within the next 15-30 years (ie the approximate economic life of rail rolling stock);
- Determined whether the development of each of these routes for heavy rail will impact on the need to electrify the passenger rail network; and
- Summarised the overall impact of each link on the immediate rolling stock and the decision whether or not the system should be electrified.

Five potential "heavy rail capable" route extensions were identified:

- Service extensions on the current lines;
- Britomart West Tunnel;
- Avondale to Southdown corridor;
- Airport connections; and
- North Shore.

These options were assessed against a range of evaluation criteria, which drew the following conclusions (relevant to this study):

- Extensions on existing lines are highly likely within 15 to 30 years, as their cost is relatively low, and demand is likely to justify them at some stage within that time period. However, they are expected to operate at a relatively low frequency, so they are unlikely to have much operational impact on the remainder of the rapid transit system (unless operated using different technology); and
- An Airport line is also unlikely within the 15 to 30 year period. It has a high cost, relatively low patronage, and would impose some operational and capacity impacts on the rest of the system.

The study then assessed each of the extension options in relation to electrification. It concluded that the strategic focus of the motive power decision, from a rapid transit development perspective, needs to be on the Britomart West Tunnel.

In relation to service extensions on existing lines, the study noted that these will be viewed as "natural extensions of the current system". Specifically, it was noted that the Pukekohe service already exists, so additional frequency on this line is "highly likely".

5.3 Passenger Transport Services

In developing a range of scenarios for consideration by the Regional Land Transport Committee, the ARC have developed low, medium and high scenarios for the year 2016. The predicted bus and rail networks with these three scenarios are set out between Figure 5-2 to Figure 5-7.

5.3.1 Low Scenario

Figure 5-2 indicates that there will be minimal bus lanes in the Southern Sector, with the Low Scenario. The only facility shown is on Great South Road, south of Manukau CBD.

Figure 5-3 indicates the bus services included in the Low Scenario, in the two hour AM peak. This shows Great South Road as taking the greatest numbers of buses, all the way from Papakura to beyond the study area, north of Otahuhu. Other "major" routes (in the context of this fairly modest level of bus services) include:

- Mangere Bridge township and Mangere town centre through to Otahuhu; and
- East Tamaki and Otara through to Manukau CBD.

Figure 5-2 : Bus Lane Locations – Low Scenario

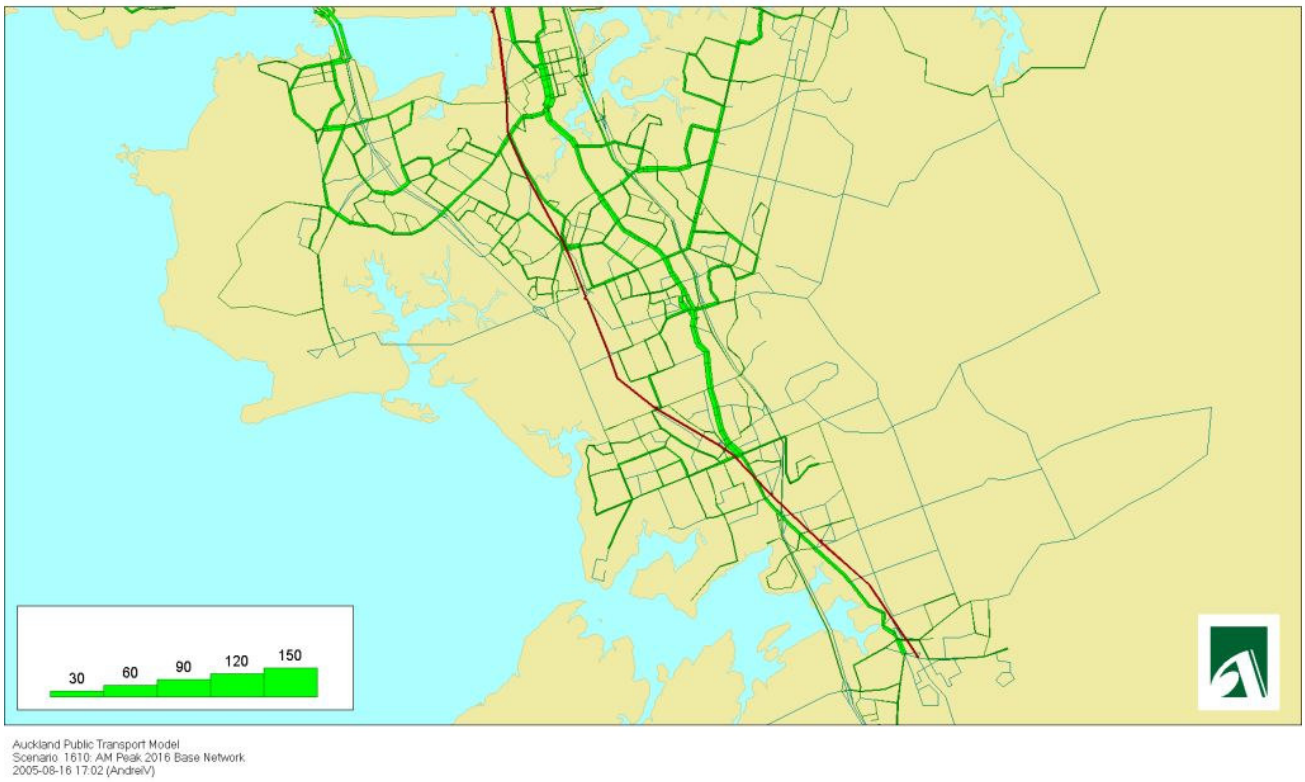


Figure 5-3 : Public Transport Services per hour – Low Scenario

5.3.2 Medium Scenario

Figure 5-4 indicates that additional bus lanes are assumed with the Medium Scenario, including

- SH20, at Mangere Bridge; and
- Great South Road, from East Tamaki Road through to Bairds Road (in addition to the bus lanes included in the Low Scenario, south of Manukau CBD);

Figure 5-5 indicates the public transport services included in the Medium Scenario, in the two hour AM peak. This shows the following increases in bus services (relative to the Low Scenario):

- Between the Airport and the north and west;
- East Tamaki and Otara through to Manukau CBD;
- Services centred around Papatoetoe;
- Services from Flatbush, via Manukau CBD and on to Manurewa; and
- Modest additional services serving Hingaia.

The Manukau Rail Link is assumed with this scenario, with services between Manukau CBD and Britomart;

5.3.3 High Scenario

Figure 5-6 indicates that additional bus lanes are assumed with the High Scenario, including

- Great South Road, right through from south of Manukau CBD through to north of Otahuhu;
- Massey Road/Mangere Road, toward Otahuhu; and
- Chapel Road (Flatbush) through to Manukau CBD.

Figure 5-7 indicates the public transport services included in the High Scenario, in the two hour AM peak. This shows the following increases in bus services (relative to the Medium Scenario):

- Significant increases between Botany and Manukau CBD and through to Puhinui, with additional services serving Flatbush;
- Additional services between Mangere town centre and Otahuhu;
- Additional services around Manurewa, including some increases through to Weymouth;
- Very modest changes within Papakura, with some increases in the east-west direction, but decreases on the north south routes along the Southern Motorway and Great South Road; and
- A modest service is introduced from Papakura to Whitford, via Mill Road.

Rail services increase in comparison with the Medium Scenario.

Figure 5-4 : Bus Lane Locations – Medium Scenario

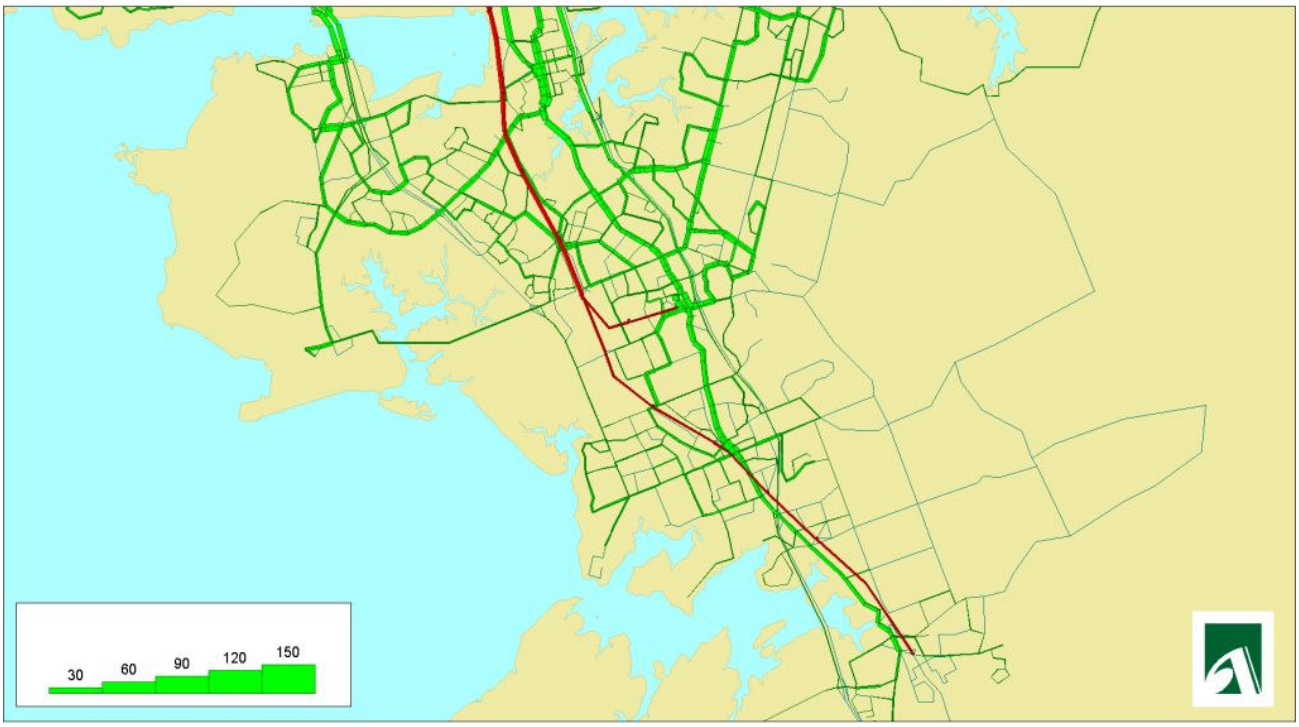


Figure 5-5 : Public Transport Services per hour – Medium Scenario

Figure 5-6 : Bus Lane Locations – High Scenario

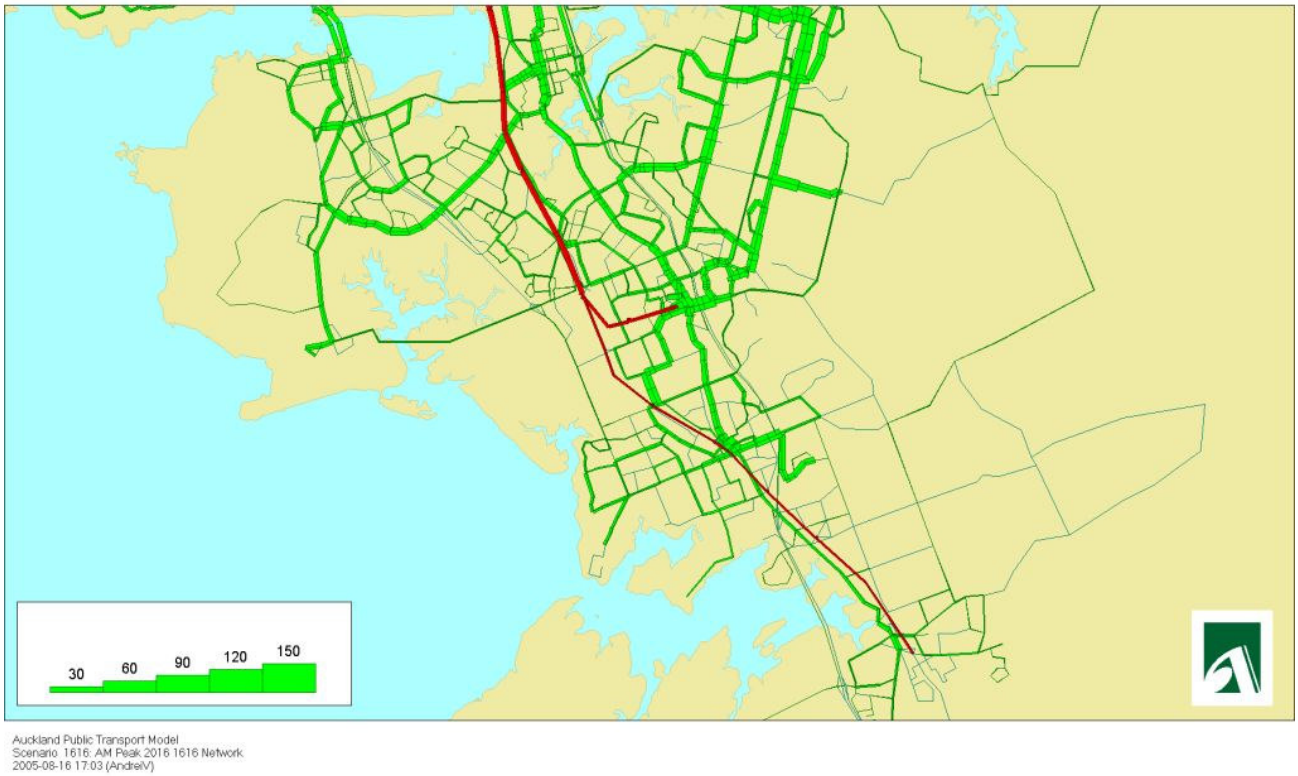


Figure 5-7 : Public Transport Services per hour – High Scenario

5.4 Scenario Analysis

The description above and accompanying plots from the Auckland Public Transport Model show the main features of the 2016 based scenarios. The analysis below will comment on these outputs and how they compare to future population growth and land use aspirations, eg growth areas as defined by the Regional Growth Strategy and other policy documents. Consideration needs to be given to the objectives of this study in that the Southern Sector Transportation Study has an aim to look far beyond 2016 (the year the APT outputs depict) and as such there are likely to be inconsistencies between long-term study objectives and the 2016 model outputs.

A further item of note is that the 2016 plots do not reflect any transport schemes proposed as part of this study that have not already been committed, eg Mill Road as a new multi-modal corridor.

5.4.1 Low Scenario – Analysis

The low scenario has limited bus lane implementation on Great South Road that is the focus of a bus corridor extending south. Bus provision is modest at best and includes corridors to Mangere and Manukau CBD.

In terms of serving areas earmarked for future residential intensification this scenario fails to provide significant levels of service to a number of key areas including:

- Flatbush;
- Hingaia;
- Manurewa;
- Takanini;
- Papakura; and
- Manukau CBD.

The highest frequency corridors are the Southern Motorway, East Tamaki Road and Great South Road with a low concentration of services (four buses per two hour period in Papakura, eight in Manurewa and similar in Manukau CBD and lower for Takanini and Hingaia) around key centres.

This scenario does not match a high level of bus services to areas that are designated as growth centres.

5.4.2 Medium Scenario

The medium scenario includes additional bus lanes on Great South Road and Mangere Bridge. Additional bus services are focused from the Airport, East Tamaki to Manukau, internally within Papatoetoe, Flatbush, Manurewa, and Manukau CBD and a small increase to Hingaia. This scenario introduces new bus routes including Roscommon Road linking to SH20.

In terms of growth areas, this scenario still lacks a significant level of service to Takanini (Mill Road) and is only a marginal improvement from the low scenario to other growth areas such as Hingaia (with four buses per two hour AM peak from zero in the low scenario).

5.4.3 High Scenario

The high option shows additional bus lanes on Great South Road, right through from south of Manukau CBD through to north of Otahuhu, Massey Road/Mangere Road, toward Otahuhu and on Chapel Road (Flatbush) through to Manukau CBD.

This scenario also includes the implementation of the Manukau Rail Link, and a greater frequency of rail services.

In terms of serving future residential growth areas, the high scenarios (over the medium scenario) delivers a greater level of service to central Manukau, Manurewa and Flatbush, smaller increases in Papakura and a new service on Mill Road linking Papakura with Whitford. There is no change on services to Hingaia.

Table 5-1 below shows some selected road links that are (or in the future will be) serviced by buses services according to the 2016 Auckland Passenger Transport model. It helps to demonstrate some of the trends mentioned above and highlights links to some of the key areas mentioned in the Regional Growth Strategy.

Table 5-1 : Bus Frequencies on Selected Links – All Scenarios

Selected Links	Low	Medium	High
Hingaia Road	0	4	4
Papakura (Hunua Road)*	8	13	13
Takanini (Taka Street/Airfield Road)	1	1	1
Manurewa (Alfriston Road)*	1	9	25
Roscommon Road*	0	8	8
East Tamaki (Te Irirangi Drive, north of Ormiston Road)*	4	8	36
Flatbush (Boundary Road)*	3	3	3
East Tamaki (East Tamaki Road, near Ormiston Road)	9	24	40
Great South Road (near Takanini)*	35	48	30

Note: * 2-way flows
Buses per two hours - AM Peak

The above values are totals for low, medium and high (not differences)

Great South Rd buses decrease for High PT as more trains are supplied and/or more services are provided on other corridors.

It needs to be recognised that the new Auckland Regional Transport Authority (ARTA) will have a significant influence in determining future passenger transport services.

5.5 Freight

The movement of freight around the region will be affected by the following developments:

- The significant increase in the distribution warehousing in the areas around the International Airport, at Mangere and Wiri;
- The further development of East Tamaki, for industrial purposes, and particularly the Waiouru Peninsula, for more high technology business park uses;
- Developments proposed by the Ports of Auckland. They are developing three inland ports, at Wiri, Otahuhu and East Tamaki, in addition to the Southdown Terminal. These, with the exception of East Tamaki, will allow containers to be moved by rail. It is not known at this stage what percentage of future trips to/from the Port are expected to transfer from road to rail; and

- Developments in the freight industry, to reduce the number of trips taken by road during "office hours". This in part will be facilitated by the above development of inland ports, but also by the desire by freight operators to be less adversely affected by inefficiencies caused by traffic congestion. Clearly it needs to be recognised that the desire for greater efficiency of freight operators may conflict with the effects of increases in freight movement at night or at weekends, on other land uses.

The availability of future business land is a major issue confronting the region and the Southern Sector, and whilst outside of the scope of this study needs to be recognised as an important issue that could directly influence transport needs and requirements. A Business Location Strategy is currently underway to tackle some of these important issues. Pressures exist throughout the study area but are particularly present in Takanini, Ardmore, Drury and Pukekohe.

5.6 Cycling

5.6.1 Manukau City Council Cycling and Walking Strategy

Currently there are very few dedicated bicycle facilities in Manukau. The existing facilities are found on:

- Great South Road (shared cycle/bus and shared cycle/pedestrian facility) and on-road cycle facility;
- East Tamaki Road (shared cycle/pedestrian facility);
- Weymouth Road (shared cycle/pedestrian facility);
- George Bolt Memorial Drive (use of shoulder as a cycle lane);
- Te Irirangi Drive (shared cycle/pedestrian facility on one section and marked cycle lane at the Great South Road end);
- Puhinui Road west of State Highway 20 (use of shoulder as a cycle lane); and
- Shared cycle/bus lanes across the city.

5.7 Manukau Strategic City Cycle Network

Manukau City's Cycling and Walking Strategy focuses on the completion of a strategic cycle network. The proposed network predominantly focuses on cycle facilities and improvements on key arterials within the urban and rural environment.

The proposed cycle network was considered taking into account places of residence, places where people work, recreational parks/reserves, rail stations, town centres ('growth' centres, schools and tertiary institutions, such as Manukau Institute of Technology, and linking to key regional cycle networks.

The strategic network forms the 'skeleton' or network of cycle routes, with the Great South Road Route providing the main north-south backbone of the cycle route network through the centre of the City. From the provision of a strategic network, it is planned to develop local and recreational cycle routes, eg Flatbush Cycle and Walking Strategy.

A proposed five year implementation programme identifies improvements on four identified routes. These are: Great South Road, Papatoetoe-Otara-East Tamaki (POET), Mangere to Papatoetoe and Auckland International Airport to Mangere Bridge. The network provides cycle connections from south to north (Great South Road and Auckland International Airport – Mangere Bridge) and West to East (POET and Mangere to Papatoetoe).

In addition, cycle routes have also been proposed as part of wider roading studies and improvements. These routes form part of the strategic cycle route network and strengthen the cycleway connections across the City. These include cycle lanes for:

(a) The planned upgrade to four lanes of Nesdale Avenue, Liverpool Street and Cavendish Drive;

(b) Wiri Station Road, Lambie Drive and Ronwood Avenue, including the proposed Lambie Drive motorway bridge (SH20 – SH1 connection); and

(c) A shared pedestrian/cycleway off-road path is also planned as part of the Waiouru-Otahuhu to East Tamaki Route (Waiouru).

Figure 5-8 shows the proposed five-year cycle network.

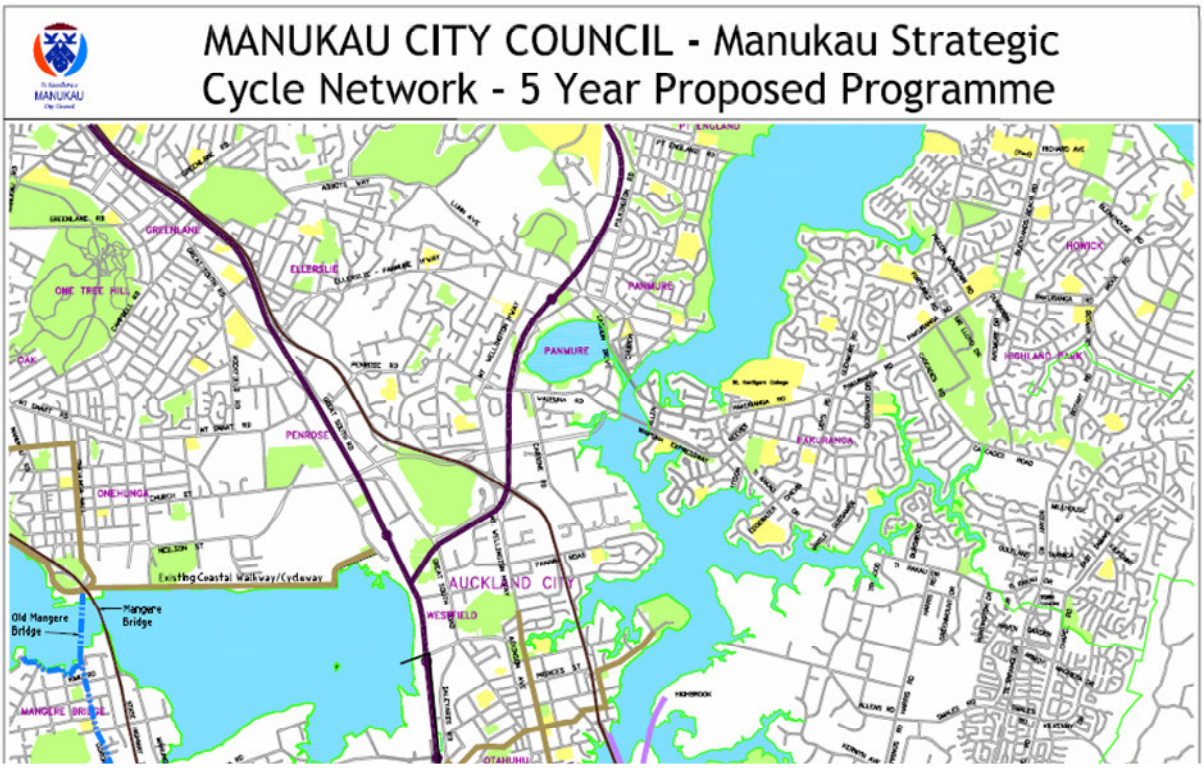


Figure 5-8 : Proposed Five-Year Cycle Network

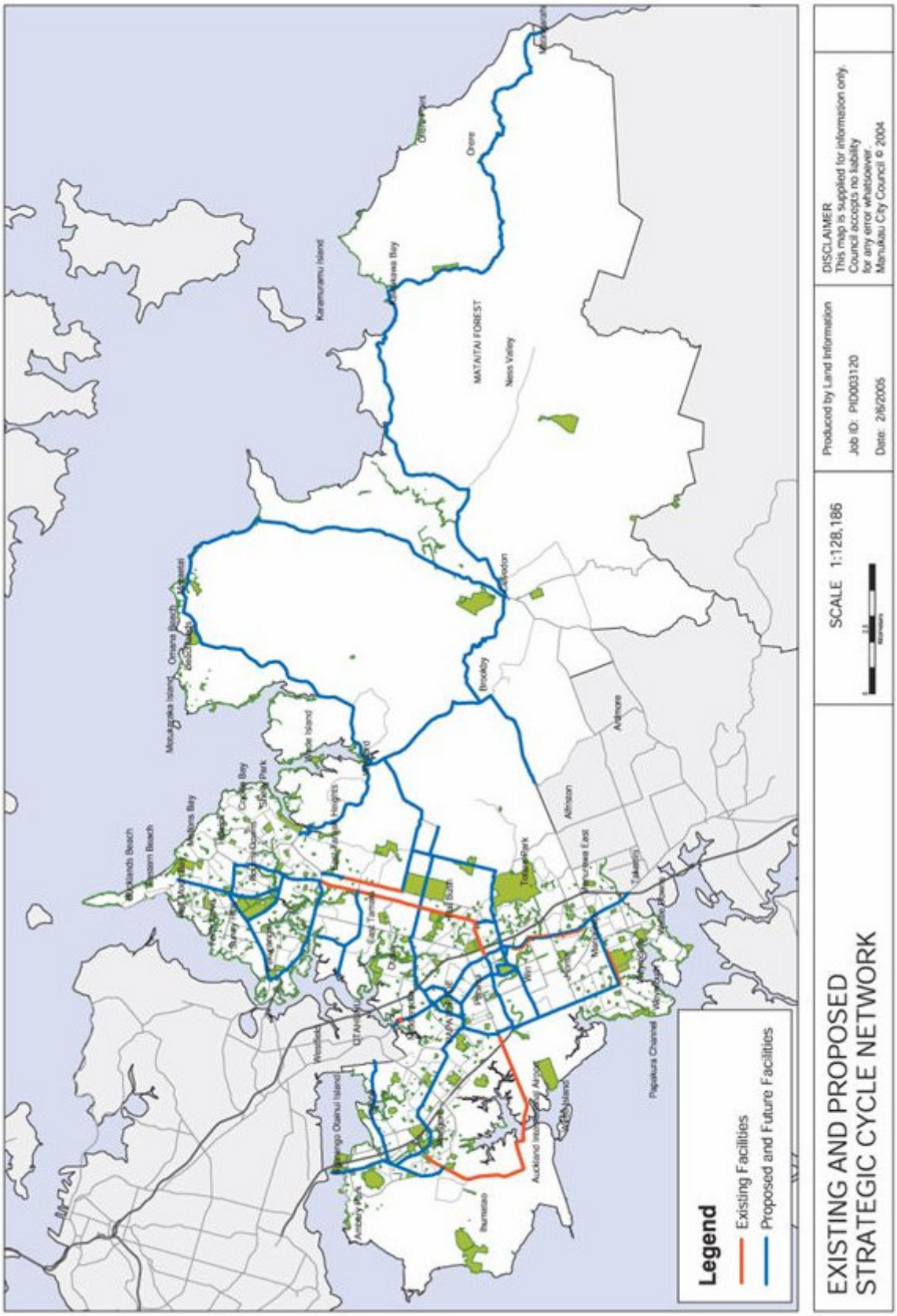


Figure 5-9 : Existing and Proposed Strategic Cycle Network

Phase One of the cycle route programme is staged over five years. 77% of the programme funding has been received from Infrastructure Auckland for this programme of works.

As identified in the five year plan, the hub of cycle network connects to Manukau City Centre (an area identified as a future growth centre as per the Regional Growth Strategy). Cycle routes will be provided as part of the SH20–SH1 connection to also enable cyclists safe and direct linkages to the city centre and other parts of the city.

5.7.1 Papakura District Council Walking and Cycling Strategy (draft document)

Papakura District Council are currently developing a walking & cycling strategy. Opus are assisting Council in this project. The draft strategy has yet to be consulted on and adopted by Council.

6 Gap Analysis

6.1 Do Minimum Networks

Before determining gaps, we need to define the Do Minimum for the study year of 2021.

Any scheme which is not committed, and where direction is sought from this study, cannot be in the Do Minimum. For example, widening of southern motorway (in parts) was previously relatively high in Transit's list, but these schemes are now outside the Transit Draft 10 year plan, pending the outcome of this study. Theses schemes therefore cannot form part of the Do Minimum for 2021, even though most parties may agree that action is required before then.

6.1.1 Roads

The Do Minimum network therefore includes the existing road network, with the following improvements:

- SH1 to Waiouru Peninsula Link;
- SH20 Manukau Extension (also known as the SH20/SH1 connection).
- The Liverpool - Nesdale link;
- Road improvements in the Flatbush area;
- Road improvements in the Papakura town centre area;
- Changes in speed limits along a number of routes that are currently "rural" and will become more urban, following proposed development in the area. These include;
  - Porchester Road;
  - Airfield Road;
  - Walters Road;
  - Popes Road;
  - Papakura – Clevedon Road; and
  - Mill Road.

6.1.2 Passenger Transport

It is assumed that the passenger transport network by 2021 will be similar to that envisaged in the "high" scenario developed for the 2005 review of the Regional Land Transport Strategy. As noted in the previous section, this scenario includes the Manukau Rail Link, bus lanes on a number of routes, plus a greater frequency of services. The scenario also included:

- Upgrade of the rail system, including improved facilities and electrification;
- Real time information around the region;
- Integrated fares and ticketing;
- High quality interchanges at all Park and Ride stations.

6.2 Areas of Growth

Section 3 above indicated future areas of growth within the Southern Sector. The main changes (zones with increases in households or employment of more than 1000) are as follows:

Table 6-1 : Areas of predicted significant growth in households (more than 1000, between 2001 and 2021)

Zone Description	ART Zone Number	Increase in Households
Whitford	161	+1500
East Tamaki Heights	168	+ 2600
Mangere East	173	+1000
Papatoetoe	174	+2100
Chapel Downs	178	+6300
Chapel Downs East	179	+5250
Manukau Heights East	180	+1150
Manukau Central	183	+1750
Manurewa East	187	+1350
Randwick Park	192	+1100
Takanini	194	+5400
Alfriston	195	+1050
Papakura	197	+2300
Hingaia	200	+1900
Pukekohe	-	+3,200
Waiuku	-	+ 1.300

Table 6-2 : Areas of Predicted Significant Growth in Employment (more than 1000, between 2001 and 2021)

Zone Description	ART Zone Number	Increase in Employment
Ihumatao	148	+ 3400
Mangere South	149	+ 1850
Manukau North	182	+1250
Manukau Central	183	+2800
Tidal Road	185	+3400
Totara Heights	186	+2850
Manurewa East	187	+1200
Takanini	194	+1350
Papakura	197	+1750
Airport	203	+7100
Pukekohe	-	+ 4,000

The definition of the above zones was set out at Figure 4-3.

The key changes are highlighted at Figure 6-1. This indicates that:

- The greatest predicted increases in households are predicted to occur around Flatbush, Manukau CBD, Manurewa, Takanini/Alfriston, Papakura and Hingaia.
- The greatest predicted increases in employment are likely to occur around the Airport, Manukau CBD, Manurewa, Takanini and Papakura.

6.3 Transport Networks around Growth Areas

The transport situation, in terms of the existing provision of transport infrastructure and proposed improvements, is as follows. Refer to Figure 6-1 for areas of growth. The plan also shows some of the options that will be considered in the following sections of this report.

6.3.1 Flatbush

This growth area is the single largest Greenfield development proposed within the Southern Sector. Significant proposals are in hand to improve the roading network in this area, including:

- Te Irirangi Drive already provides a major connection between Manukau CBD and the Southern Motorway through to Botany;
- Chapel Road provides a secondary connection;
- Ormiston Road is being upgraded to provide a regional arterial between Waiouru Peninsula and East Tamaki;

In terms of passenger transport provision the future is far less certain:

- A rapid transit link between Manukau CBD and Botany, via Te Irirangi Drive, was proposed in the Regional Passenger Transport Plan, but the reaction to the bus rapid transit plans developed as part of the Eastern Transport Corridor was somewhat lukewarm;
- In any case it was noted that Flatbush was "bypassed" by the above proposal;
- The 2016 High Scenario developed for the recent RLTS review indicated significant services between Flatbush and the Manukau CBD, but there is no commitment to these services at this stage.

A walking and cycling network has been developed for the area, and it is clearly essential to the success of this growth centre that the area develops as a walking/cycling-minded community.

6.3.2 Manukau CBD

It is anticipated that this area develops with more intensive employment, plus the introduction of mixed use residential areas. The area will benefit from the following transport investments:

- The SH20 Manukau Extension will allow through traffic to bypass the Manukau CBD, significantly improving the amenity of Wiri Station Road;
- The Manukau Rail Link will provide a significant passenger transport link, with suitable supporting feeder bus services.

In addition, Manukau CBD already has the benefit of good proximity to connections to the Southern Motorway, plus regional arterials such as Te Irirangi Drive, Great South Road and Wiri Station Road.

6.3.3 Airport

The Airport itself is clearly an important origin or destination for many trips. Also, significant growth in employment uses is already occurring around the Airport, and more is proposed.

This area has access by way of road from both SH20A and SH20B. Possible transport investments to assist this area are as follows:

- Transit's long term strategy includes the possible upgrade of SH20A to motorway status, although this will not occur within the next 10 years;
- Options for rapid transit links to the Airport have been considered, although a preferred option has yet to be formally identified.

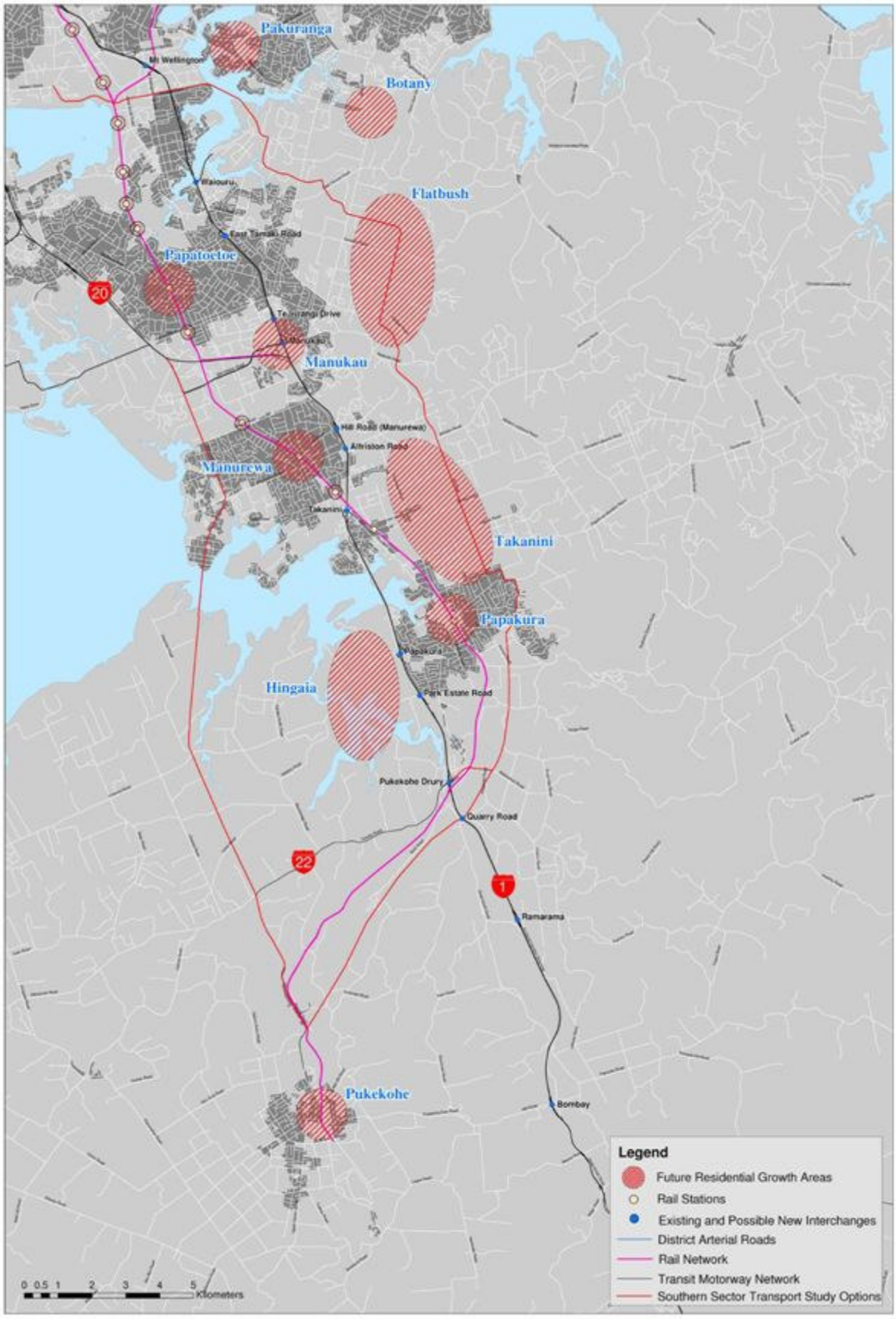


Figure 6-1 : Southern Sector Transportation Study Map

6.3.4 Manurewa

This area is well served by rail, with stations at Te Mahia, Manurewa and Homai. Significant bus services are focussed around Great South Road, with some feeders serving Manurewa rail station, in particular from Randwick Park.

The closest interchanges to the Southern Motorway are at Hill Road (to the north) and Takanini to the south. Great South Road provides the main route for traffic heading to/from these interchanges. Browns Road, Weymouth Road/Alfriston Road and to a lesser extent Hill Road form important east-west routes.

The Southern Sector agreement makes reference to the possibility of a new interchange at Alfriston Road, which would directly serve the Manurewa area. However, there could be concern that this will put traffic right through the middle of the township, and add pressure at the intersection of Great South Road with Alfriston Road/Weymouth Road.

6.3.5 Takanini

This area is served by rail, with bus services focussed around Great South Road.

The area has access to the Southern Motorway via the Takanini interchange. Great South Road also serves an important function for north-south traffic, crossing from the east of the motorway to the west at the Takanini interchange. Mill Road will serve an increasingly important role as the area develops, for north-south trips to the east of the motorway.

There are limited significant east-west routes through this area.

6.3.6 Papakura

This area is also served by rail. The 2016 “high” passenger transport scenario includes modest bus flows in the area. Again these are centred around Great South Road, with limited feeder services.

Papakura has access to the Southern Motorway via the Papakura interchange. Great South Road forms the other main north-south route.

The main east-west routes through the area are Hingaia Road/Beach Road/Settlement Road, providing access between Hingaia, the motorway and Papakura; and Clevedon Road, providing access between Clevedon and Papakura via Ardmore.

6.3.7 Hingaia

This area is heavily dependant on a limited number of connections to the roading network, with Beach Road/Hingaia Road providing the main east-west connection between the Southern Motorway and Karaka. The geography of the area means that no north-south routes are available, and there are very few east-west routes across the motorway.

Hingaia currently an area of lifestyle blocks with low population densities and is all but cut off from all passenger transport routes.

6.3.8 Pukekohe

Pukekohe is currently served by SH22, providing a strategic link from SH1 at Drury, and Mill Road, providing an alternative connection from Sh1 at Bombay. As noted earlier, Transit has been considering a significant upgrade to the SH22 route. This would decrease the role of Mill Road, by encouraging greater volumes of traffic to use the upgraded SH22 alternative.

Pukekohe is served by the North Island Main Trunk Line. As noted earlier in this report, consideration is being given to extending the rapid transit services from Papakura to Pukekohe.

6.3.9 Waiuku

The geographical location of Waiuku is such that accessibility is not particularly good. The main road link between Waiuku and the Southern Motorway is via SH22, and Glenbrook Road.

Waiuku is poorly served by passenger transport.

6.4 Roading Network

6.4.1 North-South Routes

Accessibility within the area by road is currently dominated by the Southern Motorway, running north-south through the region.

In the future, the extension of SH20 through to SH1 at Manukau will provide an alternative route at the northern edge of the study area. However, south of Manukau the Southern Motorway will continue to provide the single primary route, and north-south accessibility will be restricted to the following routes, primarily due to the geographic constraints of the area.

- Great South Road serves an important function for north-south traffic. However, significant development has occurred along the route, which passes through a number of key centres, including Papakura, Manurewa and Manukau CBD. The route is situated close to a number of rail stations, including Papakura, Takanini, and Manurewa. These activities compromise the extent to which Great South Road can serve through traffic. In fact, the status of a number of these areas as designated growth nodes indicates that the priority should be on walking and cycling, and accessibility of vehicles (especially buses) to serve the rail stations;
- Mill Road will play an increasingly important role for north-south traffic, to the east of the motorway;
- SH22 provides a route between Drury and Pukekohe which runs east-west between Drury and Karaka before heading south.

6.4.2 East-West Routes

The primary east-west routes will be:

- East Tamaki Road (at the northern edge of the study area), between Great South Road at Hunters Corner through to Otara via the town centre;
- Te Irirangi Drive/Cavendish Drive, with the future Liverpool-Nesdale connection providing a link around Manukau CBD across to SH20;
- SH20 Manukau Extension, providing a connection from Puhinui through to SH1. North of Puhinui it will follow a predominantly northerly route;
- Wiri Station Road, connecting Roscommon Road with Great South Road/SH1, will be "bypassed" by the above extension of SH20;
- Weymouth Road/Alfriston Road provides an east-west route between Weymouth and Alfriston via Manurewa;
- Hingaia Road/Beach Road/Settlement Road provides an east-west route between Karaka, Hingaia, and Papakura;
- Clevedon Road provides an east-west link between Papakura and Clevedon;
- SH22 Karaka Road, which leads to Glenbrook Road, provides an east-west link between Drury and Glenbrook;
- Mill Road (Franklin) provides an east-west route between the Southern Motorway at Bombay and Pukekohe.

6.4.3 Gaps in the Roading Network

A strategic traffic model has been developed for the whole study area, using the SATURN traffic modelling suite. This has been developed at a fairly coarse level, due to the strategic nature of the study, with capacities based on link attributes only, with no intersections modelled.

The base model has been "validated" to existing conditions, based on available traffic count and journey time information available from a number of sources. Full details regarding the development of the model and its validation are provided at Appendix A.

The matrices used for the base model were derived from the model developed by Becas for the purposes of the Eastern Transport Corridor study.

A future model has been developed for the year 2021. The future trip matrices for the year 2021 were also derived from the Beca model, which in turn was derived from the Auckland Regional Council's Auckland Regional Transport (ART) model. The predicted changes in demands due to the land use changes (broadly as set out in section 3 above) plus changes in travel patterns resulting from the various network proposals were applied to the validated SATURN model.

Figure 6-2 and Figure 6-3 illustrate locations of expected severe congestion in the AM and PM peaks respectively in the Do Minimum scenario 2021. The links highlighted in red are those with volume / capacity (V/C) ratios greater than 95%, and represent links where the traffic demand has exceeded practical capacity. It should be noted that this is quite a coarse measure, as the actual operation of the network will depend to a significant extent on the operation of critical intersections, and only a finite number of speed flow link types have been coded in the model. However, the following outputs have undergone a "sanity check", to confirm the indication that the following links are indeed likely to be "under pressure".

Figure 6-2 : Locations of Severe Congestion – Do Minimum AM Peak 2021

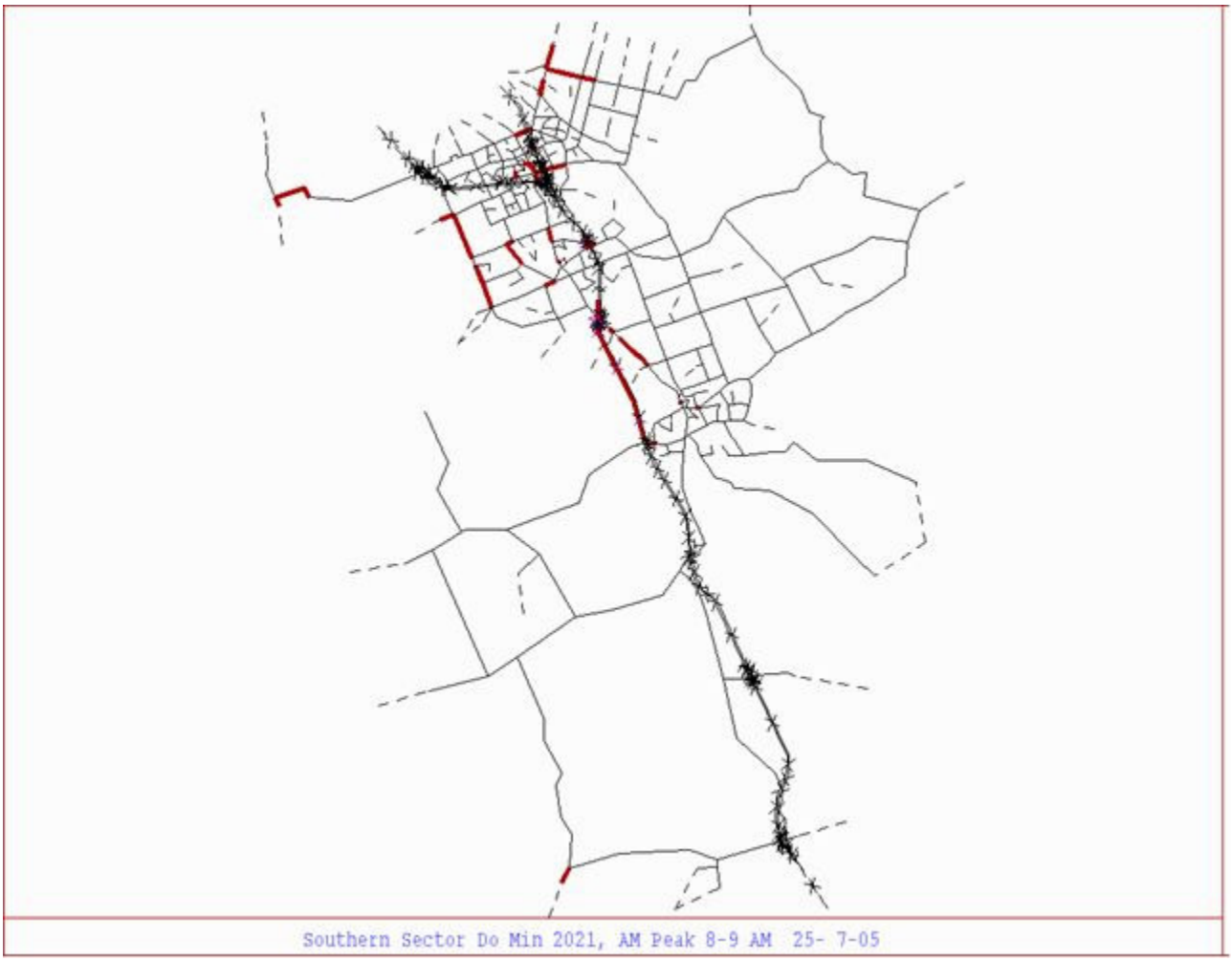


Figure 6-2 shows that in the AM Peak the following locations are exceeding practical capacity, ie have V/C ratios greater than 95%:

- SH1 Manukau Interchange;
- SH1 Hill Road / Manurewa Interchange;
- SH1 Takanini Interchange;
- SH1 between the Papakura and Takanini Interchanges;
- SH1 Papakura Interchange;
- Great South Road, at Takanini;
- Great South Road, at Manukau City Centre;
- Roscommon Road[2], south of Wiri Station Road;
- Preston Road; and
- Ormiston Road.

[2] The plots include Roscommon Road as being under significant strain - This is a combination of the course nature of the SATURN model network and high demands for access at a single point to the west of Roscommon Road. We would not expect Roscommon Road to be under such pressure as is shown in the Figures.

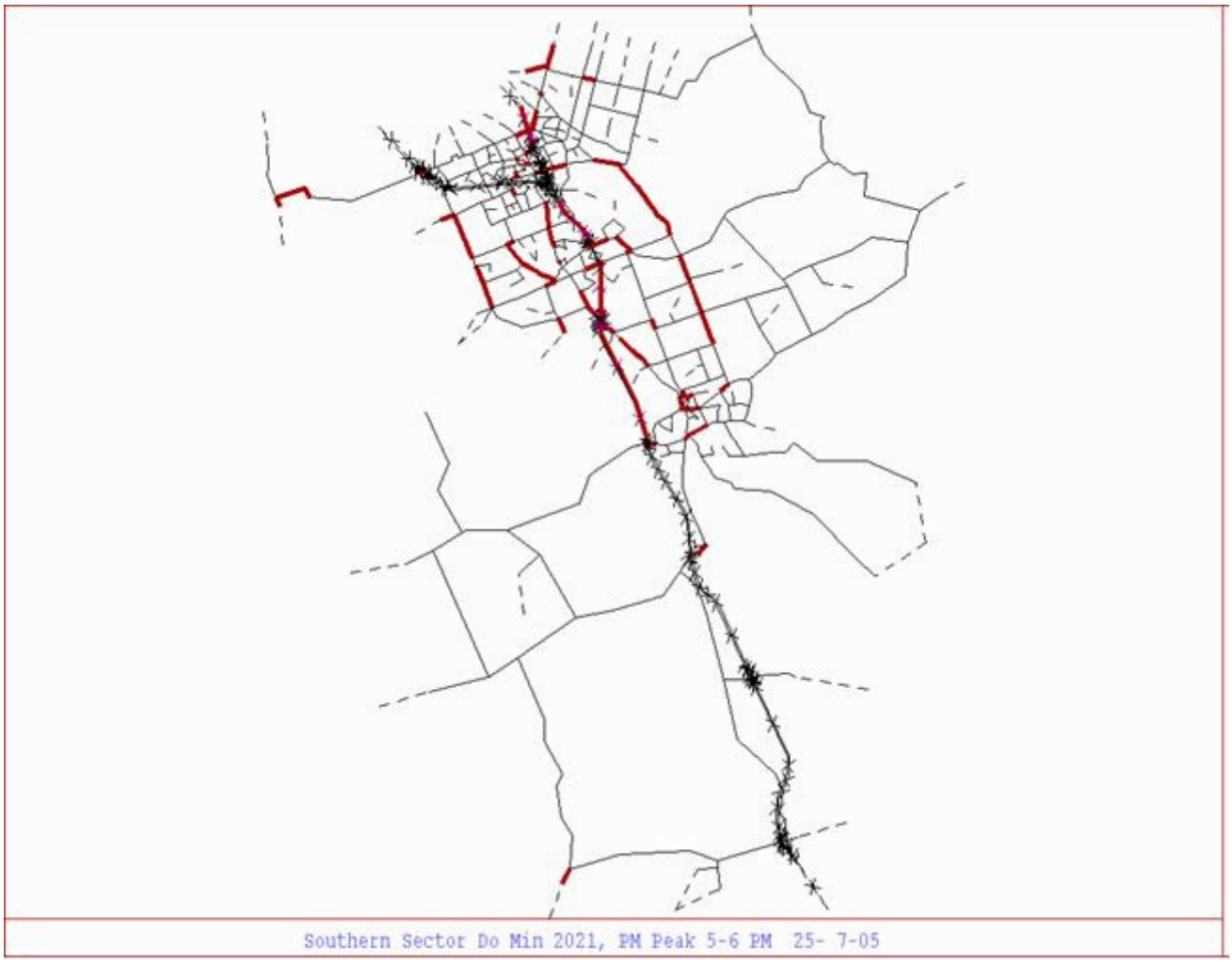


Figure 6-3 : Locations of Severe Congestion – Do Minimum PM Peak 2021

Figure 6-3 shows that the following locations are forecast to exceed capacity in the PM Peak:

- SH1 Southbound between Te Irirangi and Papakura Interchanges;
- SH1 Te Irirangi Drive Interchange;
- SH1 Manukau Interchange;
- SH1 Hill Road / Manurewa Interchange;
- SH1 Takanini Interchange;
- SH1 Papakura Interchange;
- Papakura Town Centre;
- Great South Road, at Wiri;
- Great South Road, at Takanini;
- Redoubt Road;
- Roscommon Road[1], south of Wiri Station Road;
- Mill Road;
- Preston Road; and
- Ormiston Road.

The Scoping Report tentatively proposed theoretical capacities for motorways and arterials. The true capacity of a road depends on the ratio of peak to off peak traffic flows and, for arterials, the capacity of any intersections and the number of accesses to the road (commonly referred to as side friction). However the following two-way capacities were suggested, as shown in Table 6-3.

Table 6-3 : Theoretical Two-Way Traffic Flow Capacities of Motorways and Arterials

Road Class	Capacity (Veh/day)
Motorway: three lanes per direction	120000 (two-way)
Motorway: two lanes per direction	80000 (two-way)
Arterial: two lanes per direction	40000 (two-way)
Arterial: one lane per direction	20000 (two-way)

As noted at Section 3 above, the Southern Motorway is the key traffic link serving the Southern Sector. However, Table 6-3 above indicated that the motorway will be under significant pressure in the future.

The capacity of the two lane per direction section of the Southern Motorway (SH1) between the Takanini Interchange and the Drury Interchange is approximately 80000 veh/day. However the 'practical' capacity of the link would be expected to be between 85 to 90% of this figure. The 2004 and expected 2021 ADT flows are contained in Table 6-4.

Table 6-4 : Existing (2004) and Predicted (2021) daily traffic flows on Southern Motorway (vehicles/day, two way)

Southern Motorway (SH1) Location	Existing (2004) daily flow	Predicted daily flow in 2021	Difference %	Degree of Saturation
Hill Road to Takanini	68200	106600	+56%	135%
Takakini to Papakura	63700	98800	+55%	125%
Papakura to Drury	49600	80700	+63%	100%
Drury to Ramarama	34700	63300	+82%	80%

Note: (1): the capacity and degree of saturation relates to the section with two lanes/direction

Figure 6-4 below provides a comparison between the existing (2004) and predicted daily flows on each link and ramp along the Southern Motorway.

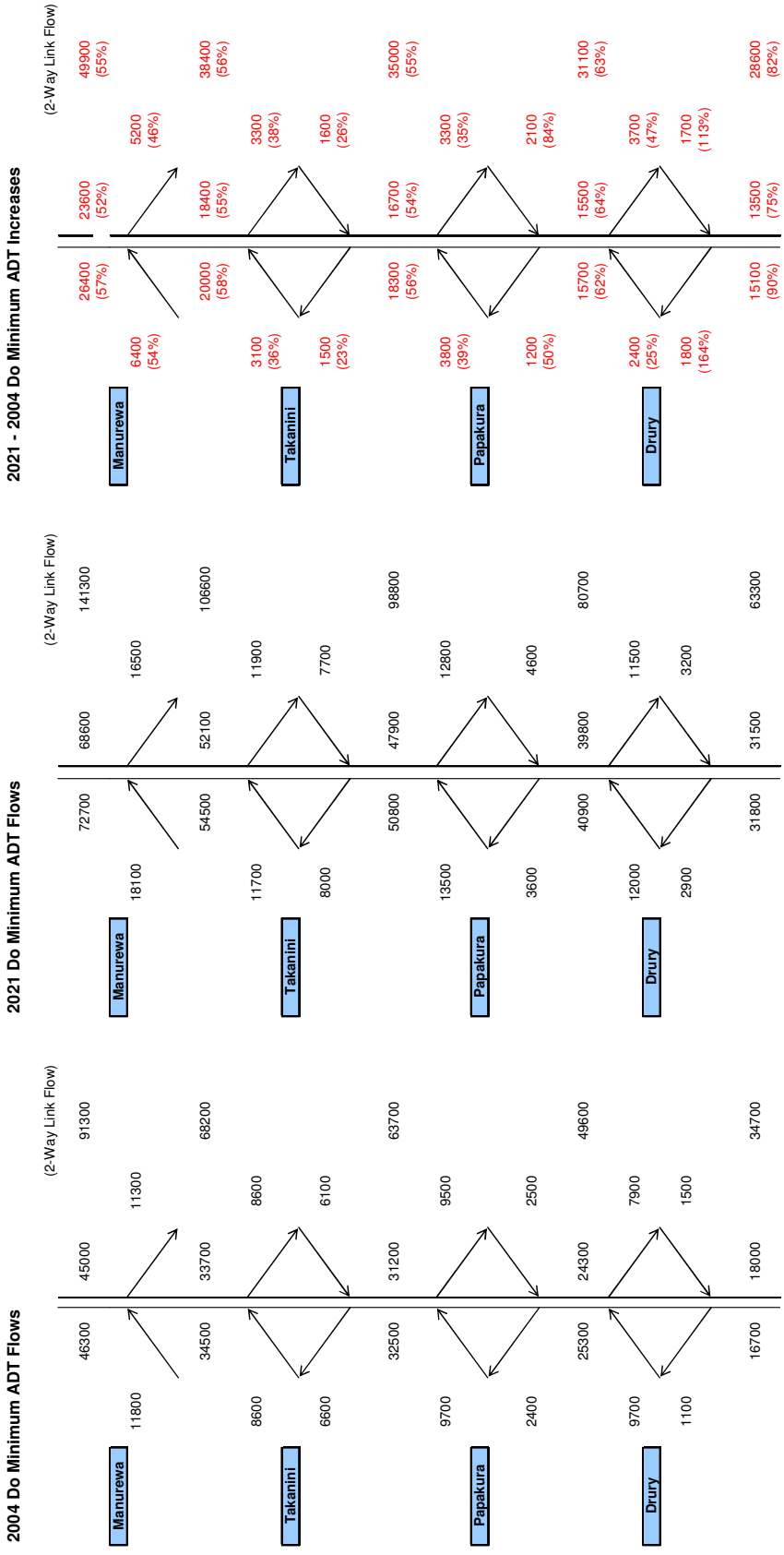


Figure 6-4 : 2004 – 2021 Do Minimum Average Daily Traffic Comparison

Table 6-5 shows that with the 2021 Do Minimum network, traffic demand on the Southern Motorway is expected to exceed the theoretical capacity between the Takanini Interchange and the Drury Interchange. The need for increased capacity is greatest for the motorway section between the Takanini Interchange and the Papakura Interchange.

Table 6-5 shows a linear extrapolation of the expected traffic flows at the three more critical sections of SH1.

Table 6-5 : Extrapolation of Expected Traffic Flows on the Southern Motorway (vehicles/day, two way)

Year	Hill Road / Manurewa to Takanini	Takanini to Papakura	Papakura to Drury
2004	68,200	63,700	49,600
2006	72,700	67,800	53,300
2009	79,500	74,000	58,700
2012	86,300	80,200	64,200
2015	93,000	86,400	69,700
2018	99,800	92,600	75,200
2021	106,600	98,800	80,700

Table 6-5 indicates that the section of SH1 between the Hill Road / Manurewa and Takanini interchanges is likely to reach theoretical capacity around 2009, and it is almost at its practical capacity already.

The section of the motorway between the Takanini and Papakura Interchanges is likely to reach theoretical capacity between 2009 and 2012, and is likely to be at practical capacity within the next few years.

The section between Papakura and Drury is expected to reach theoretical capacity between 2018 and 2021. Practical capacity for this section may be reached around 2015-2018.

6.4.4 Journey Times

Comparison of modelled journey times on the Southern Motorway (SH1) is a useful indicator to illustrate the expected levels of service and traffic congestion on the network in the future. The journey time comparisons for the peak direction (AM Peak northbound, and PM Peak southbound) are shown in Table 6-6 for the 2004 and the 2021 Do Minimum.

Table 6-6 – Journey Time Comparisons along Southern Motorway (minutes)

From	To	AM N/B: 2004	AM N/B: 2021 Do Minimum	PM S/B: 2004	PM S/B: 2021 Do Minimum
Ramarama	Takanini	8.5	13	6	33
Takanini	Te Irirangi	4.25	9.25	10.5	30.25
Ramarama	**Te Irirangi Drive**	**12.75**	**22.25**	**16.5**	**63.5**

Table 6-6 shows that journey times in the AM Peak Northbound 2021 are expected to increase more than 70% from those currently experienced. Journeys are expected to take approximately three times longer southbound in the PM Peak 2021 than those observed in 2004. Congestion is forecast to be most severe between Te Irirangi Drive Interchange and Takanini Interchange.

6.5 Passenger Transport Services

The passenger transport system in the southern sector will comprise:

- Improvements in the frequency and quality of rail services as far as Papakura, possibly to be extended to the south;
- Possible rapid transit links to the Airport and to Flatbush;
- Bus lanes along the length of Great South Road;
- Bus services along a number of north-south routes, especially Great South Road, Springs Road, and Chapel Road;
- Bus services along a number of east-west routes, including Alfriston Road.

6.5.1 Gaps in the Passenger Transport Networks

It is difficult to accurately set out gaps in the future passenger transport network, as the level of bus services in particular will only be determined closer to the time when additional services are considered to be required. Furthermore, there are a number of ongoing studies which will address the provision of passenger transport services, namely:

- The Regional Passenger Transport Network Plan, a study which is being undertaken for ARTA;
- The Rapid Transit Study, being undertaken for the ARC.

However, the following areas would appear to be poorly served by passenger transport based on our understanding of future services identified to date:

- Hingaia is a development area which appears to be poorly served by passenger transport;
- It would appear that there is scope to improve the north-south routes between Papakura to East Tamaki (ie along a route to the east of the Southern Motorway and Great South Road);
- There are relatively poor services currently envisaged between the employment zone around the Airport and Manukau CBD;
- There is as yet no commitment to the suggested services between Manukau CBD and Flatbush, nor to the bus lanes shown in the "high" passenger transport scenario, along Chapel Road.

6.6 Identification of Schemes to be evaluated

This section has identified a number of issues to be addressed in the Southern Sector. Those to be considered and fully evaluated in the following sections are as follows:

- Improvements to the Southern Motorway, to provide additional lanes;
- Extra interchanges along the Southern Motorway, in order to provide relief to a number of existing interchanges or to redistribute traffic;
- Four laning of SH22, between Drury and Pukekohe;
- Upgrading of the status of Mill Road (Papakura/Manukau), to provide an alternative North-South Road which reduces pressure on the Southern Motorway and Great South Road;
- The provision of a link between Weymouth (southern tip of Manukau) and Karaka (northern tip of Franklin), to reduce pressure on SH22 and the Southern Motorway. This could be an alternative to the option to upgrade SH22;

The above section also identified a number of issues to be addressed in the Southern Sector which will not be fully considered and fully evaluated in the following sections, as follows:

- Additional rapid transit links. The examination of these issues as part of this study should be limited as ARTA needs to guide direction of rapid transit, and the studies, noted above, are the correct "vehicles" to progress this debate. But we need to comment on extension of rapid transit on Southern Corridor, Park and Ride at Drury and Pukekohe, desirability of rapid transit to Flatbush and the Airport.

The implications of the implementation of the draft rail business plan need to be considered. As noted above, extensions of rapid transit are to be considered by other studies. However, the following issues are of relevance to this study:

- ***Location of park and ride facilities:*** It has been suggested that Park and Ride is an inefficient use of premium land within identified growth centres, and such facilities will encourage unwanted traffic into these areas at peak times. For example, the Park and Ride facility at Papakura could be relocated out to Drury, at the urban fringe, if rapid transit services are extended;
- ***Issues relating to level crossings:*** The intended increases in the frequency of rail services will increase pressure at a number of level crossing sites, predominantly situated within Papakura District. The costs of possible grade separation or the implications of possible closure of traffic routes need to be fully recognised in any studies undertaken with respect to rail upgrades;
- ***Issues relating to electrification:*** Electrification will require numerous structures to be raised to provide sufficient clearance. The costs and effects of disruption need to be recognised;
- ***Gaps in bus networks:*** These will not be examined in detail within the following sections, as issues are likely to be resolved as they arise. However, the potential for each of the various road links to be evaluated to be incorporated within the future bus network will be considered;
- ***Pedestrian and Cycle Issues:*** This is strategic study, and pedestrian and cycle links will generally form "local" connections. However, it is acknowledged that walking/cycling should be encouraged by land use/transportation integration and pedestrian/cycle needs should be at the forefront of future infrastructure planning. In particular, the needs of pedestrians and cyclists should be considered to be paramount within growth centres.

The previous section of the report noted that the Southern Sector is currently over-dependant on the Southern Motorway. This will be eased north of Manukau by the southern extension of SH20, and to a certain extent either the Mill Road link or the Weymouth to Karaka Link will improve the situation to the south. However, the concept of a long term need to provide a "proper" alternative to the Southern Motorway, maybe linking into SH2 toward Maungatawhiri or SH1 south of Bombay, has been raised during the course of this study, to reduce the impact of apparently minor incidents and improve the accessibility between the Auckland and Waikato regions. It has been agreed with the project group that this is an issue that is beyond the scope of this study.

7 Option Development

Following the gap analysis of the previous section, nine options were identified for "full evaluation" as described in the following sections. A rough order cost for each option has also been provided. Assumptions and details comprising the costs are given in Appendix B for reference.

7.1 Option 1: Motorway Widening and SH22 Four-Laning

Option 1 comprises the Do Minimum network with addition of the following schemes:

- Southern Motorway (SH1) widened to three lanes in each direction from Drury Interchange north, to tie into the existing three lane sections between the Takanini and Hill Road Interchanges;
- Papakura Interchange is upgraded to a full diamond;
- New full diamond interchanges are provided at Park Estate Road, Alfriston Road, and Quarry Road; and
- SH22 at 100kph with four lanes realigned north of the North Island Main Trunk Railway line from Karaka Road at approximately McPherson Road to Paerata Road north of Paerata township.

Option 1 is estimated to cost $475M.

7.2 Option 2: Mill Road

Option 2 comprises improvements to Mill Road, between Manukau and Papakura, and on to Drury. This scheme was devised as a route which will serve as an important north-south route, linking a number of the growth centres (Papakura, Takanini and through to Manukau CBD and Flatbush, and bypassing Manurewa). It also has the potential to be developed as a significant public transport corridor, considerably expanding both bus and general traffic and freight connectivity throughout the region. The latter of increasing significance given the expanding commercial and industrial land use towards the southern end of the proposed corridor.

The study has considered a number of variants for this concept.

- Firstly it could operate as a fairly low speed route, with frontage access along its length, or a higher speed route with limited access, with existing properties served by service roads;
- Secondly, the route could be considered as well as or instead of the Option 1 proposals to upgrade the Southern Motorway.
- Thirdly, options for the southern termination of the scheme have been considered. It was initially assumed that the route would pass round Papakura and tie back into the Southern Motorway at Drury. However, a variant would be for the route to continue to a new interchange at Quarry Road, south of Drury.
- All variants of Option 2 would significantly improve the connectivity of the local areas with the rest of the region. The corridor would strengthen and enhance existing links and provide new connections to growth centres such as East Tamaki, Botany and Flatbush.

Option 2A comprises the Do Minimum network with addition of the following schemes:

- Murphys Road would be upgraded to a four lane 70kph route between Stancombe Road and Redoubt Road. This arterial would continue along a realignment of Redoubt Road to Mill Road in the vicinity of the Redoubt Road / Mill Road intersection, and along Mill Road to Alfriston Road;

- A new limited access, 100kph four lane corridor would run parallel and adjacent to Mill Road and Cosgrave Road from Alfriston Road to Wairoa Road. The route would then skirt Papakura to the east of Dominion Road, before crossing Settlement Road and Hunua Road at approximately the Hunua Road / Boundary Road intersection;
- A new 100kph four lane corridor would run from Hunua Road south, crossing Ponga Road east of Opaheke Road and joining Waihoehoe Road west of Fitzgerald Road. Connections along Waihoehoe Road and Great South Road to the Drury Interchange would be upgraded to a similar standard.
- It is anticipated that this route is unlikely to be conducive to high passenger transport patronage, due to the surrounding land-uses, limited access and associated adjacent residential densities. Areas of minimal density do not gain extensive nor committed user support.

Option 2A is estimated to cost $700M.

Option 2B would comprise the Option 2A network with Mill Road / Cosgrave Road being upgraded to 70kph with frontage access on the existing alignment between Alfriston Road and Wairoa Road. The route then continues at the same standard on Dominion Road from Clevedon Road to Hunua Road, where the 100kph route as described in Option 2A resumes.

- The low speed variant of the Mill Road option is supportive to the provision of comprehensive measures to support local and citybound bus services. The demarcation of Mill Road as a significant bus corridor in the future will not only support the adjacent land use but will also potentially fit into a network combined with the Great South Road corridor.
- This option would allow greater bus penetration given the increased access available over the higher speed option (2a), thus it would allow greater connectivity by bus than the other option whilst still providing for general traffic access as per option 2a.
- This option is the converse of Option 2A, where the route is expected to command better patronage, due to higher levels of density, within and in close proximity to the corridor.

Option 2B is estimated to cost $505M.

Option 2C would comprise Option 2B plus the upgrades to SH1 and SH22 as detailed in Option 1.

Option 2C is estimated to cost $980M.

Option 2D would comprise Option 2C with the new link between Papakura and Waihoehoe Road continuing south to the west of Fitzgerald Road and Brookfield Road, to a new full diamond interchange on SH1 at Quarry Road. Great South Road would be upgraded between the Quarry Road Interchange and Karaka Road to two lanes per direction at 100kph.

Option 2D is estimated to cost $1,000M.

7.3 Option 3: Weymouth – Karaka Route

Option 3 would provide a route between Weymouth and Karaka. This scheme was devised as a route which will reduce pressure on SH22 Karaka Road and the Southern Motorway between Drury and Manukau. A number of permutations have been considered:

Option 3A comprises the Do Minimum network with addition of the following schemes:

- A new four lane 100kph corridor would run north from the intersection of Karaka Road / Paerata Road / Glenbrook Road to Hingaia Road, east of Urquhart Road;

- The 100kph four lane corridor would then continue north across the Papakura Channel from east of Karaka Point to Te Pua Point, and along Weymouth Road where the speed limit would reduce to 50kph; and
- The corridor would tie into the existing four lane section on Roscommon Road, south of Browns Road.

Option 3A is estimated to cost $650M.

Option 3B would be Option 3A, as set out above, plus the upgrades to SH1 and SH22 as detailed in Option 1.

Option 3B is estimated to cost $1,125M.

Option 3C would be Option 3B, without upgrades to SH22, but including upgrades to SH1.

Option 3C is estimated to cost $860M.

7.4 Option 4: Option 2D With Revised SH22 Alignment

Option 4 would be similar to Option 2D, but it would include a new alignment for SH22 to the south of the North Island Main Trunk Line (approximately along the straight section of Burtt Road), linking to the new interchange at Quarry Road.

Option 4 is estimated to cost $1,010M.

7.5 Consideration of Cycling and Walking

This is a strategy study which has looked at strategic linkages. It has been assumed that all options will need to provide for cycling and walking, to the extent that the demands of the corridor allow and are implemented and maintained to a high standard.

8 Option Evaluation Criteria

An option evaluation methodology has been developed, which is firmly driven by the requirements of the Land Transport Management Act (LTMA). This methodology was derived from two key sources:

- The methodology used for the Eastern Transport Corridor;
- The work undertaken by the ARC recently for the Regional Land Transport Strategy.

Packages of projects have been evaluated based on seven performance criteria, namely the five principles of the New Zealand Transport Strategy, the extent to which they support the growth strategy, and cost effectiveness. The evaluation has been based around the criteria identified by the ARC, as follows:

Table 8-1 : Option Evaluation Criteria

Objective	Performance Indicator
Assisting economic development	Accessibility to employment opportunities Accessibility to, between and within key economic and knowledge centres General accessibility Reliability and transport network resilience
Assisting safety and personal security	Accidents, injuries and deaths Actual and perceived levels of security Affect on vulnerable users
Improving access and mobility	Connectivity Availability of travel choices to key destinations General accessibility Impact on those without access to a car Share of trips by public transport Consideration of people with disabilities
Protecting and promoting public health	Share of trips by active modes: walking; cycling Emissions to air and water Noise and vibration
Ensuring environmental sustainability	Emissions to air, water and land Use of non-renewable resources Impact on heritage, cultural, visual, landscape and ecological sites Energy efficiency and greenhouse gas emissions Community severance

Objective	Performance Indicator
Supporting the Growth Strategy	Relative accessibility to, within and between key RGS growth centres Community coherence Level of fixed PT as pre condition for centre growth
Cost effectiveness	Affordability Benefit/cost analysis

Before that assessment, the project packages were assessed for "fatal flaws", by considering:

- Are they feasible to construct (various engineering issues)?
- Are they consistent with any strategic objectives?
- Are there fatal or serious Part II RMA or Historic Places Act flaws?
- Are they affordable?
- How do components of the packages fit together (ie are there synergies or areas of incompatibility)?

The evaluation included comments on the key risks with each of the packages.

Each of the packages of options have been assessed against the objectives using simple "scores", from "significant positive" to "significant negative" (see Appendix C). Supporting information is provided in the appendix to demonstrate how this "rating" was achieved, including the main areas of difference between options on each objective that have led to a different rating.

It is noted that emphasis in transportation planning is changing. Rather than necessarily seeking to provide for any predicted demands, the study has had to include:

- Proper consideration of the environmental implications of transportation schemes;
- Consideration of the extent to which demands for travel can be modified, both by the form of transportation investment and the form of development.

9 Option Evaluation

This chapter discusses the option evaluation based on the criteria discussed in the previous chapter. It also presents the outputs from the traffic modelling process. The options are shown in Figure 9-1.

The evaluation will summarise the effects of each option in real terms, eg in describing connections between nodes or where an option reduces traffic demand on other corridor links. It will also include discussion on other aspects such as passenger transport issues (whether the scheme would support or detract from passenger transport accessibility), freight and engineering feasibility. This will be combined with traffic modelling outputs showing flows on each option, changes in other roads and thus the traffic benefits of each scheme.

This chapter is based around the option evaluation workshop undertaken in May 2005. The outputs from that meeting and option evaluation weighting given to each option are contained in Appendix C.

The basic effects of the different options can be quantified by the change in ADT between the 2021 Do Minimum and the option being considered.

Daily two way flows are compared at 16 locations as detailed below and illustrated in Figure 9-2:

1 New Weymouth to Karaka Link;

2 Hingaia Road;

3 Karaka Road;

4 New SH22;

5 SH1 south of Quarry Road Overbridge;

6 New Drury to Papakura Link;

7 Great South Road, north of Drury Township;

8 SH1 north of Drury Interchange

9 SH1 south of Takanini Interchange;

10 Mill Road south of Airfield Road;

11 New Mill Road Limited Access Route;

12 Redoubt Road;

13 Roscommon Road north of Weymouth Road;

14 Great South Road north of Mahia Road;

15 Great South Road north of Walters Road; and

16 Porchester Road south of Airfield Road.

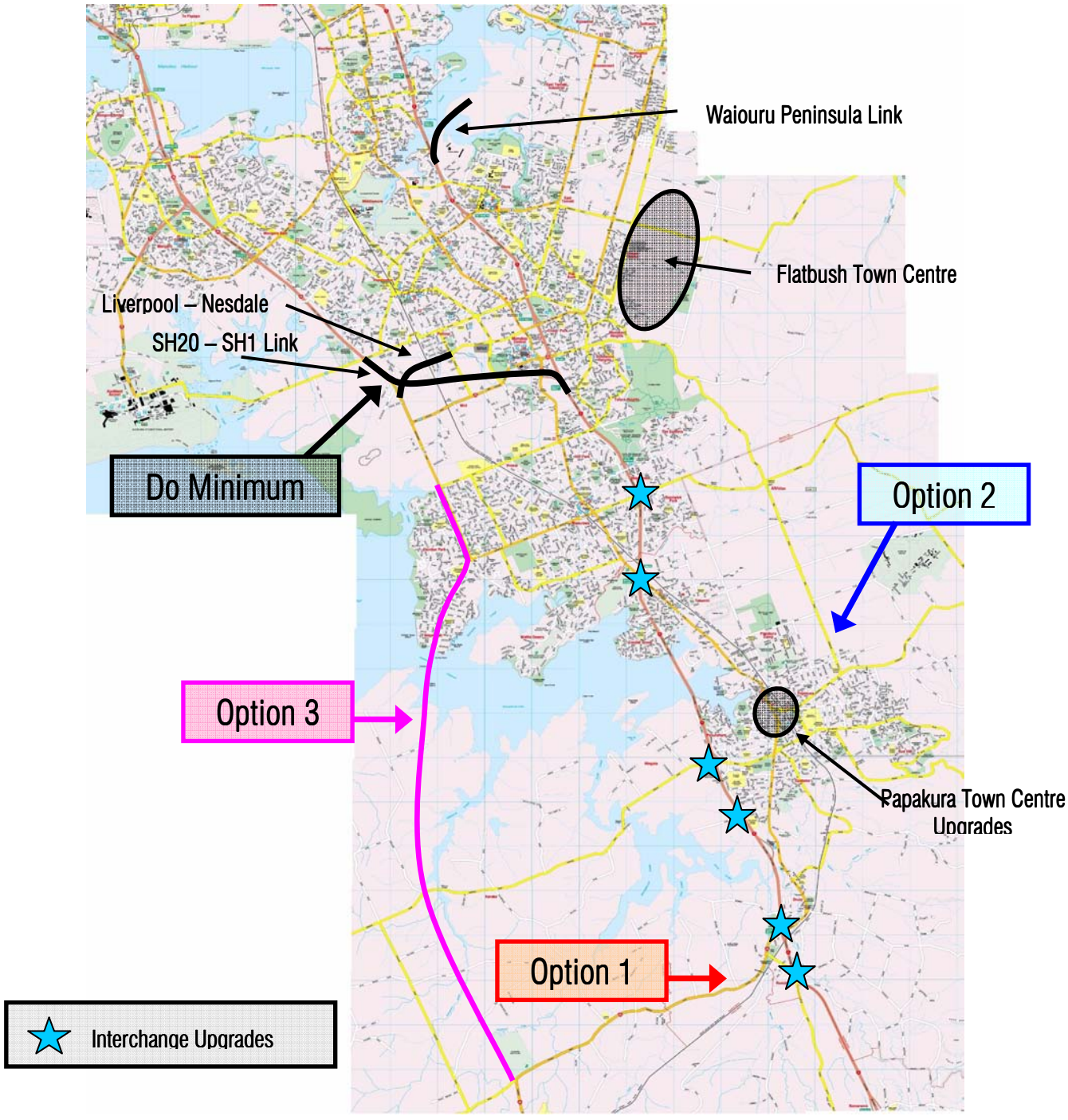


Figure 9-1 : Option Concepts

9.1 SATURN Modelling Results

The following sections address the effects of the proposed options on an individual basis. Only significant changes in network traffic are discussed in detail. Comparisons are only made between the considered option and the Do Minimum networks using expected 2021 traffic flows. ADTs are rounded to the nearest 100 vpd.

Appendix D contains an ADT comparison table for all options against both the Do Minimum and Option 1.

9.2 Regional Growth Strategy Assumptions

Adherence to the Regional Growth Strategy is one of the evaluation criteria used within the evaluation process. The basic tenet of the Regional Growth Strategy is that urban growth should be managed through a mixture of intensification and greenfield development within the Metropolitan urban limits. This is a shift from market forces and some existing District Plans that favour greenfield development exclusively of low density detached housing.

Greenfield development should also be a mix of intensification and low density to reduce sprawl, provide vibrant walkable town centres and the choice of detached housing that is suitable for families. Therefore the transport mix in these greenfield areas is important to:

- Provide accessible public transport connections for people living in higher density town centres;
- Reduce car dependence in low-density suburbs by providing park & ride transit stops or direct feeder bus routes to transit services;
- Separate or design out conflicts between pedestrian access to town centres/transit and arterial roads.

This is the new type of suburban development that should be planned for in Flatbush, East Tamaki and Hingaia urban growth areas in the Southern Sector. Flatbush already has a proposed urban form that includes a compact walkable town centre, outer areas of varying density, higher density housing on main bus routes all within a more ecologically sustainable urban "footprint". The urban design assessment of Southern Sector options is based on this vision of future urban form.

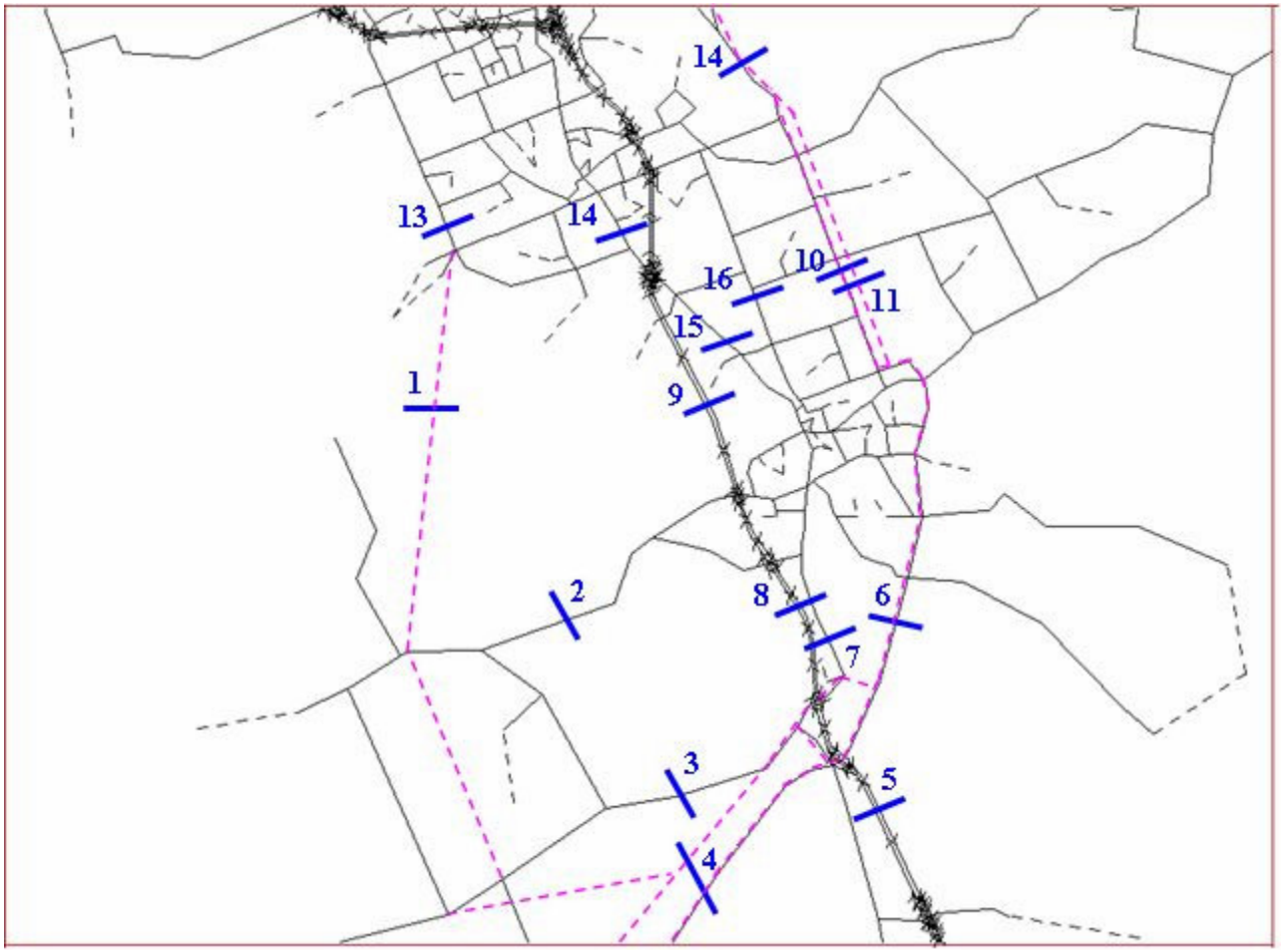


Figure 9-2 : Location of Demand Flow Comparisons

9.3 Option 1: SH1 & SH22

This option comprises upgrading of the Southern Motorway to three lanes/direction between north of Takanini and Drury, plus the provision of new or upgraded interchanges. A new alignment is assumed for SH22, from Drury to Pukekohe, along the alignment proposed by the Draft Scheme Assessment Report prepared for Transit, alongside the rail corridor.

A key issue in developing this option has been to confirm the practical feasibility of providing additional ramp connections along the Southern Motorway. The following issues have been identified:

- North facing ramps will be somewhat difficult to achieve without an auxiliary lane arrangement, due to the proximity to the existing Hill Road ramps. Additional widening will therefore be needed between Alfriston Road and Hill Road;

- The southbound on-ramp from Park Estate Road will be far too close to the existing Papakura services area. A possible solution could be to provide access to the services via the on-ramp, requiring traffic to leave the motorway via the new off-ramp in order to access the services. This clearly would not be an attractive option for the services operator;

- It would appear to be difficult to provide north facing ramps at Quarry Road due to the proximity to the south facing ramps at Drury. Solutions could either be to remove the south facing ramps at Drury, forcing the fairly modest flows using these ramps to divert to Quarry Road, or moving the Quarry Road interchange to the south (ie the existing Quarry Road bridge would not form the basis of the interchange). Appendix E contains an assessment of interchange spacing on the Southern Motorway. Further investigations into the feasibility of including north facing ramps is being undertaken by PDC. Initial outputs from this work conclude that the design is possible at concept level, though this design has yet to undergo any further more detailed consideration by the time this report was printed.

The above may be significant practical issues, but given that alternative solutions are available, the issues are not considered to be “fatal flaws”, in that it is still desirable for the study to properly assess the effects of each of these connections.

9.3.1 Traffic Effects of Option 1 in 2021

The predicted traffic flows along the motorway with the Do Minimum scenario and Option 1, in 2021, are set out at Figure 9-3.

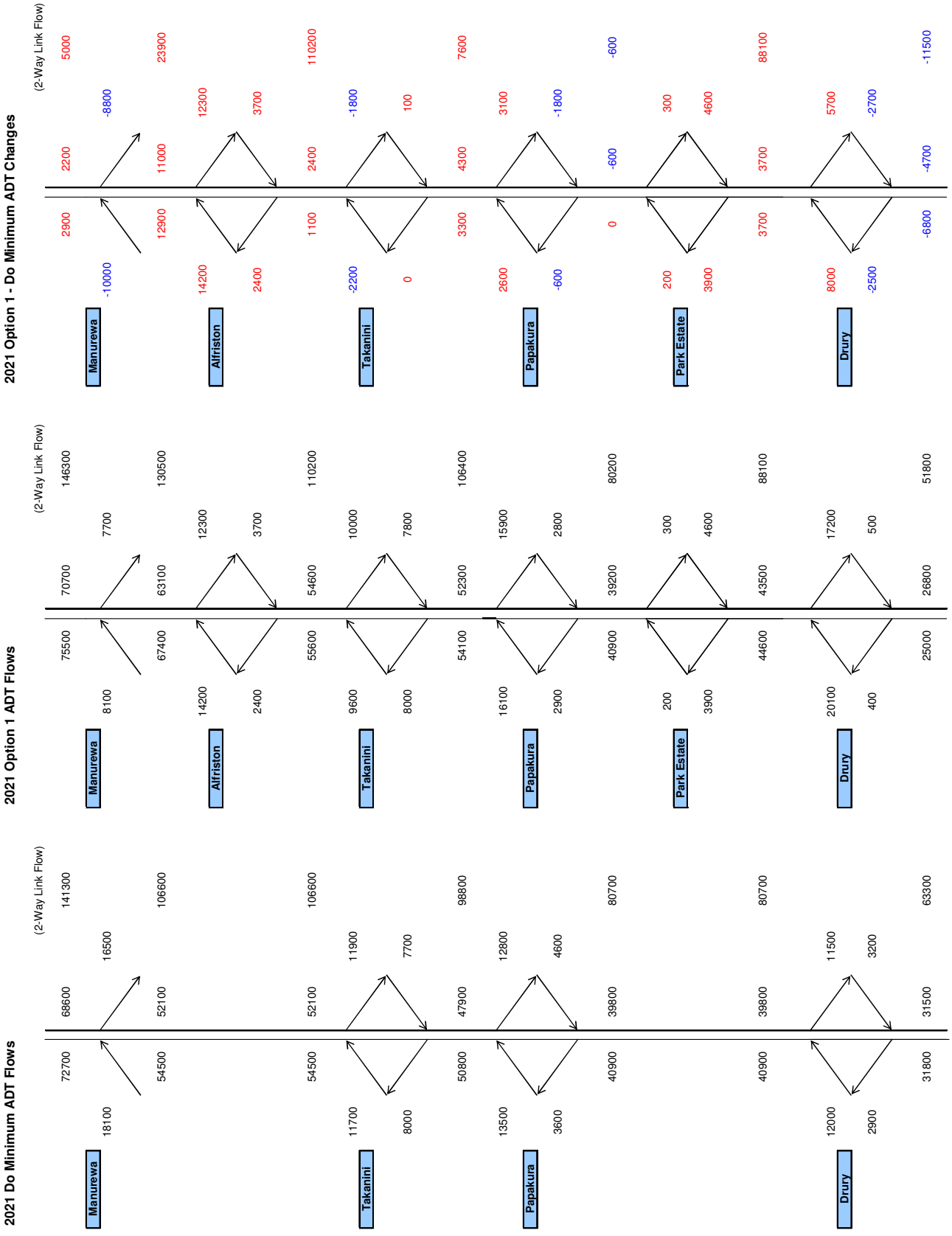


Figure 9-3 : 2021 Option 1 – Do Minimum Average Daily Traffic Comparison

The motorway is predicted to take some 5,000 to 7,000 vehicles/day more between Takanini and Drury, relative to the 2021 Do Minimum.

The effects of the new connections along the motorway are as follows:

- The Hill Road ramps are predicted to take substantial flows in the Do Minimum scenario;
- The north facing ramps at Alfriston are predicted to take significant pressure off the existing Mill Road ramps;
- The south facing ramps are predicted to take fairly modest flows;
- The north facing Park Estate Road ramps are predicted to take very modest flows, as traffic will have to go back on itself (ie head south to head north). These roads will become attractive if severe congestion builds up at the Papakura interchange, but this is not fully reflected by the coarse traffic model developed for this study;
- The south facing Park Estate Road ramps are predicted to take moderate flows, with only a minor decrease in flows at the south facing Papakura ramps;
- The Quarry Road ramps have not been modelled as part of this test. However, the predicted flows on the north facing ramps at Drury are quite substantial, indicating that an option which spreads the load may be quite attractive.

The other main traffic effects of this option are illustrated in Figure 9-4 and summarised as follows:

- The new SH22 is predicted to attract 25,200 vpd, taking 13,400 from Karaka Road, and 11,600 from SH1 South of Drury;
- Approximately 2,000 vpd less traffic is predicted on Mill Road, Porchester Road south of Airfield Road, and Redoubt Road, and 2,700 vpd less on Great South Road north of Walters Road.

Overall, the introduction of Option 1 attracts traffic away from the eastern route through Great South Road, Mill Road and Redoubt Road, while promoting use of the motorway. The new SH22 removes the bulk of traffic from Karaka Road, and approximately 20% of traffic from the motorway south of Drury.

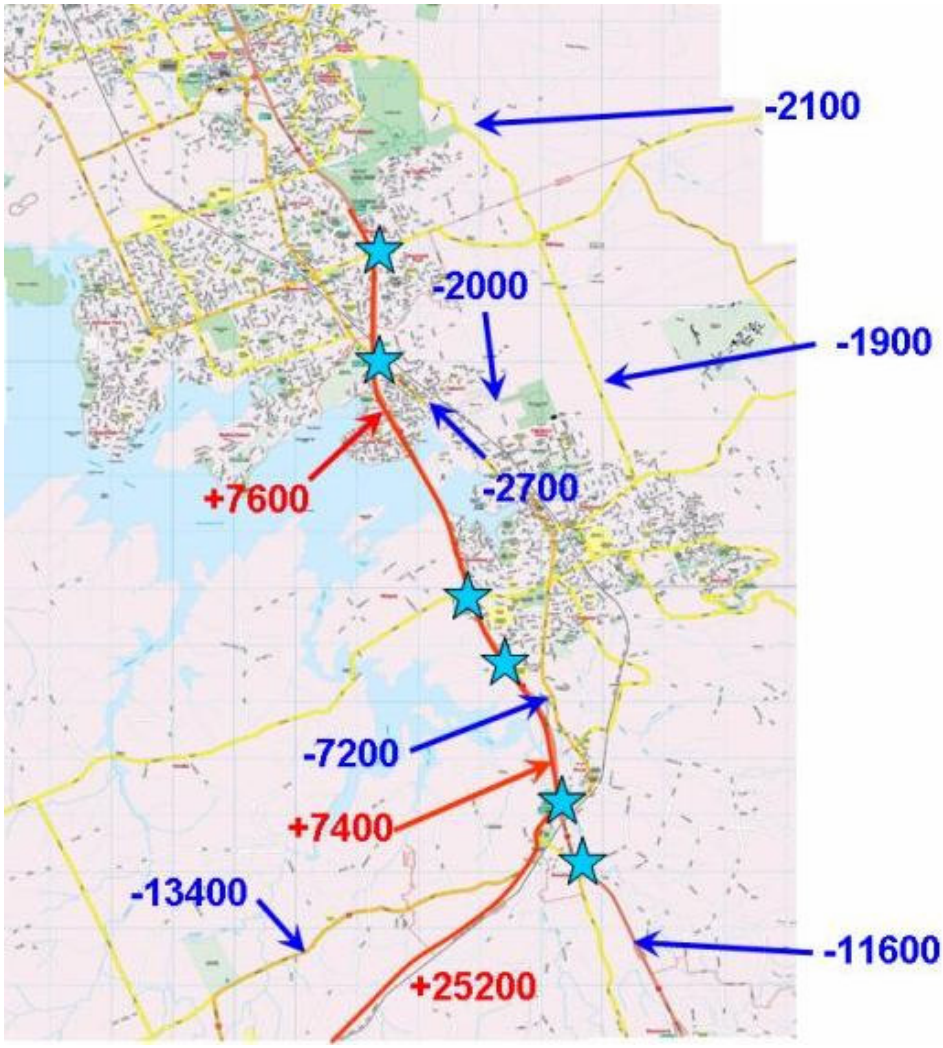


Figure 9-4 : Effects of Option 1 in 2021

9.3.2 Evaluation of Option

(a) Assisting Economic Development

The introduction of additional capacity on SH1 and the implementation of SH22 will increase accessibility for cars and freight traffic and will offer a net benefit compared with the Do Minimum. These improvements will not improve access to many growth centres in the study area, such as Flatbush, Takanini, Pukekohe and Hingaia, which will support commercial as well as the planned residential intensification.

(b) Assisting Safety and Personal Security

Enhancements to capacity and new links should result in minor accident benefits, relative to the Do Minimum. Minor benefits to vulnerable road users should be felt through traffic redistribution from local roads to the Motorway. Redistribution of traffic to SH1 should assist in increasing bus patronage on Great South Road, and an increase in people on buses, especially late at night would assist in increasing safety.

(c) Improving Access and Mobility

This option does not provide connections to new areas but does enhance links that are currently under pressure and is an improvement on the existing situation. Therefore direct access benefits are not predicted but mobility and access will improve. Some small benefit would exist in regard to promoting travel choice and accessibility via the improvements to existing infrastructure and subsequent benefits to adjacent roads such as Great South Road.

(d) Protecting and Promoting Public Health

Health benefits promoted by modes such as walking and cycling are not predicted to result from this option as no facilities are designed into either State Highway scheme. Some benefits may be achieved by the promotion of cycling, via the traffic redistribution from local roads to SH1, but this is likely to be insignificant.

Noise is not likely to significantly change as the motorway in particular already exists and trips are currently being made. The option will increase noise slightly, but in an area already affected by noise. There are currently few noise receivers along the route of the proposed SH22. There will be some minor benefits due to the redistribution of some traffic from other roads. These comment also apply to vehicle emissions that may benefit from less congestion but not to a considerable degree.

(e) Ensuring Environmental Sustainability

Community severance is not an issue with the motorway upgrade as the facility already exists. Also, it is not likely to become a significant issue with the new SH22 alignment. Emissions are likely to remain constant, relative to the Do Minimum. Heritage and cultural issues do not seem to be significant.

Creating new road links or enhancing existing ones is questionably not a good use of non-renewable (fossil fuel) resources, but reductions in congestion will reduce the amount of vehicle idling.

Overall, this option does not have any significant issues under the heading of ensuring environmental sustainability.

(f) Supporting the Growth Strategy

The development of future growth centres needs strategic transport links integrated with supportive urban design. There is a danger that the over reliance on SH1 will not support a regional framework as prescribed in the Regional Growth Strategy. This option fails to link some growth centres such as Pukekohe but does others such as Manukau CBD and Manurewa. It therefore offers limited positive benefits in terms of compliance with the growth strategy.

This option creates relatively few environmental effects given the existing motorway and designation. However, the criticism from an urban design perspective is that this should not happen if it means parallel routes of different transport function are not created. It is possible to widen SH1 and create parallel transit corridors, but widening SH1 and only providing connecting roads will favour car dependency and low-density urban form. SH1 will become congested again at a faster rate.

(g) Economic Efficiency

The undiscounted capital cost of Option 1 is estimated at $475m, resulting in a Benefit / Cost Ratio (BCR) of 1.4. This is a relatively high value (compared with the analysis of other options).

9.4 Option 2A : Mill Road (Limited Access Road)

9.4.1 Traffic Effects of Option 2A in 2021

The effects of Option 2A are illustrated in Figure 9-5 and summarised as follows:

- The new Drury to Papakura Link is predicted to take 15,100 vpd;
- The main routes to benefit from this new link are Great South Road north of Drury (-7,900) and SH1 north of Drury (-6,500);
- New Mill Road Limited Access is predicted to attract 28,000 vpd;
- These flows will come from Mill Road (12,500), SH1 south of Takanini (5,600), Porchester Road south of Airfield Road (5,500), and Great South Road north of Walters Road (2,500);
- Traffic on Redoubt Road increases by 6100 vpd.

A key issue with this option is the relatively modest reduction in flows on the Southern Motorway. This means that Option 2 on its own does not remove the need for upgrades to the Southern Motorway.

The new Limited Access Mill Road and connection from Papakura to Drury generally attracts traffic away from SH1, with a significant amount of long distance 'through' trips using the length of the new route.

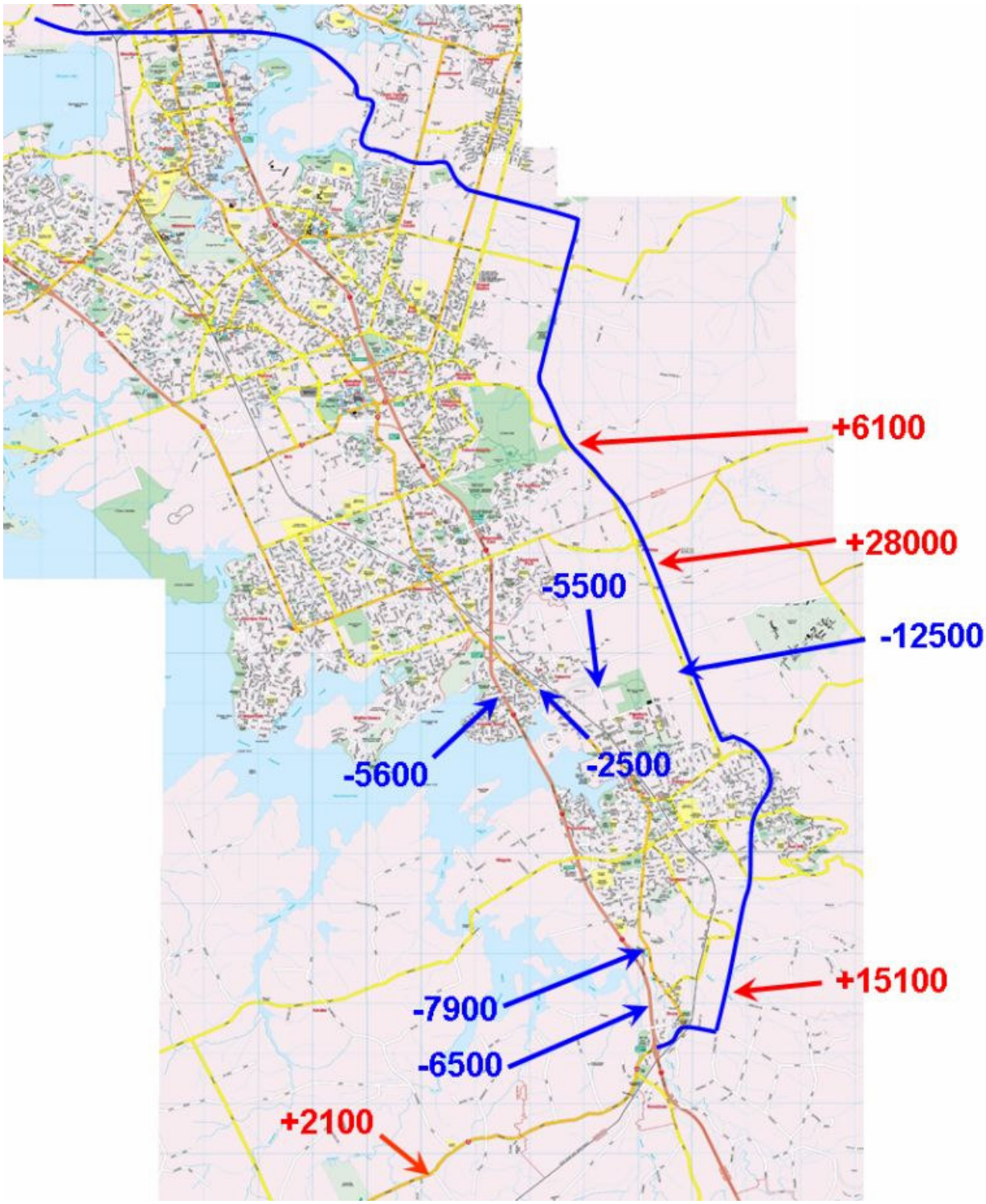


Figure 9-5 : Effects of Option 2A in 2021

9.4.2 Evaluation of Option

(a) Assisting Economic Development

The Mill Road limited access route will provide a new corridor. It will benefit economic development through improving access between Flatbush, Takanini and Papakura. Redistribution of traffic from other areas will allow for increased reliability and resilience across the network as a whole. Freight traffic will benefit but bus usage will likely only marginally gain from this option.

(b) Assisting Safety and Personal Security

The reduced local access proposed with this option will do little to increase perceptions of personal safety. The scheme should reduce accidents along the existing Mill Road route by controlling access, and there will be some associated minor benefits to vulnerable users via the redistribution of traffic from other routes.

(c) Improving Access and Mobility

The new link will increase connectivity across the region and open up new areas. It will increase travel choice to new growth areas but do little to improve the situation to those without access to a private car. The scheme will offer significant benefits for freight traffic, but benefits for buses will be confined to the benefits of reducing traffic on other routes.

(d) Protecting and Promoting Public Health

Mill Road with a higher speed environment would offer no benefits to active modes because pedestrian and cycle facilities is unlikely to be included in any design. However, the reduced level of congestion elsewhere on the network may allow minor benefits in terms of vehicle emissions. Effects from the new link on emissions to the local water catchment and through vibration will increase and are not likely to be offset from a reduction in emissions elsewhere.

(e) Ensuring Environmental Sustainability

Mill Road limited access would offer a range disbenefits to each category due to new road construction.

(f) Supporting the Growth Strategy

This scheme will connect some of the major growth centres, but will provide a route which introduces significant local severance, in a form that will support a car dominated culture. Therefore, the effects of this option on the support of the growth strategy are considered to be negative.

(g) Economic Efficiency

The undiscounted capital cost of Option 2A is estimated at $700m, resulting in a Benefit / Cost Ratio (BCR) of 1.0.

9.5 Option 2B : Mill Road – 70kph Route with Frontage Access

9.5.1 Traffic Effects of Option 2B in 2021

The effects of Option 2B are illustrated in Figure 9-6 and summarised as follows:

- The new Drury to Papakura Link is predicted to take 13,100 vpd, mostly from Great South Road north of Drury (7,500) and SH1 north of Drury (4,900);
- Traffic on Mill Road increases by 6,600 vpd, relative to the Do Minimum;
- There are corresponding decreases forecast on SH1 south of Takanini (1,500), Great South Road north of Walters Road (1,400) and Porchester Road south of Airfield Road (3,600); and
- Traffic on Redoubt Road increases by 2600 vpd.

As with Option 2A, the scheme will not offer sufficient relief to the Southern Motorway to avoid the need for widening of SH1.

Overall, Option 2B is less efficient than Option 2A at providing for trips bypassing SH1 as expected, due to its 70kph speed environment and access requirements along the route - however, traffic on Mill Road increases by about 30%.

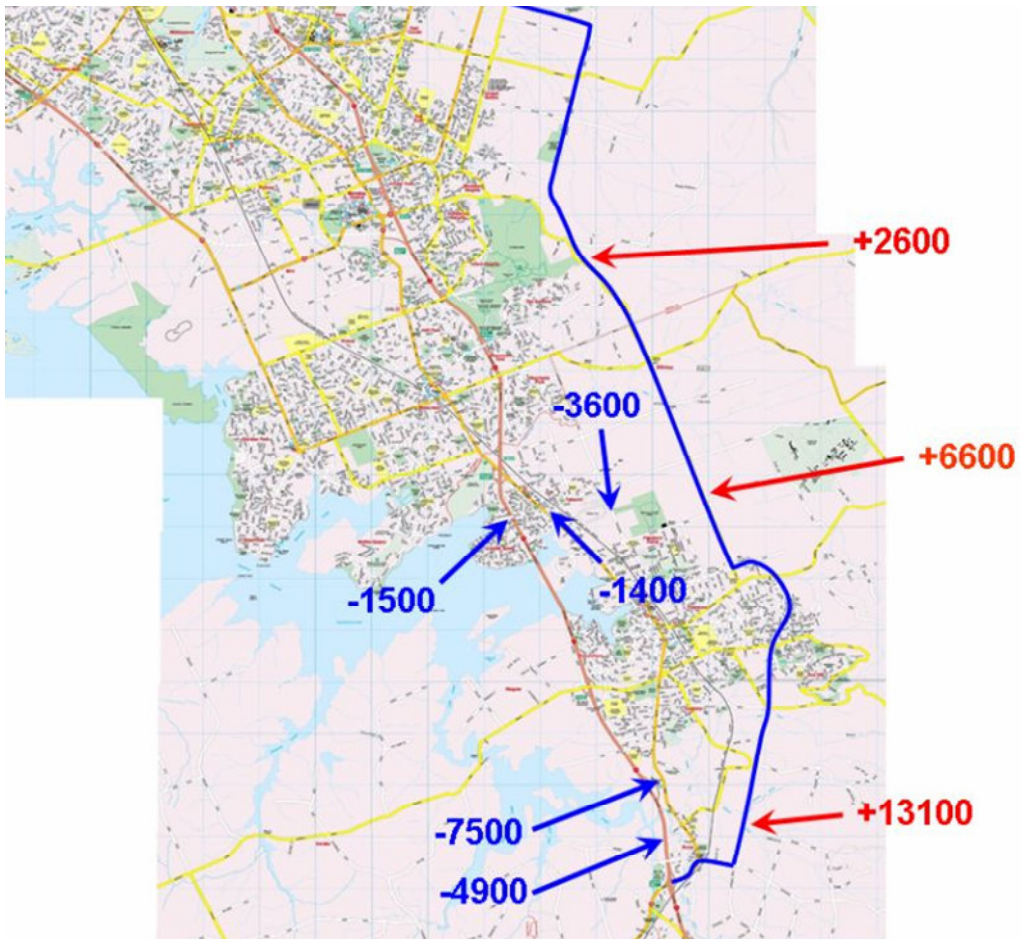


Figure 9-6 : Effects of Option 2B in 2021

9.5.2 Evaluation of Option

(a) Assisting Economic Development

Comments made with regard to Option 2A are applicable here but the lower speed environment and greater local access will offer greater benefits for local employment, via links to existing side roads. Lower speeds will make the route less effective for freight traffic but local employees would benefit from corridor having significant bus and active mode facilities built in.

(b) Assisting Safety and Personal Security

This option will provide significantly more frontage than Option 2A. Increased access lowers accident related benefits due to increases in intersection movements, but not to a significant degree. Increased accessibility on Mill Road will allow pedestrian and cycle schemes to form part of the corridor thus allowing increased benefits to vulnerable users. Growth areas such as Papakura, Takanini and Flatbush will benefit in terms of greater accessibility, and the communities will be less secluded.

(c) Improving Access and Mobility

A lower speed environment on an extended Mill Road and the creation of a new link will result in net positive benefits. Connectivity is improved due to wider local access from Mill Road as is travel choice and accessibility (to a greater degree). Benefits exist for non-car trips due to the potential for bus priority and walking and cycling schemes in a lower speed corridor that could not exist comfortably in a higher speed environment.

(d) Protecting and Promoting Public Health

Mill Road with a lower speed environment would give benefits to active modes as specific facilities can be provided in new corridor. As with Option 2A, noise and vibration will be increased by the provision of the new highway. There should be some benefits in terms of emissions, as the route is less likely to suffer from congestion over prolonged periods.

(e) Ensuring Environmental Sustainability

Mill Road with frontage access is still creating a new link and will have similar negative benefits to a higher speed option. However, community severance issues are less of a concern in the frontage access option than the limited access option.

(f) Supporting the Growth Strategy

Options 2A and 2B are clear contrasts in terms of land use development and the support of the growth strategy. The route passes through the Flatbush and East Tamaki urban growth areas. The opportunity exists with option 2B to create a parallel transit corridor to complement SH1 and the North Island Main Trunk (NIMT) Line. The route could be a multi-way boulevard that combines bus rapid transit, arterial road lanes and high amenity cycling/walking strips. The boulevard's bus services could be routed through the middle or just outside the town centres. Whatever format is decided, the route is superior in serving designated urban growth areas, and links to Te Irirangi Drive/Manukau City and Papakura for public transport connections back to NIMT Line.

Figure 9-7 shows some possibilities for separating public transport connections to NIMT Line and road connections to SH1 from a Mill Road transit corridor. Beach and Karaka Roads remain the main link for private vehicles to the existing interchange.

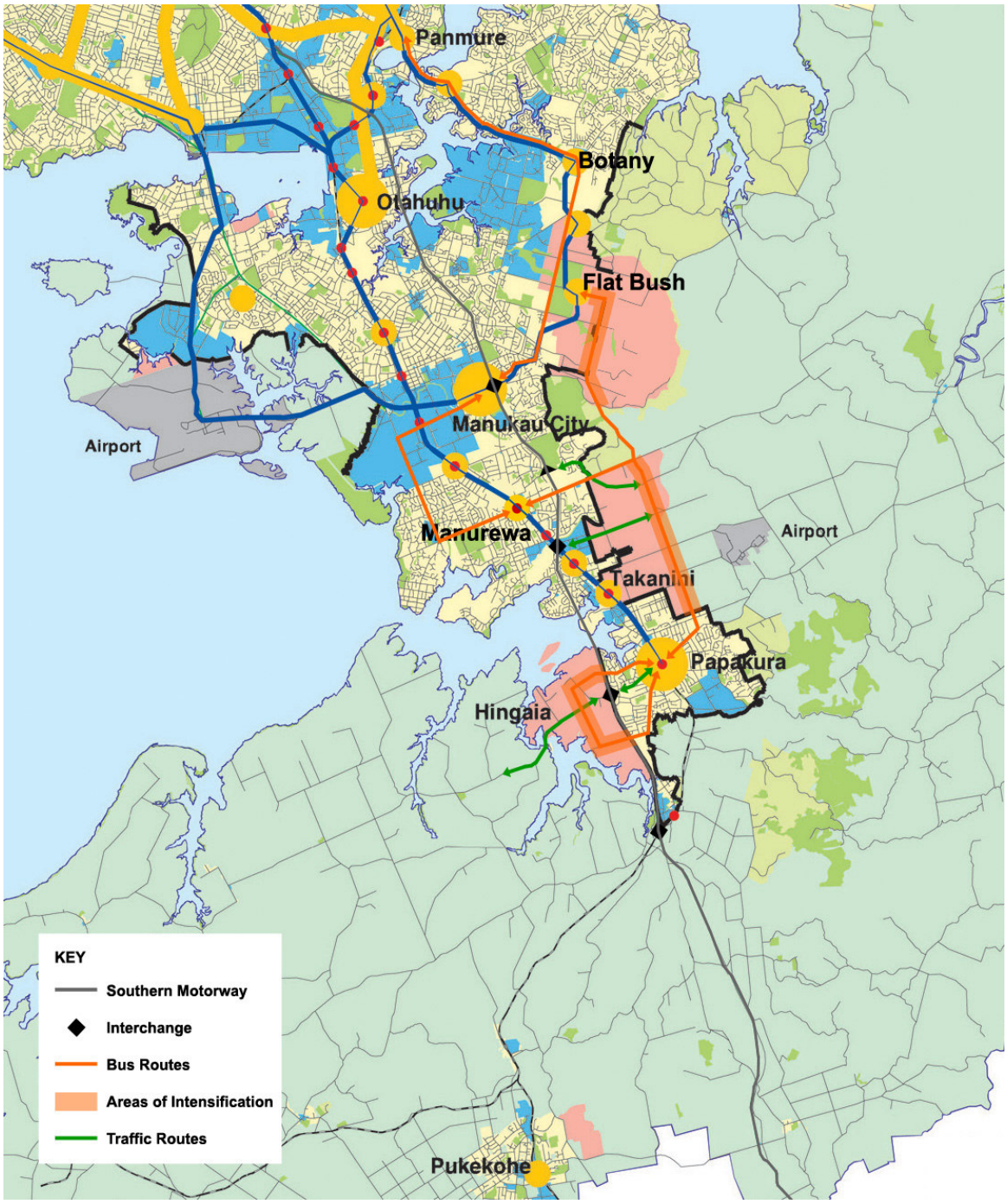


Figure 9-7 : Transport and Land Use Options

Feeder bus routes will utilise the existing Park Estate Road overbridge and a new overbridge at Pahurehure to form a simple route based around Papakura town centre and rail station. Buses will avoid the motorway interchange, and higher density housing and neighbourhood centres could be developed around the bus route.

A second feeder bus route could use Clevedon Road to access the Mill Road corridor and could link back to Manurewa rail station along Alfriston/Ranfurly Roads. Private vehicles could be encouraged to use Alfriston/Hill Roads to access the Hill Road north facing ramps, or Popes Road/Airfield Road to access the Takanini interchange. Again town centres and higher density housing can be co designed with a transport network.

Another bus route could loop from Manurewa along Weymouth Road to Clendon, north along Roscommon and Wiri Station Road to the proposed Manukau rail station and the town centre. Although Roscommon Road will combine bus and private vehicle routes, the bus route will avoid the proposed SH20 motorway interchange north of Wiri Station Road.

The last bus route could utilise Te Irirangi Drive and Ormiston Road to access Flatbush and the northern end of the Mill Road corridor. If rapid transit is extended to the Flatbush/Botany area then the Mill Road connection will become more direct.

(g) Economic Efficiency

The undiscounted capital cost of Option 2B is estimated at $505m, resulting in a Benefit / Cost Ratio (BCR) of 0.9.

9.6 Option 2C : Mill Road – As Option 2B but Including Option 1

9.6.1 Traffic Effects of Option 2C in 2021

The effects of Option 2C are illustrated in Figure 9-7 and summarised as follows:

- A flow of 25,600 vpd is forecast on the new SH22, taking 13,000 from Karaka Road, and 11,900 from SH1 South of Quarry Road;
- The new Drury to Papakura Link is predicted to take 10,900 vpd, all from Great South Road north of Drury;
- Demands on SH1 south of Takanini and Mill Road increase by 5,300 vpd, and 3,600 vpd respectively;
- Corresponding decreases in traffic flow are forecast on Porchester Road south of Airfield Road (5100 vpd), and Great South Road north of Walters Road (3400 vpd).

Option 2C removes a significant amount of traffic away from the eastern Mill Road route predicted with Options 2A and 2B, and reassigns it to SH1. The new SH22 relieves traffic from Karaka Road and SH1 south of Drury.

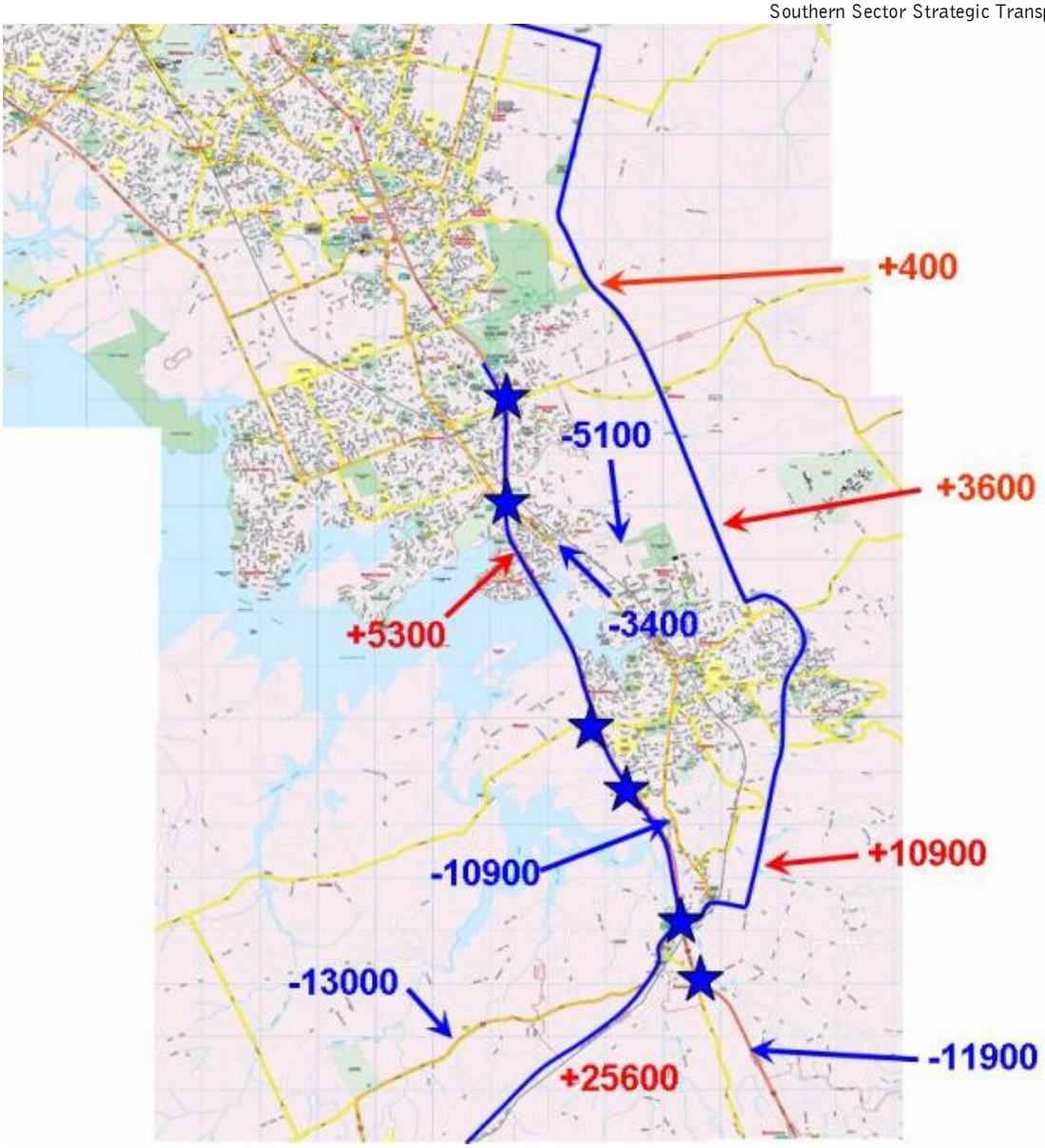


Figure 9-8 : Effects of Option 2C in 2021

9.6.2 Evaluation of Option

(a) Assisting Economic Development

The Mill Road corridor with full access combined with SH1 improvements will offer significant benefits in terms of travel reliability and network resilience via the provision of two major new road corridors. One will be a State Highway with the emphasis on car and freight movements and the other a transport corridor providing for general use with priority measures for bus users, cyclists and pedestrians. Access to key growth centres and employment opportunities will benefit from the SH1 improvements and the provision of an extended Mill Road.

(b) Assisting Safety and Personal Security

This option will offer accident reductions due to inclusion of the SH1 improvements. It will also offer benefits for vulnerable road users, with the provision of local access via the Mill Road corridor as a low speed environment, with priority measures for non-car users.

(c) Improving Access and Mobility

Limited access on Mill Road with SH1 improvements would allow minor benefits to connectivity and accessibility via the creation of a new link on Mill Road. Some benefits will exist for non-car trips via the redistribution of traffic from adjacent roads such as Great South Road. This option connects several growth centres described in the Regional Growth Strategy.

(d) Protecting and Promoting Public Health

A slow speed Mill Road option, with motorway improvements, will offer the same benefits as attributed to Option 2B (in terms of health benefits). The Mill Road corridor would allow for facilities for pedestrians and cyclists that would likely encourage an increase in trips by these modes and a possible transfer of cycle trips from other adjacent and potentially less safe parts of the local road network).

(e) Ensuring Environmental Sustainability

Mill Road with frontage access and SH1 improvements will have some effects, which will generally be fairly modest.

(f) Supporting the Growth Strategy

As with option 2b, this option is very supportive of the Regional Growth Strategy.

(g) Economic Efficiency

The undiscounted capital cost of Option 2C is estimated at $980m, resulting in a Benefit / Cost Ratio (BCR) of 0.9.

9.7 Option 2D : Mill Road – as Option 2C but Including Connection to Quarry Road Interchange

9.7.1 Traffic Effects of Option 2D in 2021

The effects of Option 2D are illustrated in Figure 9-9 and summarised as follows:

- Demand on the new SH22 is predicted to be 25,600 vpd, taking 12,900 each from Karaka Road and SH1 South of Quarry Road;
- The new Drury to Papakura Link is predicted to take 9,200 vpd, mostly from Great South Road north of Drury (8,700);
- Demand on SH1 south of Takanini increases by 5,200 vpd, relative to the Do Minimum, with increases of 3,300 vpd on Mill Road;
- With more traffic being attracted to SH1 and Mill Road, flow decreases are predicted on Porchester Road south of Airfield Road (4,800), and Great South Road north of Walters Road (3,100); and
- Traffic on Redoubt Road has a minor increase of 300 vpd.

Option 2D draws very similar conclusions to Option 2C, but with less traffic using the new link between Papakura and the Quarry Road Interchange.

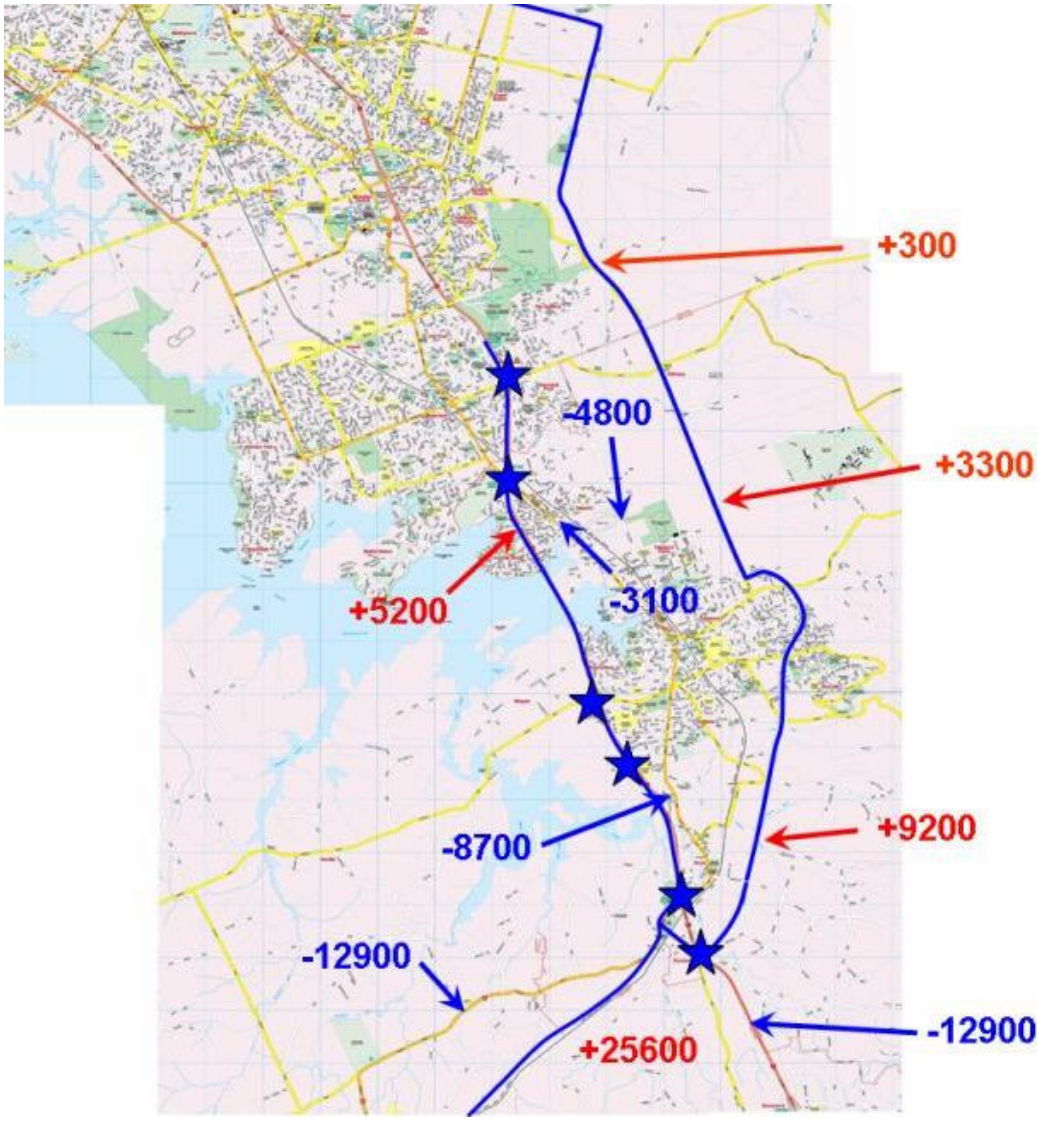


Figure 9-9 : Effects of Option 2D in 2021

9.7.2 Evaluation of Option

(a) Assisting Economic Development

The inclusion of a Quarry Road interchange has little effect from the description applied to Option 2C. Economic benefits of this option over 2C will be concentrated on a small area and will only benefit a small amount of additional road users. It will not allow for new trips to be made or open up new areas.

(b) Assisting Safety and Personal Security

As Option 2C, Quarry Road interchange is perceived to have no significant regional wide impacts on the option description applied to 2C. However, there will be some localised benefits in the Drury area.

(c) Improving Access and Mobility

Inclusion of an extension of the route to Quarry Road is not considered to lead to any significant changes in benefits from Option 2C.

(d) Protecting and Promoting Public Health

The inclusion of a link to Quarry Road is considered to generate no significant changes to benefits as previously described with Option 2C.

(e) Ensuring Environmental Sustainability

There are predicted to be some potential minor benefits to emissions, relative to option 2C through the construction of a new interchange and subsequent effects on traffic flows.

Supporting the Growth Strategy

As with option 2c, this option is very supportive of the growth strategy.

(f) Economic Efficiency

The undiscounted capital cost of Option 2D is estimated at $1,000m, resulting in a Benefit / Cost Ratio (BCR) of 0.9.

9.8 Option 3A : Weymouth – Karaka

9.8.1 Traffic Effects of Option 3A in 2021

The effects of Option 3A are illustrated in Figure 9-10 and summarised as follows:

- A flow of 21,400 vpd is predicted on the new Weymouth to Karaka Link, all attracted from SH1 North of Drury Interchange;
- As a result of the new link, flows on Hingaia Road and Roscommon Road are predicted to increase by 1,000 and 16,900 vpd respectively;
- Demand on SH22 Karaka Road decreases by 16800 vpd;
- Demands on SH1 South of Quarry Road decrease by 5600 vpd; and
- Minor flow decreases are also predicted on Mill Road (2100), Great South Road north of Walters Road (500), Porchester Road south of Airfield Road (1300), and Redoubt Road (1400).

This option will offer significant travel time benefits along SH1.

Generally, Option 3A sees a significant routing shift from SH1 and the eastern route through Mill Road to the new Weymouth to Karaka route. The faster link between the existing SH22 / Glenbrook Road intersection and Hingaia Road promotes this as a bypass for traffic currently using SH1, going to Papakura and eastern areas.

It is noted that this option does not support the implementation of measures which assist a modal shift to passenger transport, cycling or walking.

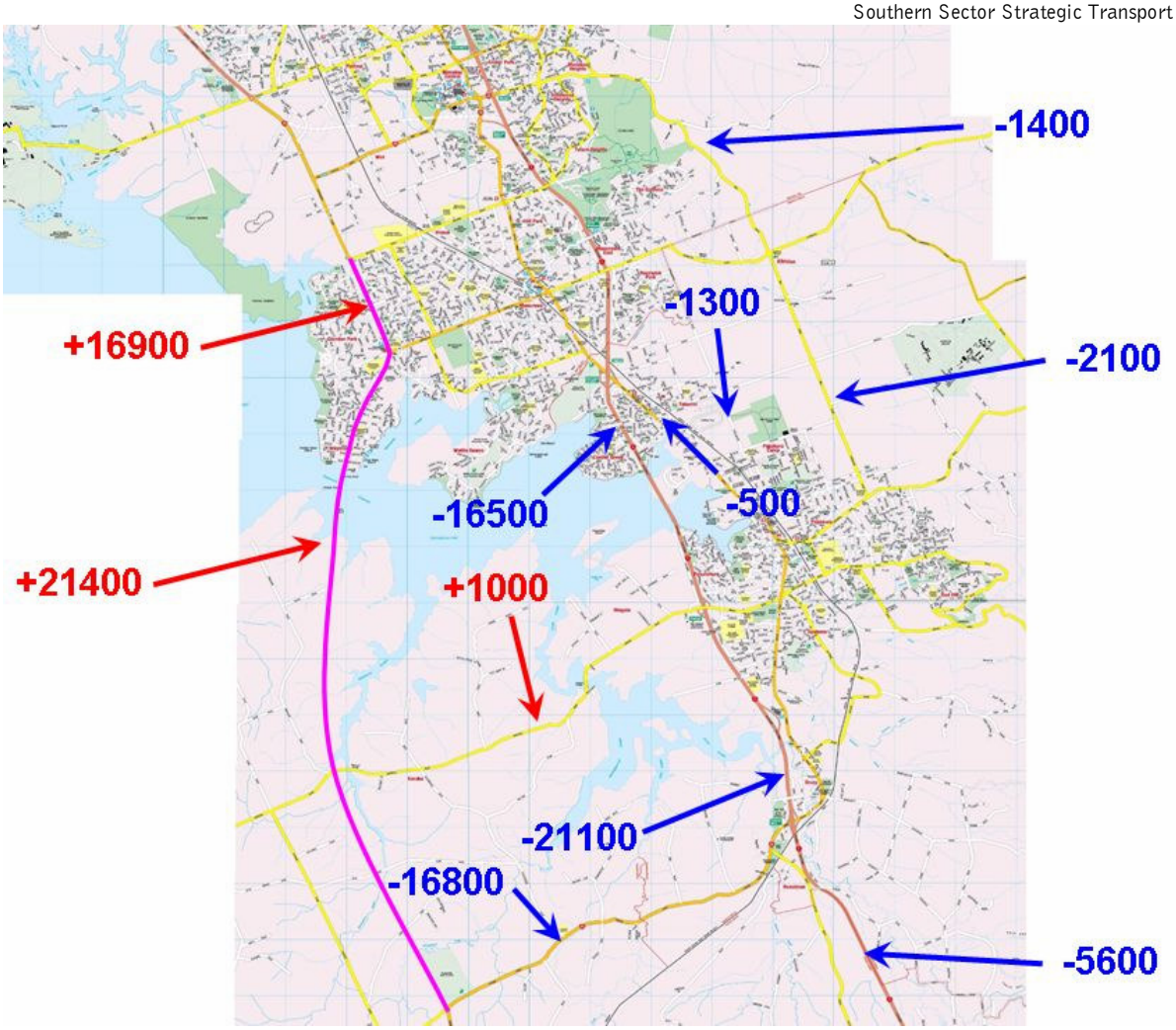


Figure 9-10 : Effects of Option 3A in 2021

9.8.2 Evaluation of Option

(a) Assisting Economic Development

The new corridor provides no benefits in connecting key growth centres or employment opportunities. The closest centres will be Hingaia and Pukekohe. Some minor benefits would be incurred via traffic redistribution from other parts of the network. Accessibility for cars and freight would increase significantly between Franklin and the Airport and beyond and a new link would be provided toward central Auckland that would offer an alternative to SH1 but would not serve a similar adjacent catchment. The new link is likely to stimulate economic and residential activity but not in areas identified in the Regional Growth Strategy.

(b) Assisting Safety and Personal Security

The Weymouth-Karaka connection would offer minor accident benefits via smoother traffic flows. The new link is considered to offer no benefits in terms of perceived levels of safety and security but would offer benefits to vulnerable road users if the new corridor is designed to accommodate pedestrians and cyclists. However, the benefits to commuter based active mode trips are likely to be insignificant as key employment areas are not connected by this route.

(c) Improving Access and Mobility

The new link will provide improved connectivity and travel choice with some benefits to accessibility for those with access to a private car and little to no benefit for others. The route would offer an alternative route for freight trips but would not be as direct as SH1 for most trips. The new link is not likely to provide a benefit to bus users as Weymouth to Karaka is not considered to be a natural route for any significant level of bus services. The other public transport corridors that exists (ie the rail corridor) already provides a north-south service.

(d) Protecting and Promoting Public Health

Whilst the Weymouth-Karaka link could offer benefits to active modes this is considered to have very little effect on commuter based trips and will provide more a recreational function for cyclists. Minor benefits are offered in terms of emissions, due to trip redistribution and reduced exposure to population centres and reduced congestion on existing links. Disbenefits will occur in relation to noise and vibration through the creation of a new road link. While the link will pass significant greenfield sites, there will be effects on the Weymouth community.

(e) Ensuring Environmental Sustainability

The construction of this new link to Weymouth, across greenfield sites in Franklin, via protected coastal areas and existing established residential areas in Weymouth will give rise to significant disbenefits with this option. Severance issues would be a particular concern in the Weymouth area as well as the significant land take required for construction of a new road corridor and bridge.

(f) Supporting the Growth Strategy

If the goal of major new transport infrastructure is to serve existing or urban growth areas this option is flawed. Karaka is outside the Metropolitan Urban Limit and traffic modeling shows that Hingaia residents would generally continue to use SH1. Although the modelling shows reasonable numbers of Franklin residents using the route, refer Figure 9-11, these car trips are not serving major growth areas outside of Pukekohe or encouraging a shift to public transport. Moreover the link will create pressure to subdivide rural land before it is decided if Papakura City should expand to the east, west or south. This would be contrary to the purpose of the Local Government (Auckland) Amendment Act and to Plan Change 6 to the Regional Policy Statement.

(g) Economic Efficiency

The undiscounted capital cost of Option 3A is estimated at $650m, resulting in a Benefit / Cost Ratio (BCR) of 0.9.

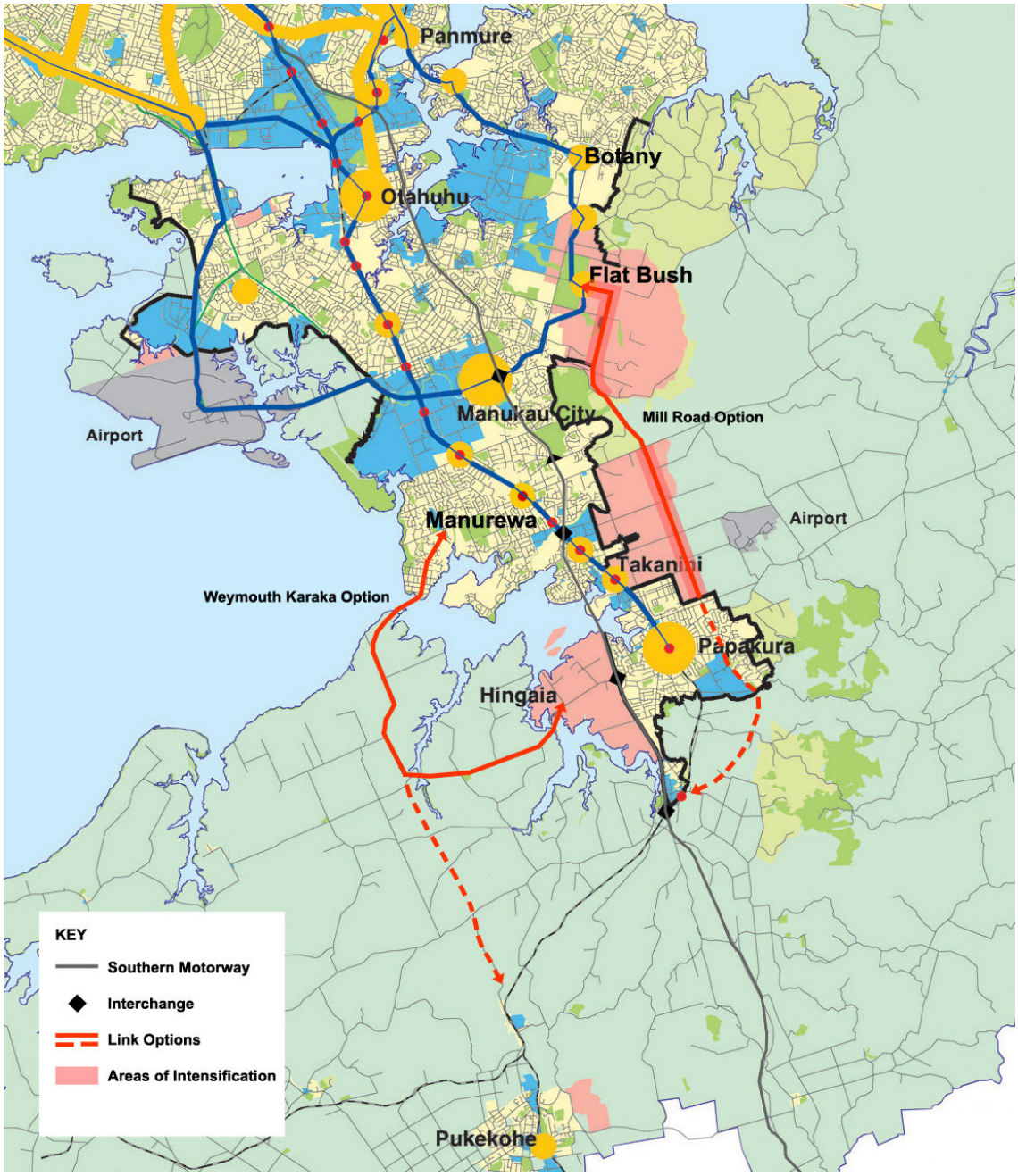


Figure 9-11 : Growth Areas and Transport Corridor Proposals

9.9 Option 3B : Weymouth – Karaka + Option 1

9.9.1 Traffic Effects of Option 3B in 2021

The effects of Option 3B are illustrated in Figure 9-12 and summarised as follows:

- The new Weymouth to Karaka Link will attract 13,900 vpd, mostly from SH1 North of Drury Interchange (3800) and Great South Road north of Drury (8100). This is a significantly lower flow than with option 3A, which did not include widening of SH1 or the provision of a new SH22 route;
- As a result of the new Weymouth – Karaka link, flows on Hingaia Road are predicted to decrease by 1900 vpd, and Roscommon Road increase by 11,000;
- The new SH22 will carry 19,100 vpd, most of which will transfer from Karaka Road;
- Flows on SH1 south of Quarry Road are predicted to decrease by 12100 vpd; and
- Flow decreases are predicted on Mill Road (2800), Great South Road north of Walters Road (2000), Porchester Road south of Airfield Road (2600), and Redoubt Road (2900).

The inclusion of the motorway widening and interchange upgrades from Option 1 moderated the substantial route shift to the new Weymouth to Karaka Link predicted with Option 3A, although this is still significant. Traffic is predicted to prefer the upgraded SH1 as opposed to eastern routes, with further decreases in demand from those shown in Option 3A.

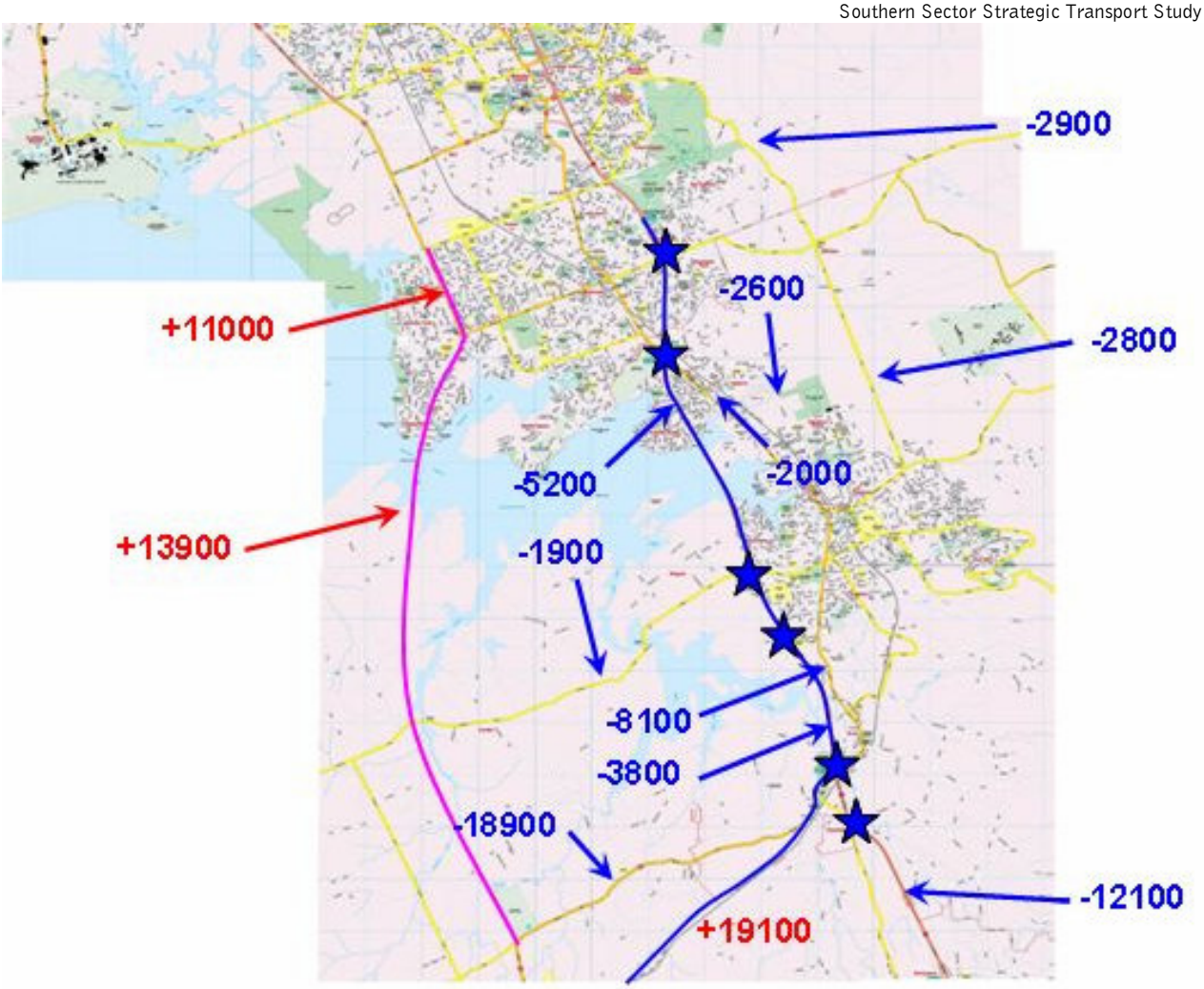


Figure 9-12 : Effects of Option 3B in 2021

9.9.2 Evaluation of Option

(a) Assisting Economic Development

This will offer similar benefits to Option 3A, with greater benefits attributed to reliability and network resilience. General accessibility will be improved due to a new connection being provided and an existing key links being enhanced. The SH1 improvements will connect growth centres such as Manukau CBD and Takanini. SH22 will provide a good connection to Pukekohe, as will the Weymouth to Karaka link.

(b) Assisting Safety and Personal Security

As Option 3A but with increased benefits to vulnerable users due to SH1 and SH22 improvements and redistribution of traffic from local roads.

(c) Improving Access and Mobility

It is not considered that the inclusion of SH1/SH22 improvements to the Weymouth-Karaka option would have any significant change in benefits obtained in Option 3A.

(d) Protecting and Promoting Public Health

Inclusion of Option 1 to Weymouth-Karaka link is considered to offer no significant changes to benefits from Option 3A.

(e) Ensuring Environmental Sustainability

As Option 3A with disbenefits increasing with likely greater emissions to land, water and air and greater impact on the landscape. Community severance still remains a key issue in the Weymouth area.

(f) Supporting the Growth Strategy

As option 3a, this option is considered to be contrary to the growth strategy.

(g) Economic Efficiency

The undiscounted capital cost of Option 3B is estimated at $1,125m, resulting in a Benefit / Cost Ratio (BCR) of 0.8.

9.10 Option 3C : Weymouth – Karaka, with SH1 widening but without SH22

9.10.1 Traffic Effects of Option 3C in 2021

The effects of Option 3C are illustrated in Figure 9-13 and summarised as follows:

- The new Weymouth to Karaka Link will attract 21100 vpd, with the greatest reductions being SH1 North of Drury Interchange (15100) and Great South Road north of Drury (8100);
- As a result, flows on Hingaia Road and Roscommon Road increase by 2200 and 17200 vpd respectively, while Flows on Karaka Road decrease by 17300 vpd;
- Flows on SH1 south of Quarry Road decrease by 6000 vpd; and
- Flow decreases are predicted on Mill Road (2700), Great South Road north of Walters Road (2800), Porchester Road south of Airfield Road (2600), and Redoubt Road (2800).

The removal of SH22 redirects a significant amount of traffic back to the Weymouth to Karaka Route from that in Option 3B, with significant traffic decreases are seen on SH1 compared to the Do Minimum. Similar levels of traffic are expected to use the eastern route as for Option 3B.

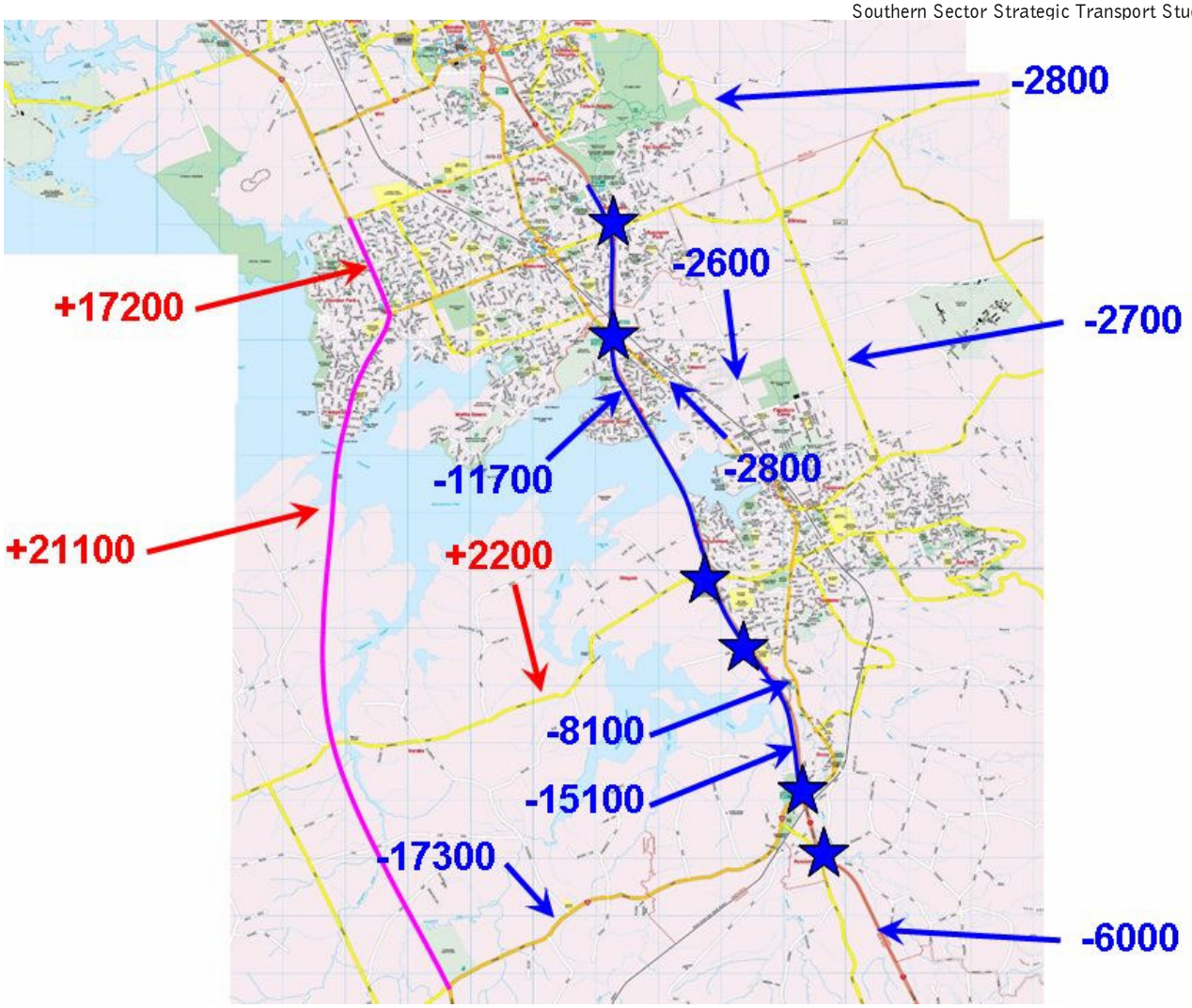


Figure 9-13 : Effects of Option 3C in 2021

9.10.2 Evaluation of Option

(a) Assisting Economic Development

This combination will have almost identical effects to those noted with Option 3B. The exclusion of SH22 from this option has little effect other than reducing accessibility to a very minor degree, since the SH22 link still exists and a small disbenefit in terms of transport network resilience.

(b) Assisting Safety and Personal Security

As Option 3B but with less benefits to vulnerable users due to exclusion of SH22 from this option.

(c) Improving Access and Mobility

As Option 3B, exclusion of SH22 would not result in any major change to either access or mobility. SH22 is unlikely to provide bus priority due to public transport trips being served by the rail network that remains in this option.

(d) Protecting and Promoting Public Health

As Option 3B.

(e) Ensuring Environmental Sustainability

As Option 3B, this scheme will have some negative effects.

(f) Supporting the Growth Strategy

As Option 3B, this option is considered to be contrary to the intentions of the growth strategy.

(g) Economic Efficiency

The undiscounted capital cost of Option 3C is estimated at $860m, resulting in a Benefit / Cost Ratio (BCR) of 1.0.

9.11 Option 4 : Quarry Road as Option 2D, extended to Pukekohe

9.11.1 Traffic Effects of Option 4 in 2021

The effects of Option 4 are illustrated in Figure 9-14 and summarised as follows:

- The new SH22 is predicted to attract 25,800 vpd, with reductions on Karaka Road (12700) and SH1 south of Quarry Road (13000);
- New Drury to Papakura Link takes 9200 vpd mostly from Great South Road north of Drury (8900);
- Traffic demands on SH1 south of Takanini and Mill Road increase 5100 and 3200 vpd respectively;
- Corresponding decreases in flow are predicted on Great South Road north of Walters Road (2900) and Porchester Road south of Airfield Road (4900); and
- Traffic on Redoubt Road has a minor increase of 400 vpd.

The effects of Option 4 are similar to those in Option 2D as expected; SH22 will carry a similar amount of traffic, and Mill road and Great South Road also show similar levels of demand.

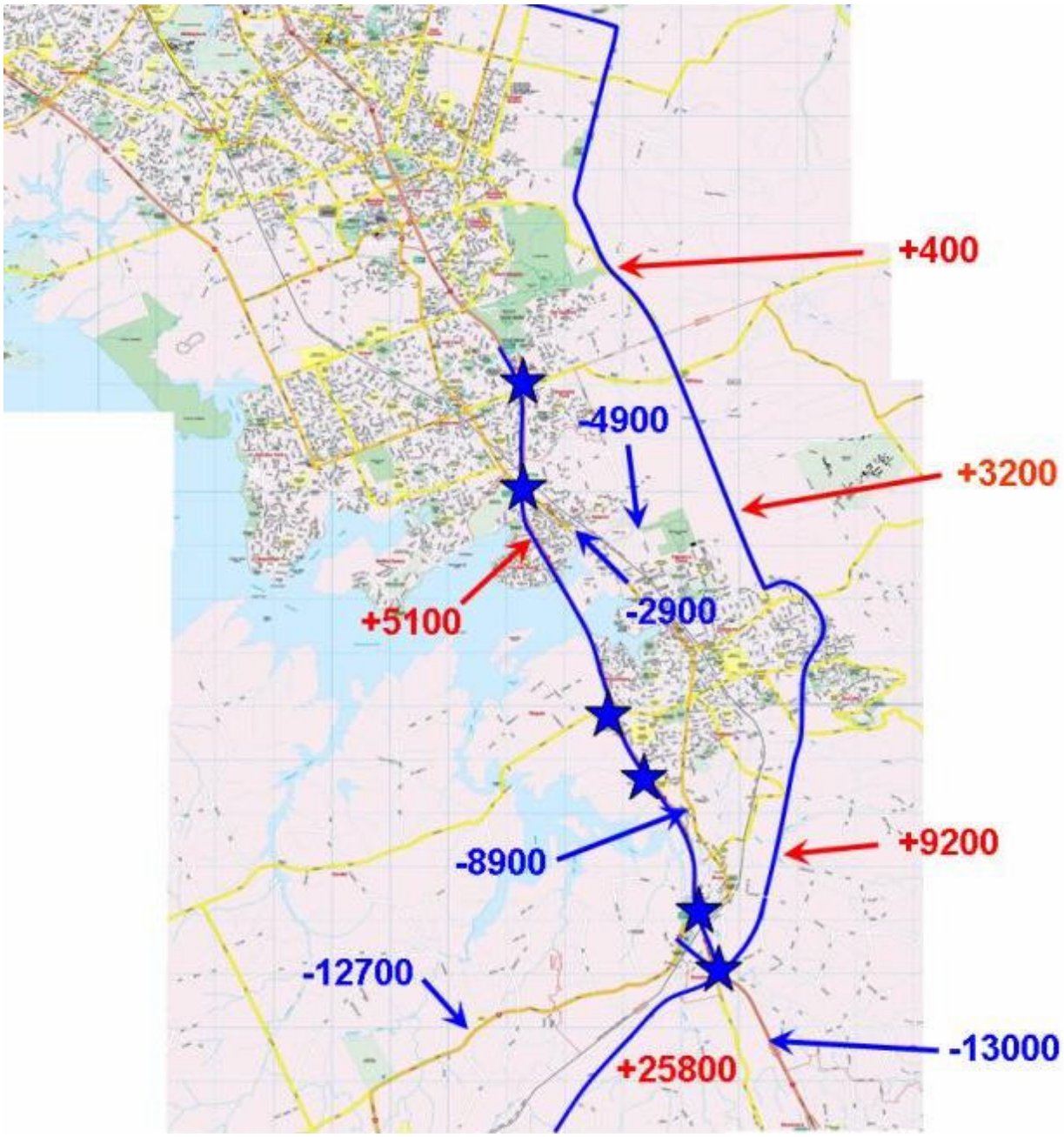


Figure 9-14 : Effects of Option 4 in 2021

9.11.2 Evaluation of Option

(a) Assisting Economic Development

As Option 2D, inclusion of a connection from Quarry Road to Pukekohe provides no measurable benefits of significance.

(b) Assisting Safety and Personal Security

As Option 2D, the additional link is considered to offer no changes to benefits either way to Option 2D.

(c) Improving Access and Mobility

As Option 2D, inclusion of Quarry Road would have negligible effects on benefits obtained in Option 2D.

(d) Protecting and Promoting Public Health

As Option 2D, inclusion of Quarry Road is considered to offer no change in benefits from those previously obtained.

(e) Ensuring Environmental Sustainability

As Option 2D.

(f) Supporting the Growth Strategy

As Option 2D, inclusion of Quarry Road considered to have no effect on benefits previously established.

(g) Economic Efficiency

The undiscounted capital cost of Option 4 is estimated at $1,010m, resulting in a Benefit / Cost Ratio (BCR) of 0.9.

9.12 Risk

A project risk workshop will be undertaken before this main report is finalised and outcomes will be reported in the final report.

Current risks identified include:

- Public Opposition – objections are likely to arise from noise and visual effects and will concern each option. This is likely to be a very major issue with the Weymouth-Karaka option and a significant issue with the Mill Road options, especially around Papakura and along Mill Road;
- Consenting Issues – will effect each option but this is a major concern with the Weymouth-Karaka option, with particular note to coastal zone issues;
- Form of route/constructability – again, there are significant issues for both the Mill Road and Weymouth-Karaka options. Significant investigation will be required to establish feasible alignments;
- Property Impacts – will effect all options. Particular concerns are noted with respect to Mill Road and Weymouth-Karaka on the Manukau side of the water;
- Environmental – loss of greenfield sites will be an issue with the Mill Road and Weymouth-Karaka options and significant impact on coastal areas with the latter option;

- Iwi Issues – investigations to date have not established any major issues related to Iwi. Local Iwi have been included in the first phase of consultation and will be included in the second phase;
- Political Motivation – lack of political support for proposed options may be an issue;
- Future changes in transport strategy - it is difficult to accurately quantify future changes to national and local transport and land-use planning policy. It is assumed that the current approach will continue;
- Funding – Failure to achieve funding for scheme implementation or even further investigation is clearly a risk for projects of this nature;
- Unknown ground conditions – this concerns all options at this stage, as no site investigations has been undertaken for this study.

10 Travel Demand Management

This chapter seeks to provide a generic overview of how travel demand management (TDM) measures could potentially influence travel behaviour in the Southern sector. It starts with a section on what exactly we mean by TDM, as interpretations can often be unspecific between organisations.

Work undertaken by Opus for the separate South Western Sector Transportation Study has been used to assist in the following assessment.

Work has been undertaken by Auckland Regional Council on measuring the potential effects of implementing a variety of TDM measures. To a varying degree each Council within the Auckland region is implementing TDM measures, eg workplace travel plans in Auckland City and the beginning of a school travel plan process in Manukau City. It is worth at least mentioning what TDM can achieve in a high level study such as this, TDM is a supportive measure that can help maximise the potential of certain land use scenarios, eg around intensive residential developments TDM measures can be very supportive in encouraging and promoting high quality public transport use via a variety of tools.

10.1 What is TDM?

The primary purpose of Travel Demand Management is:

> "… to reduce the number of vehicles using the road system while providing a wide variety of mobility options to those who wish to travel" (Comsis, 1994).

Travel Demand Management has been broadly defined under four categories:

Category	Measure
Reduce need to travel	Land use intensification
	Mixed use developments
	Telecommunication infrastructure
Provide for travel choices	Allocation of road space (to passenger transport, walking, cycling, high occupancy vehicles)
	Construction of walking and cycling networks
Influence travel choices	School travel plans
	Workplace travel plans
	Community travel plans
The "toolbox" to assist in these plans includes:	Infrastructure development
	School bus, walking school bus
	PT info and marketing
	Ridesharing
	Teleworking, teleconferencing
	Locally agreed parking controls

Category	Measure
Pricing	Regionally/nationally agreed parking controls
	Congestion pricing
	Tolling of existing roads

For the purposes of this study travel demand management can be broadly separated into two categories with the same aims:

- "Soft" – non-specific infrastructure based measures such as travel plans, education and publicity tools designed to influence behavioural change; and
- "Hard" – physical measures usually based around the provision of new infrastructure designed to manage or regulate demand, eg ramp metering or implementation of bus/bike lanes within transport corridors.

In most cases both hard and soft TDM measures need to form part of a wider coordinated strategy if they are to have any significant effect on influencing mode shift or influencing when non essential travel is undertaken, eg leisure based car trips during commuter peak hours.

The Auckland Regional Council's March 2005 report: "Travel Demand Management – Strategic Options for Regional Land Transport Strategy" investigated the impact of the following non-pricing TDM measures:

1 Cycling Network Construction;

2 School travel plans;

3 Centre-based Community travel plans, supported by walking improvements;

4 Centre based, workplace and tertiary travel plans;

5 Capacity building and pilot projects.

The focus of this chapter will be on the potential for "softer" mechanisms, such as those mentioned above, to influence travel choice to and from locations within the study area and to understand the impact of TDM mechanisms, as outlined in the March 2005 paper: Travel Demand Management: Strategic Options for RLTS, on travel behaviour in the Southern Sector study area. It also identifies any barriers to success and TDM-related opportunities and makes recommendations for future strategic TDM options.

The March 2005 TDM paper and further input from ARTA indicated that the following assumptions comprise a "high" TDM scenario:

- A 15% reduction in trips is possible with a medium scenario[3] school travel plan implementation programme;
- A 3% reduction to, from and within each APT model zone can be achieved with medium scenario community travel plans;
- A 5% reduction in peak time car driver trips is achievable for medium scenario workplace travel plans, divided by 3 (on the basis that travel plans will reach around a third of employees in each zone).

This chapter is based on the 2001 morning peak, most TDM measures relate to peak periods.

[3] Refer to Travel Demand Management: Strategic Options for RLTS for scenario definition

10.2 Growth Centres

The Auckland Regional Growth Strategy supports the development of a "compact city", with much of the development concentrated within "Growth Centres" or Growth Nodes". It is intended that these growth centres will be developed around passenger transport nodes, with intensive mixed use development, and an environment which encourages minimal dependency on the private car. The location of these growth centres within the study area has been discussed previously but is primarily based around:

- Flatbush;
- Manurewa;
- Takanini;
- Papakura;
- Manukau CBD;
- Pukekohe; and
- Hingaia.

It is apparent that the implementation of these growth centres is consistent with a TDM philosophy in that travel demands in the region will be less than would otherwise be the case for a more "traditional" New Zealand (and Auckland) residential pattern.

10.3 Community Travel Initiatives

The ARC's TDM Strategic Options paper describes community travel initiatives as a series of measures that target households and communities to change travel patterns. They are customised, household focused, travel behaviour change measures which aim to:

- Achieve *"Direct engagement of households, rather than general marketing;*
- *Target all household travel;*
- *Promote positive personal outcomes of change rather than disbenefits of not taking action;*
- *Focus on small actions suited to individual circumstances and values that can be integrated into daily life rather than generic fundamental change."* (RLTS TDM Strategy paper).

Although there is currently no regional objective to implement community travel plans, the ARC's Long Term Council Community Plan 2004/05 does include an intention to increase the number of areas covered by such schemes. Further reference to the detail and potential effects of community travel initiatives can be found in the March 2005 paper: Travel Demand Management: Strategic Options for RLTS.

10.3.1 School Travel Plans

Manukau City Council have recently started at Papatoetoe Intermediate school a pilot for a Safer Routes program and there are 12-14 walking buses operating in the region. Other local authorities across the region are slightly more advanced in the school travel plan programmes.

Journeys to school make up 35% of peak time traffic across the region. Again, a significant reduction of trips in the morning peak could be achieved with a medium impact school travel plan program. This figure would be similar if TDM was implemented in 2021 (because the number of school students remains almost constant).

10.3.2 Workplace Travel Plans

Excluding the Airport, there are approximately 67,352 full time equivalent positions of employment within the study area in 2001.Additionally, the Airport currently employs 8,225 full time equivalents and this number is set to increase to 14,900 by 2021.

Using ARTA's assumption that 1 in 3 of the employees in the study area could be reached with TDM, 22,450 employees existing travel behaviour could be influenced by TDM measures.

Greater modal shifts would be possible if travel plans are coupled with measures that control car parking at the workplace, both on site and in the surrounding area. Once the sustainable transport network is in place, implementing a travel plan supported by a car park management system can significantly reduce car journeys to work. These higher impact plans would be most effective in larger workplaces or where smaller organisations can be included in an area specific travel plan (perhaps run by a Traffic Management Association or similar).

At a cost of approximately $150 per employee, implementing a travel plan is much more cost effective than building or leasing new car parks.

10.3.3 Travel Plan Summary

Whilst the impact of TDM appears to be small when compared to total peak time trips on the network, travel plans could have a more significant localised impact.

Estimating the impact of TDM for traffic generators within the network does not take into account the impact of TDM strategies outside the network, ie if school and workplace travel plans were implemented at centres outside the network, the impact of TDM would be roughly double, since some car journeys to these places would also be removed from the network.

10.4 Further Work

In order to fully assess the impact of travel behaviour change mechanisms, further work would need to be undertaken to understand sustainable transport access at workplaces, educational establishments, communities, the Airport and hospitals within the catchment area.

Understanding access to sustainable transport will allow the potential for shifts in travel behaviour to be calculated. Further work to establish the receptiveness to mode change of people working, living or visiting these areas could be used to plan who to target with travel plan measures. Gaps in the network and the need for new services/ infrastructure could be identified and those that will best influence travel behaviour, taken forward.

Once the services and infrastructure exist, travel behaviour change mechanisms can be put in place to attract people to the sustainable transport network and, if more comprehensive travel plans are taken forward, push users onto the network (for example, by allocating parking on the basis of need to drive, those with access to sustainable transport could be encouraged to use alternatives to onsite parking).

Future demand should also be taken into account and this could include understanding employers' recruitment needs and targeting transport to areas with households most likely to meet these needs. These could be tied in with relevant socio-economic growth goals.

All forms of mass transit should be considered to ensure the most cost effective and appropriate option is put in place. Demand Responsive Transport options should also be considered. These are already in place for the Airport and some hospital services, reaching a greater number of markets (such as commuters) should be investigated. Providing a city wide software system to manage demand responsive transport could create the efficiency gains and real time information required to allow this market to take off.

All reductions in car driver trips need to be maintained in order to ensure long term benefits are achieved. Reducing congestion and freeing up road space can attract more drivers onto the road network if perceived journey times seem more desirable. Controlled and/or restricted parking as well as other economic mechanisms such as road user charging can be used to prevent this from happening. Whilst these mechanisms are not currently considered in the TDM strategy, their appropriateness should continue to be assessed.

(We note that an investigation into road pricing in Auckland is currently being undertaken by the Ministry of Transport, and the conclusions of this study are anticipated in late 2005).

The ARC's TDM Strategy paper outlines other gaps in TDM packages including:

- Demand Management for freight and commercial vehicles - improvements to logistics, changes to management practices to adapt to congestion; shifting freight from road to rail [or sea];
- Improvements to the suburban pedestrian environment to ensure all trips are catered for, eg shopping trips, trips to local doctors, gym etc, as well as making the city more walkable, eg home zones and walkable city projects.

Further measures not yet considered could include:

- More general rideshare projects to target social clubs and other groups;
- Building a traffic free continuous network of cycle routes throughout the city;
- Improvements to rideline software to act as a journey planner for all modes (www.transportdirect.info in the UK is an example of a site set up in this way - this site is planning to integrate public car share trips of www.liftshare.com into the model);
- More general public transport information and marketing and travel awareness campaigns;
- Teleworking and tele/ video conferencing;
- Home shopping;
- Ramp metering and traveller information systems.

Transit NZ has a number of supply management measures at its disposal to manage demand. Some of these measures include advanced traffic management systems, advanced traveller information systems and the reallocation of road space for high priority vehicles eg bus lanes on State Highways.

Advanced traffic management systems are those that actively manage traffic conditions, which in turn influence driver behaviour such as route choice and potentially mode choice. Ramp metering, variable speed limits and dynamic lane changing are several examples. Ramp metering has proven to be successful in managing the demand for motorways and particularly influencing the choice of entry point to the motorway.

Advanced traffic management systems contribute to the core behaviour of the travelling public as they develop their travel preferences based on their direct experience. Without encouragement it is very difficult to change the public's behaviour unless drastic changes in the operation of the network occur.

An integrated approach in implementing Advance Traffic Management Systems and Advanced Traveller Information Systems will most likely have the greatest effect on influencing travel demand and driver behaviour.

In addition, consideration should be given to the fact that this is a young and growing discipline and new, innovative measures, not yet trialled overseas, could bring benefits to Auckland. Setting aside a fund to support innovations in TDM could allow for the implementation and trial of such projects. Innovations in software in particular have the potential to offer up further options for solving congestion problems.

10.5 Summary

This chapter has summarised the form of various medium-impact Travel Demand Management measures, and their potential impact on travel demands within the study area in the 2001 morning peak. It is estimated that the ARC medium scenario TDM has the potential to reduce one-way morning peak trips on the network by approximately 5%. However, this figure does not reflect the potential localised impact of TDM, which could be much more significant.

It could be possible that the new growth nodes planned for the Southern Sector could have a more "higher" scenario TDM package worked in to the development and this could lead to greater benefits/reduced car trips.

It is noted that the measures outlined in the ARC's TDM Strategic Options for RLTS begin to address new legal requirements to consider demand management as part of the package of measures included in a regional land transport strategy. Whilst much can be taken from overseas examples, this is a young and growing discipline and some finances should be set aside to back new and innovative measures that could help reduce congestion in Auckland.

10.6 Applicability to this Study

The implementation of TDM measures at the same time as new growth nodes are constructed should in the future be a matter of course. In many respects this is happening now, the difference being TDM measures are being implemented around existing developments or organisations. There is nothing wrong with this approach, an approach that is contained in the current Auckland City Council Growth Management Strategy however, to potentially gain the most benefits it would be best to incorporate TDM measures into any new land-use proposals.

How would this fit into the options proposed in this strategy?

Regardless of options proposed, a number of benefits can be achieved through the implementation of certain committed and proposed schemes (and some are already happening). The following list shows where a broad range of TDM measures can support proposed growth or transport corridors. The first list focuses on transport, the "hard" TDM options; the second list will focus on the "soft" measures, those not directly related to infrastructure provision.

10.6.1 Hard TDM Measures

Option 1

- New capacity on existing State Highways allows more priority on other links for priority measures for other modes, eg widening SH1 would allow for an increased level of bus priority measures on Great South Road due to the likely re-allocation of cars to SH1. Bus priority measures are also likely to provide for cyclists. Great South Road can therefore have much more of a public transport and cyclist corridor emphasise.

- SH22 is not a likely corridor for the inclusion of bus priority measures because the rail line to Pukekohe will serve as a future public transport corridor.

Option 2A

- A limited access/higher speed Mill Road is still a new link that could be constructed with a more multi-modal function in mind, eg provision of bus lanes and cyclist facilities. A limited access function does not allow or really support significant bus service integration with adjoining high density housing. However, it is still an opportunity for longer-distance express bus routes. Also, in the same principal as above, it may allow other areas of the road network to undertake amore bus based function if traffic is more likely to use Mill Road for long-distance trips.

Option 2B

- Similar to the above but with a much greater potential to maximise the corridors bus corridor potential. Local access to the new Mill Road corridor will serve to a much greater degree the new public transport catchments created by the residential developments planned in Flatbush and Takanini whilst still serving longer distance trips from Papakura that would likely use this corridor.

Option 2C

- As Option 2B. This option excludes the provision of SH22 and the widening of SH1. This would not allow the full potential of Great South Road to be reached as a bus corridor and would therefore place more emphasise on Mill Road to cater more for bus trips in terms of providing priority measures.

Option 2D

- As Option 2C. Connection to Quarry Road would have no effect to TDM benefits.

Option 3A

- Very limited scope for practical application of TDM measures. A Weymouth to Karaka link is not going to be a significant bus corridor (other than for low frequency local bus services and not at a level likely to justify any bus priority measures) or support high density residential development that would support provision of high frequency bus services (exactly the opposite of Option 2B). If it serves any function this option will support car trips and the redistribution of traffic from other links (SH1) is unlikely to support or encourage a greater bus emphasise on other parallel roads such as Great South Road. In essence, if TDM on this list is viewed as infrastructure related and designed to support bus services then a Weymouth to Karaka road will be exactly that, a road and not a multi-modal corridor as proposed for Mill Road.

Option 3B

- As Option 3A. The inclusion of SH22 and additional capacity on SH1 is unlikely to change the assessment described for Option 3A.

Option 3C

- As Option 3B.

Option 4

- As Option 2C. Extension of Quarry Road to Pukekohe is unlikely to warrant any bus based TDM measures. Provision and enhancement of rail corridor will cater for long-distance public transport trips.

10.6.2 Soft TDM Measures

Option 1

- Basically a roading scheme that offers little in the way of promoting or encouraging soft TDM measures.

Option 2A

- Similar to Option 1. Little local bus priority and alternatives to the private therefore do not really offer a stimulus to implementation of local TDM measures.

Option 2B

- Huge potential to build on infrastructure proposals. Mill Road as a multi-modal transport corridor can offer several alternatives to the private car for work related and other trips. Measures could include:
  - School travel plans if new schools are proposed as part of the residential growth in the area;
  - Workplace travel plans in areas such as Papakura, Flatbush and Manukau CBD;
  - Widespread publicity of passenger transport options as development is constructed.
  - Guidance to new residents and businesses on likely use of local road network eg Mill Road as a public transport corridor with trips to Papakura, Manurewa, Manukau CDB, central Auckland and use of SH1 for long-distance car and freight trips.

Option 2C

- As Option 2B.

Option 2D

- As Option 2B.

Option 3A

- Very limited potential. The focus in the Auckland region in regard to reducing private car trips is around the AM peak period. The Weymouth-Karaka link does not serve employment areas or areas of growth outside Pukekohe (and Pukekohe has a rail link to Auckland);
- If this option were to go ahead, TDM measures as those described for Option 2B should be undertaken in tandem with any commercial or residential growth. However, residential growth stimulated by this link may be low-density and piecemeal and may not be suited to a coordinated TDM strategy due to low numbers of people affected.

Option 3B

- As Option 3A.

Option 3C

- As Option 3A.

Option 4

- As Option 2B when applied to the Mill Road corridor.

10.7 Conclusion

It is quite clear that the Mill Road corridor as prescribed in Option 2B is the most relevant or applicable to supportive TDM measures being applied. This option offers the most potential for a reduction in private car trips through a variety of infrastructure schemes related to promoting non-car modes and supplementary non-physical measures such as travel planning to support mode switch.

No other option comes close to the potential offered by Option 2B.

11 Consultation

11.1 Consultation

Consultation represents an exchange of information and therefore a process of discussion, between those proposing a course of action and those likely to be affected by those actions.

This section identifies the process adhered to and undertaken in the assessment and development of this project: Southern Sector Corridor Strategic Transport Study; together with a summation of points raised during the consultation process.

11.2 Consultation Process

Consultation is a statutory process which for transportation related schemes is directed by the Land Transport Management Act (LTMA) 2003.

The process which has occurred in this project is diagrammatically presented in the figure below. The process elements are explained in greater detail below.

Defining the purpose of Consultation	*The purpose of the Southern Sector Corridor Strategic Transport Study is to deliver a "strategy for the development of the arterial roading, passenger transport, walking and cycling network in the "Southern Sector" which will meet the transportation demands of the Region's growth vision." (refer RFT 05/2004).*
Development of a Consultation Plan (June 2005)	*Set out a process for consultation which identified:* *Who was to be consulted* *The form of consultation* *Document content* *Procedural matters*
Consultation Measureables	*As defined by the Land Transport Management Act (LTMA) 2003, Schedule 2*
Consultation – Stage 1 (June 2005) - Stakeholder	*Appendix H*
Consultation – Stage 2 (October 2005) - Stakeholder	*Appendix H*

12 Process Elements

12.1 Purpose of Consultation

Consultation under the Land Transport Management Act (LTMA) 2003 is a mandatory requirement.

Given this project is a high level strategy study, consultation has been directed at identifying broad issues, rather than assisting in the resolution of localised problems; it is to a large extent anticipatory rather than reactive. While being mindful of present and perceived problems, the strategy has sought to predict and mange transport demands in the context of future growth.

It is acknowledged that general public consultation is most appropriate when there are options to implement, as opposed to considering the broad approach to the issue. Accordingly the project group concurred that broader public consultation should be undertaken at future corridor investigation stages, which is where due consideration of local issues will and can be made.

The overall objective of this phase of the project was therefore to offer project partners access to wide-ranging information enabling them to understand and consider people's views, experiences and aspirations for the study area.

12.2 Consultation Plan

The consultation plan (draft June 2005) (Appendix F) set out a process for consultation for the Southern Sector designed to:

- Focus on main arterials within the southern sector
- Work with the user groups to gather a wide range of information about their aspirations and their needs, that will contribute to planning for the future transportation needs of the study area
- Be inclusive of both organisations and individuals
- Be efficient and practical, to meet required timelines and budgets

12.3 Keyholder Identification

The project partners identified appropriate stakeholder groups to consult with, identifying a broad representative range of user groups across the study area. Once again the list of parties with which consultation is mandatory under the LTMA was used as a guide (refer Section 15(3)), and given the context of the consultation, not all these parties were contacted. In general the stakeholders were considered to be local political representatives such as Councillors, community board members, and resident association groups. The project partners also sought the inputs from user groups such as transportation dependent business groups, public transport providers, emergency services and cycle and walking organisations. A full list of stakeholder organisations is attached in Appendix H

The contact list of Iwi was sought from all Councils to confirm the total list of Iwi groups who have Mana Whenua status within the study area. A full list of iwi consulted with is attached in Appendix H

It is fully expected that the stakeholders, iwi and the broader public will be further consulted as the strategy is implemented and corridor plans are initiated.

12.4 Consultation Measureables

These consultation principles from Schedule 2 Part 1 of the LTMA and the means by which they have been met (or otherwise at the discretion of the project partners) are outlined in the table below:

Principle	Means achieved
(a) That persons who will or may be affected by, or have an interest in, the decision or matter should be provided by the approved organisation with reasonable access to relevant information in a manner and format that is appropriate to the preferences and needs of those persons;	Key stakeholders were identified by all project partners Key stakeholders were advised of the proposals and invited to lodge their opinion as a result of letter drops distributed by post on the xx June & 30th September 2005..
(b) That persons who will or may be affected by, or have an interest in, the decision or matter should be encouraged by the approved organisation to present their views to the approved organisation;	Stakeholders were offered to feedback their comments to either a client representative and / or the project consultant. Accepted means of feedback included email, phone or return letter and/or simple prompt questionnaire provided in letter drop.
(c) That persons who are invited or encouraged to present their views to the approved organisation should be given clear information by the approved organisation concerning the purpose of the consultation and the scope of the decisions to be taken following the consideration of views presented;	In the first stage of consultation (May 2005) a letter including a plan of the study area and brief explanation as to the nature of the study, that is to identify long term transport improvements required to support strategic and growth objectives for the southern part of the Auckland region – was released. The above was true for the second stage of consultation, albeit the plan was removed in light of procedural feedback received in the first stage.
(d) That persons who wish to have their views on the decision or matter considered by the approved organisation should be provided by the approved organisation with a reasonable opportunity to present those views to the approved organisation in a manner and format that is appropriate to the preferences and needs of those persons;	Respondents were offered a variety of measures as in item (b) above. All of the measures were utilised by the responding participant as appropriate to their circumstance.
(e) That the views presented to the approved organisation should be received by the approved organisation with an open mind and should be given by the approved organisation, in making a decision, due consideration;	Salient points are summarised in section 4.0 with a detailed summary presented in section 5.0. Letters received are appended in Appendix H. Comments were used to assist with issue identification and in part to provide a component of the option evaluation in Stage 1 Consutlation. Consultation in Stage 2 consutled on the agreed and re-defined options.

Principle	Means achieved
(f) That persons who present views to the approved organisation should be provided by the approved organisation with information concerning both the relevant decisions and the reasons for those decisions.	To date (as @ 03/11/05). feedback has not been acknowledged formally in the way of a letter. Records present the release of holding responses (email, phone conversation)

12.5 Consultation Feedback: Summary of Salient Points

12.6 Stage 1: 27 May 2005 – 24 June 2005

A total of 43 respondents were consulted upon, 5 responses were received; a response rate of 12%.

- (People) who don't need to travel during the peak tend to try and arrange to travel when they think traffic on the roads will be lighter, some indicated that this didn't help with travel times with off peak congestion getting worse
- Section of SH22 between Glenbrook Road and SH1 and SH1 between Drury and Manurewa is getting worse
- Section of SH22 between Glenbrook Road and SH1 and SH1 between Drury and Manurewa needs to be improved giving that Pukekohe is a "future residential growth area"
- Current roading links to the State highway network are essentially rural roads and are not designed to service commercial transportation demands, which has the potential to adversely affect communities, especially given the predicted growth of the area
- The main points of congestion are Wiri Central, old Papatoetoe, East Tamaki and the Southern Motorway
- Feeders to the motorways will get worse in the future
- Those using public transport especially during peak periods didn't fare much better with most services held up in traffic or were operating at capacity.

Indications of where options for future transportation routes might be considered included many local solutions which can feed into the option development stage of the project.

Both the Fire Service and NZ Police have responded, giving a perspective from emergency services. The NZ Police are undertaking its own transport study. The Fire Service has already moved stations to place resources more appropriate to areas of risk.

A total summary of feedback received and copies of letters will be put together separate to this report or in the final report version.

12.7 Stage 2: 30 September 2005 – 3 November 2005

Aligning the Stage 2 process to Stage 1, the same consultees were consulted. There was a 7% response rate.

In general all of the respondents were happy with the proposals set before them. The only proviso being: "Recommendations of the study are supported providing that tangata whenua consultation occurs and cultural value assessments (by tangata whenua only) are undertaken as appropriate.

12.8 Consultation Feedback: Detailed Summary

12.8.1 Consultation Stage 1: May / June 2005

This consultation was in the form of a letter with a supporting stakeholder response form. The form asked the following questions which have been incorporated into the comments column:

(a) What travel / road trips do people within your organisation make?
What time of day do people normally travel (work related)?
Where do most trips begin and end?

(b) What and where are the main problems e.g.: congestion points, unsafe areas, access to motorways etc.

(c) What parts of the road and public transport network have become worse in the last 10 years?

(d) Have you changed how you operate to make travelling easier? How?

(e) What part of the road / public transport networks do you think will get worse in the next 10-20 years?

RECEIVED			COMMENTS
By:	Date:	From:	
MCC Stakeholder Feedback Form	July 2005	Pakuranga Community Board Chairman: Ross Warren	(a) Pakuranga, Bucklands Beach, Howick & Botany (b) Ti Rakau Drive with Reeves Rd / Gossamer Drive / Ti Irirangi & Botany Cascades Rd / Botany Rd (c) All of the above (d) Where possible choosing the time of day to travel using the ferry service from Halfmoon Bay where possible (e) The above intersections plus Pakuranga Rd are likely to be totally chocked unless the Eastern Corridor is built.

RECEIVED			COMMENTS
By:	Date:	From:	
OPUS Letter	14 July 2005	Burton Planning Consultants Ltd on behalf of Stevenson Resources – quarry operation at Drury, Papakura District	*Did not respond to Stakeholder form - letter with the following comments:* 1. Quarry is currently operating close to capacity - recent property acquisitions / new plant will enable and increase within next 5 years 2. Productivity levels cannot rely upon present road links to regional arterial network. "unless a new more direct transport link to the Southern Motorway is provided, aggregate production at Drury could become adversely affected to the point where production at Drury could become adversely affected" 3. Network changes - Formation of a new interchange on the Southern Motorway between Ramarama and Drury. Such an interchange could also form part of a new regional link from the Southern Motorway at Ramarama through Takanini to East Tamaki / Flatbush 4. The Company considers the following benefits will arise out of affirmative action with regards to item 3. - the regional significance of the Drury Quarry to the supply of aggregate in the Auckland region and in particular its ongoing, and growing contribution to the large roading projects proposed for the region over the next decade. - the significant safety and environmental issues which arise from the concentrated and increasing flow of heavy quarry-related truck traffic on the surrounding Drury rural environment and the Drury community. - the opportunities available to develop an efficient alternative route for trucks to the Southern Motorway. These opportunities will diminish over time as the pattern of land usage within this area intensifies through continued rural land fragmentation associated with the pressures of countryside living. - the Company's willingness to participate at all stages in this new roading proposal.

RECEIVED			COMMENTS
By:	Date:	From:	
			5. The Company believes that it would be a mistake for this proposal to be omitted from further consideration in the Southern Sector Strategic Study simply because the volume of traffic do not achieve levels normally required for the creation of a new interchange.
? Stakeholder Feedback Form	04/07/05	Conifer Grove Residents Association Chairman – J van Wijk	(a) Private Cars; 07:00-09:00, 15:60 – 18:00; Conifer Grove, Papakura / Manukau (via Great South Rd) Manukau / Auckland City (Via Southern Motorway) (b) Intersections: Beaumaris Way / Manuroa Rd / Walter Stevens Drive (all with Great South Rd) Great South Rd: Papakura Stream to Waterview Rd West Southern Motorway: Bridge over Great South Rd – Takanini (c) Great South Rd – Takanini Southern Motorway (d) Some Conifer Grove residents have tried travelling outside peak hours (with little relief from congestion) (e) Great South Road (Takanini), Southern Motorway (interchanges at Papakura & Takanini), Beach Road (Papakura), Manuroa Rd (Takanini) Mahia Road (Manurewa) *Additional comments (summarised:* - With the housing development at Hingaia, this area will also need a major upgrade. A new on-ramp leading from Beach Road to the southbound Southern Motorway could be constructed on the south eastern side of the Motorway overbridge. Vacant land is available. The overbridge should also be widened. - Great South Road / Redoubt Road / Wiri Station Road Intersection alteration which will enable the east/west traffic to pass over Great South Road

Received			Comments
By:	**Date:**	**From:**	
MCC Stakeholder Feedback Form	?	NZ Fire Station	(a) Our vehicles are using the roads 24/7 Not big volume users but our business is often urgent Staff travel predominantly from east and south to our central South Auckland stations (b) Main choke points are Wiri Central, Old Papatoetoe, East Tamaki, Wiri Station Road, Southern Motorway (in general) (c) Arterials around Wiri / State Highway 20 / Main Motorway (d) Yes, moved stations (e) Feeders to the motorway system, SH20 widening (new Mangere Bridge) (f) SH22 between Glenbrook Road and SH1, and SH1 between Drury and Manurewa. A link between SH22 and SH20 via a bridge between Karaka and Weymouth is an option that should be seriously considered. Consideration should be given to reviving the project to realign SH22 between Drury and the Glenbrook road turnoff.
MCC Letter	8 July 2005	Federated Farmers (NZ)	
OPUS Email	30 June 2005	Walk Auckland	(a) Public transport only works with the link bus route. All other networks are slow, late or unsafe. Where is the guarantee of safe passage for patrons? (b) Will only get worse. Council's continue to increase the provision of housing with no consideration for parking / additional transportation.

12.8.2

12.8.3 Consultation Stage 2: 30 September 2005 - 3 November 2005

This consultation took the form of a letter, seeking views. There was no stakeholder form. The following comments are taken as being received.

RECEIVED			COMMENTS
By:	Date:	From:	
MCC Email	28 October 2005	Conifer Grove Residents Association	Generally happy – subject to the following comments: 1 Why is the Takanini Interchange not listed for upgrading? 2 Support the grade-separation of the road/rail crossing in Papakura.
MCC Email	27 October 2005	Federated Farmers	Generally support SH22 as a priority, although they want a higher priority on the Karaka-Weymouth link. They see this as a logical link from rural Franklin. See this as a preferred route to SH1.
MCC Email	25 October 2005	Ngaati Te Ata	1 Support for the current approach proposed to be undertaken 2 Support to pursue and investigate key findings (a), (c), (e) and (f) 3 Key finding (c) - we were involved in the project of improving SH22 with Transit. We advised Transit that cultural values assessment would need to be undertaken by us to ascertain any impact on cultural heritage as a result of planned routes. This will need to be undertaken. 4 Recommendations of the study are supported providing that tangata whenua consultation occurs and cultural value assessments (by tangata whenua only) are undertaken as appropriate.

13 Conclusions

This report sets out the basis for the development of a strategy for the transport networks in Auckland's Southern Sector, to accommodate the growth which is predicted to occur in the area.

13.1 Development in the Southern Sector

The manner of growth is set out in the Regional Growth Strategy and the Southern Sector Agreement. It is predicted that the southern sector will need to accommodate 52,000 more residents in Papakura by 2050, 178,000 more in Manukau and 43,000 more in Franklin. This gives a total population in 2050 of 601,000, compared with a current figure of 328,000. The intention is that the majority of growth takes place in growth centres, in order to reduce the extent of urban sprawl. Major growth nodes will include Papakura, Takanini, Flatbush, Pukekohe and Hingaia.

13.2 Context of Study

In general the Southern Sector Strategic Transport Study is a high level concept study designed primarily to outline possible "future transport schemes" that merit further more detailed investigation. The study has been undertaken with key consideration to the various tools and policies operating today at both a regional and national level, some of which are fairly new to the national and local planning scene. At a national level, all transport related projects need to consider the guidance and direction given by the:

- New Zealand Transport Strategy; and the
- Land Transport Management Act.

At a regional and more local level the study has been undertaken within the framework provided by the:

- Regional Growth Strategy;
- Regional Land Transport Strategy;
- Southern Sector Agreement;
- Other relevant local strategy documents, eg Manukau Cycling and Walking Strategy, Papakura Draft Walking and Cycling Strategy; and
- All appropriate District Plans.

In particular, the study is intended to identify the strategic transport network development implications of the land use development pattern envisaged for the southern part of the Auckland Region as detailed in the Southern Sector Agreement signed by the Auckland Regional Council, Franklin and Papakura District Councils and Manukau City Council. Consideration of alternative land use distributions, or possible land uses beyond the 2021 planning horizon of the Southern Sector Agreement, were outside the scope and resources of this study.

13.3 "Gap Analysis"

The report has noted the committed investments in the transport networks and the various proposals that have been or are being considered but not committed. A previous "scoping" report, prepared as part of this study, set out the existing and future travel patterns in the study area.

A future traffic model has been developed for the year 2021 in order to establish the likely deficiencies in the road network. These include:

- The Southern Motorway, both in terms of the number of lanes from north of Takanini to Drury and the pressure on a number of interchanges;
- The lack of a strategic alternative to the Southern Motorway and the low number of north south routes;
- Conflicts along Great South Road, where it seeks to provide a strategic north-south route, while at the same time passing through a number of growth centres. In these centres balance needs to be considered with regard to the needs of pedestrian/cycle activity, and to the needs of traffic (especially buses) serving the rail stations;
- A lack of arterial capacity serving key growth centres, such as Takanini.

It is difficult to accurately set out gaps in the future passenger transport network, as the level of bus services in particular will only be determined closer to the time when additional services are required. Furthermore, there are a number of ongoing studies which will address the provision of passenger transport services at a strategic level, namely:

- The Regional Passenger Transport Network Plan, a study which is being undertaken for Auckland Regional Transport Authority (ARTA); and
- The Rapid Transit Study, being undertaken for the Auckland Regional Council (ARC).

However, the study area would appear to be poorly served by passenger transport services, based on our understanding of future services identified to date:

- There is scope to improve north-south services between Papakura to East Tamaki and Botany Downs (ie along a route to the east of the Southern Motorway and Great South Road);
- The services proposed between the employment zone around the Airport and Manukau CBD are at this stage quite limited;
- There is as yet no commitment to the suggested services between Manukau CBD and Flatbush, nor to the bus lanes shown in the "high" passenger transport scenario, along Chapel Road;
- Although currently a lifestyle block with low population densities, Hingaia is a future growth area which appears to be poorly served by passenger transport;
- Passenger transport in Franklin is centred around Pukekohe, however, this future growth area is not currently well served by passenger transport services; and
- Local feeder bus services.

13.4 Identification of Schemes to be Evaluated

The study has therefore considered and reported on the following proposals:

- Improvements to the Southern Motorway, to provide additional lanes;
- Extra interchanges/interchange upgrades along the Southern Motorway, in order to provide relief to a number of existing interchanges or to redistribute traffic;
- Four laning of SH22, between Drury and Pukekohe;
- Upgrading of the status of Mill Road (Drury/Papakura to Flat Bush/Manukau), to provide an alternative north-south route to reduce pressure on the Southern Motorway and Great South Road. This route will also serve the growth area at Takanini;
- The provision of a link between State Highway 20 at Wiri and State Highway 22 at Karaka by way of a bridge linking Karaka and Weymouth (southern tip of Manukau) and Karaka (northern tip of Franklin), to reduce pressure on SH22 and the Southern Motorway. This could be an alternative to the option to upgrade SH22.

The report has also identified a number of issues to be addressed in the Southern Sector which have not been fully considered by this study, as follows:

- **Additional rapid transit links.** The examination of bus services for additional rapid transit links should be limited as ARTA needs to guide direction of the studies;
- **The implications of the implementation of the draft rail business plan.** As noted above, extensions of rapid transit are to be considered by other studies. However, the following issues are of relevance to this study:
  - Location of park and ride facilities;
  - Issues relating to grade separation at level crossings[4]; and
  - Issues relating to electrification.
- There is a need for an integrated bus network.
- **Gaps in bus networks.** These have not been examined in detail in the report as issues are likely to be resolved as they arise. However, the potential for each of the various road links to be evaluated to be incorporated within the future bus network have been considered.
- **Pedestrian and Cycle Issues.** This is a strategic study, and pedestrian and cycle links will generally form "local" connections will be accommodated principally through TLA walking/cycling strategies. However, the following issues are of relevance to this study:
  - A significant proportion of movements are short distance trips, which have the potential to be made on foot or by cycle;
  - Walking/cycling should be encouraged by land use/ transportation integration, and pedestrian/cycle needs should be at the forefront of future infrastructure planning; and
  - The needs of pedestrians and cyclists are an important consideration within growth centres.
- The report has noted that the Southern Sector is currently over-dependant on the Southern Motorway. This will be eased north of Manukau by the southern extension of SH20, and to a certain extent either the Mill Road link or the Weymouth to Karaka Link.

  However, the concept of a long term need to provide a "proper" alternative to the Southern Motorway, maybe linking into SH2 toward Maungatawhiri, or SH1 south of Bombay, has been raised during the course of this study. This has been suggested primarily for the strategic reason of providing "network resilience", to reduce the impact of apparently minor incidents on the accessibility between the Auckland and Waikato regions, rather than to accommodate the predicted travel demands. It has been agreed with the project group that this is an issue that is beyond the scope of this study.

13.5 Evaluation of Schemes

The study has evaluated a number of variants around three "packages" of schemes in the Southern Sector. Some of the projects within each of these packages have been tested in conjunction with projects within other packages. This has been undertaken in order to determine the relative impact of, and need for, implementing a project as well as, rather than instead of, another project.

It is noted that the evaluation process was based on the principles of the Land Transport Management Act, in addition to the guidance and direction of the Regional Growth Strategy.

[4] Reference Pakuranga Transportation Study and Level Crossing Study currently being prepared by Opus

13.6 Evaluation Criteria

The table below sets out the criteria used within this study to assess the merits of each proposal against the principles and objectives of the Land Transport Management Act.

Objective	Performance Indicator
Assisting economic development	Accessibility to employment opportunities Accessibility to, between and within key economic and knowledge centres General accessibility Reliability and transport network resilience
Assisting safety and personal security	Accidents, injuries and deaths Actual and perceived levels of security Affect on vulnerable users
Improving access and mobility	Connectivity Availability of travel choices to key destinations General accessibility Impact on those without access to a car Share of trips by public transport Consideration of people with disabilities
Protecting and promoting public health	Share of trips by active modes: walking; cycling Emissions to air and water Noise and vibration
Ensuring environmental sustainability	Emissions to air, water and land Use of non-renewable resources Impact on heritage, cultural, visual, landscape and ecological sites Energy efficiency and greenhouse gas emissions Community severance
Supporting the Growth Strategy	Relative accessibility to, within and between key RGS growth centres Community coherence Level of fixed PT as pre condition for centre growth
Cost effectiveness	Affordability Benefit/cost analysis

13.7 Options Evaluated

Option 1 – Upgrading the Southern Motorway: Comprises widening of the Southern Motorway, such that three lanes are provided per direction as far south as Drury. In addition, new or upgraded interchanges have been considered along the Motorway at Alfriston Road, Papakura, Park Estate Road, Drury and Quarry Road, along with four laning of SH22 between Drury and Pukekohe.

The study has concluded that this package of works will offer significant benefits in terms of travel time savings and therefore economic efficiencies. The adverse effects of the investment are fairly modest, in that they generally concentrate the effects along the Motorway corridor which is already subject to the effects of traffic.

This option is relatively simple and a significant amount of investigations has already been undertaken. This scheme could be implemented relatively quicker than other options and is also included in Transit's 10 year plan.

Option 2 – Eastern Link Options: Comprises improvements to Mill Road between Flat Bush and Papakura and south to Drury. This scheme was devised as a route which would serve an important north-south role, linking a number of the growth centres (Papakura, Takanini and through to Manukau CBD, East Tamaki and Flatbush, and bypassing Manurewa).

The study has considered a number of variants for this option:

- Firstly it could operate as a fairly low speed route, with frontage access along its length, or a higher speed route with limited access, with existing properties served by service roads. The local effects of these two variants will be very different: a low speed route could "embrace" local land uses and the corridor could become an intensified area, which could become a major passenger transport route with suitable pedestrian/cycle activity along and across it. By comparison, an "expressway" type of road would allow quicker access between the major growth centres but it would sever land uses on either side and would be a predominantly car based solution;
- Secondly, this option could be considered as well as or instead of the Option 1 proposals to upgrade the Southern Motorway. However, the study has found that the Mill Road route offers fairly modest relief to the Southern Motorway, to the extent that both options are considered to be required;
- Thirdly, options for the southern termination of the scheme have been considered. It was initially assumed that the route would pass round Papakura and tie back into the Southern Motorway at Drury. However, a variant would be for the route to continue to a new interchange at Quarry Road, south of Drury.

The study has concluded that a Papakura/Drury to Flat Bush/Manukau link would perform an important role in the future, including for both commercial and PT. There is a need to undertake more detailed assessment of the transportation function and capacity requirements as well as route and alignment options.

Option 3 – Weymouth to Karaka: Comprises a route between SH20 at Wiri and SH22 at Karaka by way of a bridge linking Weymouth and Karaka. This scheme was devised as a route which could reduce pressure on SH22, Karaka Road and the Southern Motorway between Drury and Manukau.

The analysis indicates that the route would offer significant accessibility benefits between Franklin and Manukau. It would reduce flows along SH1 and parts of SH22 and would therefore offer significant benefits, particularly if the Southern Motorway is not upgraded. However the traffic assessment indicates that the scheme would not be sufficient to obviate the need for widening of sections of the Southern Motorway. Furthermore, it is noted that the scheme would have significant environmental effects, particularly on the Weymouth community within Manukau City, the crossing of the Papakura Channel and on the rural area of Karaka. However, the provision of an upgraded Southern Motorway will in turn reduce the need for a Weymouth – Karaka Link.

Recognising that the scope of this study is to provide a transportation strategy to support the expected growth as set out in the Southern Sector Agreement, it has been noted that the implementation of the Weymouth – Karaka link is likely to place considerable pressure to urbanise the rural zoned land in Karaka. This is not consistent with the growth strategy, Local

Government (Auckland) Amendment Act or Plan Change 6 to the Regional Policy Statement, and is not supported by the Southern Sector Agreement.

The Draft Strategy recommends that the level of protection for this route is kept at an appropriate level to not preclude its potential implementation and that the position with regard to its progression is reviewed in the context of any future land use planning changes should they occur.

The provision of a Weymouth – Karaka Link could therefore be considered to be a long term solution which could be pursued if changes are made to the growth strategy and land use planning strategies. We note that it is becoming more and more difficult to implement significant transport projects of this nature and there is, therefore, a need to protect long term solutions. However, in the absence of an identified need under current land use assumptions, it is the view of this study that the level of protection currently in place is likely to be sufficient, although this should be reviewed to ensure that the future option for this link is not compromised.

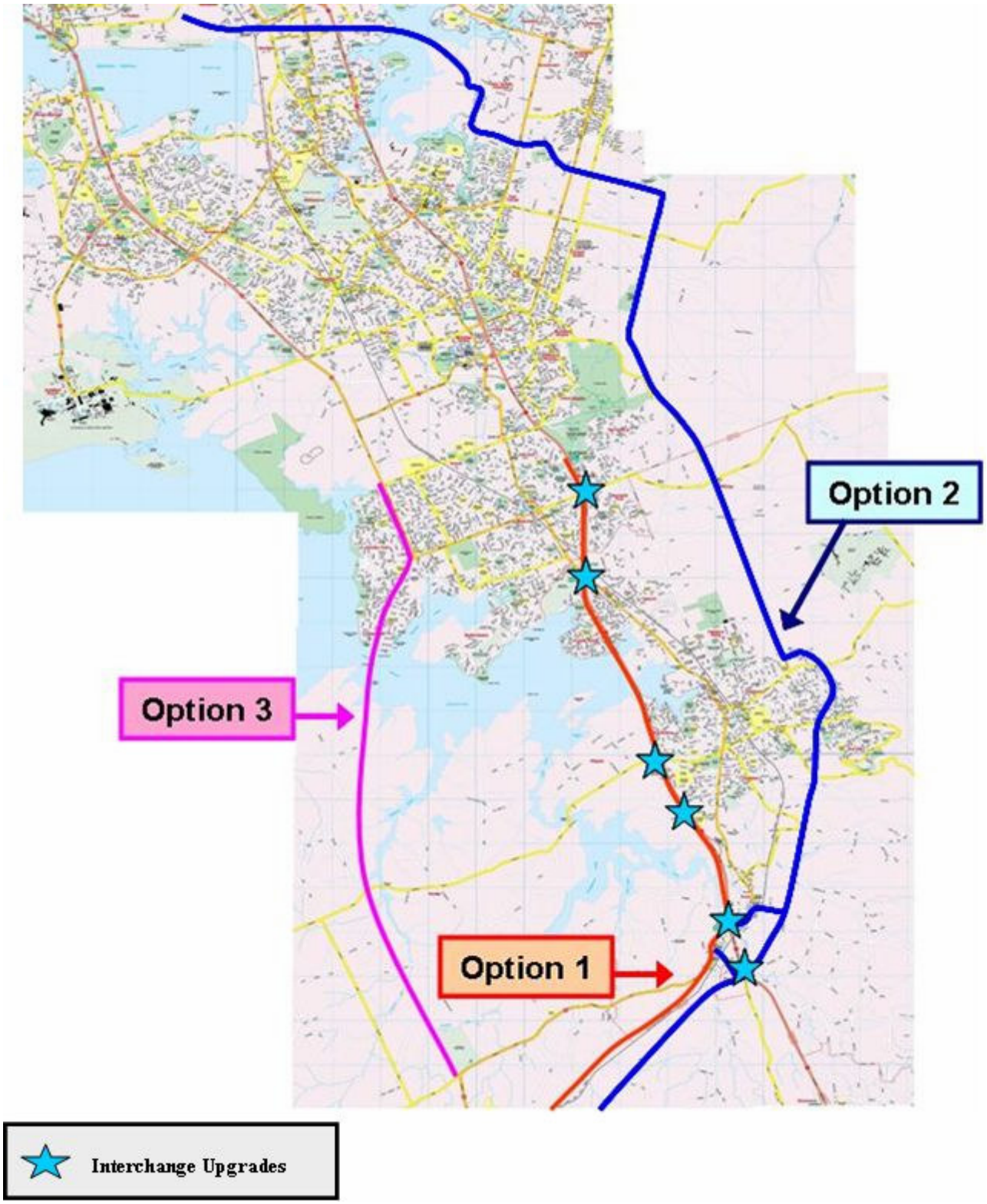


Figure 13-1 : Option Concepts

13.8 Conclusions for Transport Modes

The conclusions of the study are as follows:

13.8.1 Roads

- The traffic modelling indicates that the Southern Motorway will come under increased pressure and should be upgraded as a matter of priority. Widening to three lanes per direction will be required south from Manurewa, first to Takanini and as far as Drury by about 2021. Interchange upgrades should be pursued at Papakura and Drury, with possible additional interchanges at Alfriston Road and Quarry Road, with the latter influencing the need for an upgrade at Drury;

- The Mill Road route between Drury, Papakura and Manukau/Flatbush will need to be upgraded. The form of the upgrade should be examined further as part of a corridor study. This link is likely to be needed in addition to the above works proposed on the Southern Motorway. The link can be developed in a way which is supportive of passenger transport;

- The opportunity to implement the Weymouth – Karaka Link would provide a significant new regional link and improve network resilience but it should only be progressed if there are changes to current land use strategies. The need for the increased capacity will be deferred by the proposed upgrade of the Southern Motorway which will be needed within the short term.

- An upgrade of the SH22 route from Drury to Pukekohe is needed, either in the form of providing a new four lane route alongside the railway corridor, as previously proposed or by providing a link from any new motorway interchange at Quarry Road across to the railway corridor. The decision regarding the relative merits of these two broad options needs to be taken in the context of the conclusions of the suggested Mill Road corridor study, which will determine whether that route terminates at Drury or Quarry Road. Under current land use assumptions, the provision of such an improved SH22 route will defer the need for a Weymouth – Karaka route.

13.8.2 Passenger Transport

Rapid transit in the area currently consists only of the rail link as far as Papakura, although rail services to Pukekohe are provided on a limited frequency. The upgrade of this route should be progressed in accordance with the Draft Rail Business Plan. Additional rapid transit links need to be fully considered as follows:

- Extension of the rapid transit rail services to Drury and increased services to Pukekohe in tandem with growth in the area;
- Rapid transit between the Airport and Manukau CBD;
- Rapid transit between Flatbush and Manukau CBD.

A number of other passenger transport requirements have been noted, including:

- Hingaia to Papakura, and Papakura to Flatbush;
- Mill Road – one option variant is seen as a potential major passenger transport corridor;
- Great South Road – requires continual improvement and development as a pivotal passenger transport corridor, particularly in light of the potential it has to interact Mill Road;
- Future road developments within the region need to be protect passenger transport. Imposing Right of Ways on development is considered the most stringent means to employ, where appropriate.

13.8.3 Walking and Cycling

The report has stressed the importance of walking and cycling, especially within the growth nodes, and as an important mode for short-medium distance trips. This then dictates the need for careful design for through traffic in these areas, suggesting the need for complementary measures to manage the effects of through traffic within these growth centres.

The design of new transport corridors within the region, and the re-design of existing corridors, will seek to incorporate walking and cycling facilities, where practical, with due regard to enhancing the safety of these vulnerable users.

Manukau City Council will actively promote and implement walking and cycling facilities as identified in its adopted, Walking and Cycling Strategy (December 2004).

13.8.4 Travel Demand Management

The study has noted the various tools available to manage the demand for travel, rather than simply seek to accommodate the predicted demands which then become self-fulfilling. The most significant way this will occur in the Southern Sector will be by influencing the form of land use change, including a suitable emphasis on development within growth centres, and generally to ensure the suitable location of complementary land uses. Further measures to encourage use of passenger transport, walking and cycling by appropriate means will reduce the car dominated culture of the Southern Sector. The important role of travel planning initiatives is acknowledged.

13.9 Recommendations of the Study

As a result of the above conclusions, it is recommended that:

- ARTA and MCC, with the support of ARC, investigate and protect rapid transit links between Manukau CBD and Flatbush and between the Airport and Manukau CBD;
- ARC and ARTA and MCC, and ONTRACK with the support of ARC, continue to investigate and implement the proposed upgrade of the North Island Main Trunk Line, with improvements to rapid transit services and facilities (such as the Manukau Rail Link, station upgrades, Park and Ride bus interchange, and electrification). Extension of rapid transit services, initially to Drury and subsequently to Pukekohe, should be investigated;
- ARTA's Passenger Transport Network Plan should address the potential issues identified in the gap Analysis, in particular:
  - north-south services between Papakura to East Tamaki;
  - services between the employment zone around the Airport and Manukau CBD;
  - services between Manukau CBD and Flatbush;
  - future growth in Hingaia;
  - future growth in Pukekohe.
- New road corridors must, where practical, provide for passenger transport facilities. ARC, ARTA and MCC, in accordance with the Regional Land Transport Strategy, are required to continually develop passenger transport service levels and supporting infrastructure.
- Transit include proposals to upgrade the Southern Motorway in its next 10 year plan. These improvements would comprise an additional lane in each direction, starting with the section from south of Manurewa to Takanini and subsequently extending the six lane section to Drury. The following interchange proposals require full investigation:

  - Alfriston Road: new interchange
  - Papakura: interchange upgrade
  - Quarry Road: a possible new interchange at Quarry Road, at a suitable distance from the Drury interchange, or alternatively
  - Drury: interchange upgrade

- Transit recommence investigations into options to upgrade SH22, between Drury and Pukekohe. Options to be pursued should be those considered in the previous study, plus a possible new route from the proposed Quarry Road interchange (see above), as a southern extension of the Mill Road route (see below);

- Manukau City and Papakura District undertake a corridor study for a route from Flat Bush to Papakura, and possibly on to Drury (termed in this report the "Mill Road" route). This corridor study should acknowledge the advantages of a multi modal corridor which integrates well with land use;

- Manukau City, Auckland City and possibly Transit investigate the concept of an "Allens Road Link" between the Waiouru Peninsula and Mount Wellington Highway, with a possible extension to Neilson Street;

- Manukau City Council and Franklin District Council should examine the current level of protection for a future Karaka to Weymouth crossing to ensure that the opportunity to implement this link is not precluded, noting that this link does not support the Regional Growth Strategy and is inconsistent with the Local Government (Auckland) Amendment Act and Plan Change 6 to the Regional Policy Statement and will only be considered in the context of possible changes to current land use strategies;

- The territorial local authorities and Transit monitor land use developments, changes in travel demands and network conditions over time, to reconfirm that the above recommendations remain valid. In particular, it needs to be confirmed that the transport networks develop to support land use developments in a particular area;

- Emphasis continue to be placed on land use developments that minimise the need for travel and on the whole variety of travel demand management measures that encourage travel by modes other than the private car;

- The conclusions and recommendations of the study be revisited if any key assumptions in the report change.

Appendix A – Traffic Model Development

A1 Southern Sector Model Validation Report

A1.1 Base Network

Opus developed a strategic SATURN traffic model for the Southern Sector study. The purpose of this model is to assist with the assessment of strategic transportation options, and in particular to assess the traffic flows, network operation, trip reassignment and broad economic benefits of the options. The model encompasses the core study area as shown in yellow in Figure A1-1 below.

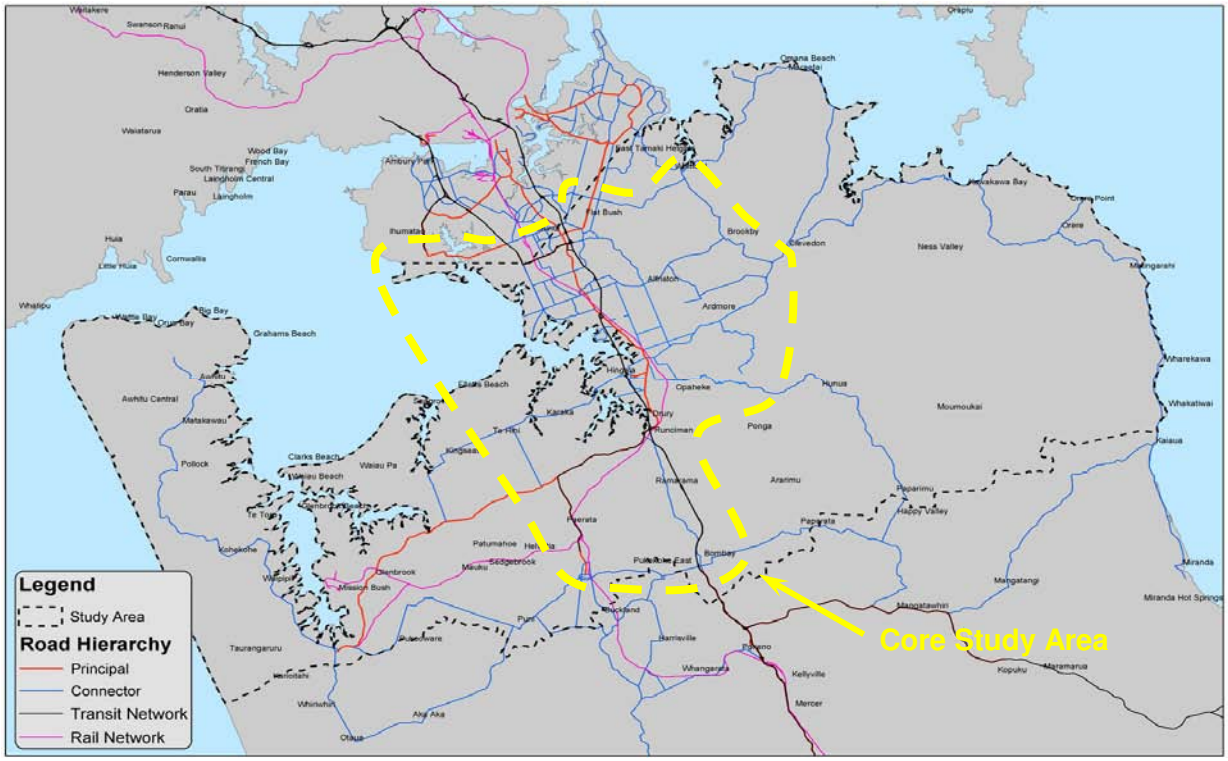


Figure A1-1 - Core Southern Sector Study Area

A coarse 'Buffer' model was developed using the software program SATURN for the base year 2004, and future year 2021. These models do not account for intersection delay - instead, traffic flows are regulated by assigning each link a 'capacity index' which defines the length, traffic flow capacity, free flow speed, speed at capacity, and decay curve of the link. For the strategic purposes of this study, this form of model is considered appropriate.

Three 2004 base year models were developed and validated:

- AM Peak 0800 to 0900
- Inter Peak 1200 to 1300
- PM Peak 1700 to 1800

A1.2 Matrices and Zone System

Initial matrices for the network were obtained from the model developed by Beca, Carter, Hollings and Ferner Ltd. (Beca), which in turn was based on the Auckland Regional Transport (ART) model developed by the Auckland Regional Council. Hence, the model largely uses the same network of roads as the Beca model, with extensions to the south and west to

include both the Ramarama and Bombay Interchanges on State Highway 1, Pukekohe Township, Glenbrook Road west of Charles Road, and Linwood Road west of Charles Road.

The 2001 Beca matrices contained 61 traffic zones. These zones were extended using count data to include the extensions to the south and west detailed above, and in some cases, existing zones were disaggregated to better distribute demand on the network. The extended matrices now contain 82 traffic zones. Trip distributions for any new zones have been extrapolated from similar nearby zones.

A1.3 Base Model Validation

A1.3.1 Introduction

The 2004 base model was validated to Transfund Project Evaluation Manual (PEM) guidelines for strategic models to ensure that the assessment of future options can be carried out with confidence.

Modelled and observed traffic flows were compared on 227 links. Count data was obtained for Papakura District, Franklin District, and Manukau City Councils, and Transit New Zealand.

A1.3.2 Matrix Estimation

As some manual manipulation of the matrices was required to extend the model (Section A1.2), one loop of matrix estimation was used to establish the appropriate flows on links throughout the network to meet PEM criteria. Parameters on the estimation process were set so that the integrity of the initial matrix would be maintained in the final validated matrix.

A1.3.3 Link Count Validation

Tables 1, 2, and 3 show the link count validation for the AM, Inter and PM Peaks respectively. The modelled 'goodness of fit' was measured in three ways, namely:

- Scatter plots and corresponding linear function statistics;
- Root Mean Square Error (RMSE) for the whole data set; and
- Distribution of the GEH statistic for links.

Figures 2, 3, and 4 show the scatter plots of observed versus modelled link flows for the AM, Inter, and PM Peaks respectively. The coefficient of determination (R^2) is also shown on each plot. PEM guidelines suggest that R^2 values should be generally greater than 0.85 for the overall network, and 0.95 within the vicinity of the scheme. The R^2 values for the networks are 0.965 for the AM Peak, 0.977 for the Inter Peak, and 0.966 for the PM Peak.

Route Mean Square Error (RMSE) was calculated for each of the Peak periods. PEM guidelines suggested that RMSE values should be generally less than 30%. The values for the validated periods were found to be 16%, 13% and 16% for the three Peak periods.

The GEH statistic was assessed for each count in the study area as shown in Tables 1, 2, and 3. GEH is a form of the Chi-Squared measure of fit, and is defined as:

$$GEH = [(V_2 - V_1)^2 / (0.5 * (V_1 + V_2)]^{0.5}$$

Where V_1 Modelled flow (vehicles / hour)

V_2 Observed (Count) flow (vehicles / hour)

The PEM suggests the following targets:

- At least 60% of individual link flows should have a GEH less than 5;
- At least 95% of individual link flows should have a GEH less than 10; and
- All individual link flows should have GEH less than 12.

Table A1-1 summarises the link flow GEH statistics for the modelled time periods.

Table A1-1- GEH Statistics for Link Flows

Peak Period	% GEH ≤ 5	% GEH ≤ 10	% GEH > 12
AM Peak	85%	100%	0%
Inter Peak	94%	100%	0%
PM Peak	81%	98%	0%

All three peak models meet the required network percentages of 60% of the counts having a GEH less than 5, and 95% of the counts having a GEH less than 10. All GEHs are less than 12.

A1.3.4 Journey Time Validation

Modelled journey times were compared to observed journey times on the Southern Motorway (SH1) between Te Irirangi Drive and Ramarama Interchanges.

Summary tables from the journey time comparison are included in Tables 5 to 10 for each peak, and northbound / southbound direction. In general, modelled journey times were slightly faster for the southbound AM and Inter Peaks (-13% and -11%) and slower for the PM Peak (+24%). Northbound modelled journey times are -13%, +3% and 0% for the three peak periods respectively. These results are satisfactory for a strategy study.

A1.4 Comment on Validation Results

The performance of the AM, Inter and PM Peak base models meet the requirements set out in the PEM for strategic transportation models. As a result, we consider that the model is suitable for the purposes of which it has been built, being the assessment of strategic transportation schemes for the Southern Sector Strategy study.

A1.5 Future Year Model Development

Future year 2021 'Do Minimum' and options as described in the main text of the report were modelled for the AM, Inter and PM Peaks.

A1.5.1 Matrices

A difference matrix was calculated for the three peak periods, being the difference between the Beca 2021 and Beca 2001 matrix for each peak. The difference matrices were factored to reflect the difference between the base year 2004 and the 2021. This was assumed to be 85% of the differences between 2001 and 2021. The same extrapolation files were then run on the difference matrices as were used on the base year matrices to extend them to 82 zones. The 2004 to 2021 difference matrices were then added to the validated 2004 base year matrices to produce 2021 matrices for each peak period.

Franklin District Council (FDC) is forecasting a global 60% increase in population across the district between 2001 and 2021. Therefore trip increases in FDC zones were further factored to a standard 50% increase between 2004 and 2021 - being approximately 60% * 85%.

A1.5.2 Do Minimum Schemes

The 2021 Do Minimum models were the existing networks plus the following additions:

- The SH20 extension from the Puhinui Interchange to SH1 at Manukau - consisting of a two lane motorway in each direction and including the relevant connections and interchanges;
- As a result of the SH20 to SH1 connection, the Liverpool-Nesdale scheme was also included in Manukau City Centre;
- Changes in speed limits along a number of routes that are currently "rural" and will become more urban in line with Opus Report CER 04/107 – Papakura Traffic Model: Takanini Development, following proposed development in the area. These include;
  - Porchester Road;
  - Airfield Road;
  - Walters Road;
  - Popes Road;
  - Papakura – Clevedon Road; and
  - Mill Road.

Other schemes are also assumed to be included in future Do Minimum models in the main Southern Sector report. These have not been included here, as they are either outside the core study area, or are of a small scale with regard to the strategic nature of the model, and will have little if no effect on the modelling for the study.

A1.5.3 Options

Various options and schemes were modelled for the AM, Inter and PM Peaks in 2021 as detailed in the main text of the report.

Table 1 - Link Flow Comparison - AM Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
NB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	1	1015	1002	0	142	79	2180	-62	-44.43	5.99	3844
SB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	2	1002	1015	0	58	58	2180	0	-0.84	0.00	0
NB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	3	1027	1015	0	70	67	2180	-2	-4.16	0.36	4
SB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	4	1015	1027	0	78	80	2180	2	2.93	0.23	4
NB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	5	1101	1062	0	402	350	1660	-51	-12.89	2.68	2601
SB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	6	1062	1101	0	348	382	1660	34	9.8	1.78	1156
NB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	7	3448	3546	0	371	371	1270	0	-0.07	0.00	0
SB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	8	3546	3448	0	242	244	1270	2	0.65	0.13	4
WB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	9	1002	1003	0	273	179	2180	-93	-34.5	6.25	8649
EB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	10	1003	1002	0	132	84	2180	-47	-36.35	4.62	2209
WB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	11	1009	1065	0	450	515	1270	65	14.37	2.96	4225
EB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	12	1065	1009	0	500	396	1270	-103	-20.73	4.91	10609
NB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	13	3035	3063	0	143	90	2180	-52	-36.83	4.91	2704
SB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	14	3063	3035	0	72	87	2180	15	21.53	1.68	225
WB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	15	3066	3136	0	548	643	2180	95	17.34	3.89	9025
EB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	16	3136	3066	0	947	914	2180	-32	-3.52	1.08	1024
WB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	17	3243	3241	0	176	180	1660	4	2.05	0.30	16
EB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	18	3241	3243	0	86	86	1660	0	0.46	0.00	0
NB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	19	3184	3163	0	247	280	1270	33	13.42	2.03	1089
SB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	20	3163	3184	0	309	308	1270	0	-0.48	0.06	0
WB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	21	3141	3142	0	25	57	1660	32	129.76	5.00	1024
EB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	22	3142	3141	0	11	21	1660	10	92.48	2.50	100
WB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	23	3113	3134	0	129	132	2180	3	2.2	0.26	9
EB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	24	3134	3113	0	473	475	2180	2	0.4	0.09	4
WB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	25	3111	3113	0	157	132	1380	-24	-16.02	2.08	576
EB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	26	3113	3111	0	513	475	1380	-37	-7.43	1.71	1369
NB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	27	3112	3463	0	590	533	1270	-56	-9.66	2.41	3136
SB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	28	3463	3112	0	520	589	1270	69	13.29	2.93	4761
NB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	29	3433	3432	0	676	642	1275	-33	-5.03	1.32	1089
SB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	30	3432	3433	0	354	306	1275	-47	-13.58	2.64	2209
WB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	31	3205	3204	0	499	565	1270	66	13.22	2.86	4356
EB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	32	3204	3205	0	401	574	1270	173	43.17	7.84	29929
NB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	33	3617	3220	0	568	520	1380	-47	-8.46	2.06	2209
SB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	34	3220	3617	0	383	343	1380	-39	-10.56	2.10	1521
NB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	35	1034	1033	0	420	489	1270	69	16.47	3.24	4761
SB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	36	1033	1034	0	457	378	1270	-78	-17.2	3.87	6084
WB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	37	3438	3206	0	549	587	1270	38	6.86	1.59	1444
EB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	38	3206	3438	0	536	556	1270	20	3.69	0.86	400
WB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	39	1162	1042	0	631	652	1270	21	3.33	0.83	441
EB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	40	1042	1162	0	599	498	1270	-100	-16.85	4.31	10000
NB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	41	3451	1039	0	524	490	1270	-33	-6.4	1.51	1089
SB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	42	1039	3451	0	385	384	1270	0	-0.34	0.05	0
WB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	43	5234	1055	0	299	299	1380	0	0.15	0.00	0
EB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	44	1055	5234	0	188	179	1380	-8	-4.79	0.66	64
NB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	45	1055	1103	0	508	393	1380	-114	-22.59	5.42	12996
SB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	46	1103	1055	0	419	343	1380	-75	-18.09	3.89	5625
NB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	47	1029	1004	0	675	630	1660	-44	-6.61	1.76	1936
SB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	48	1004	1029	0	375	470	1660	95	25.36	4.62	9025
NB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	49	1032	1024	0	545	531	1660	-13	-2.61	0.60	169
SB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	50	1024	1032	0	247	340	1660	93	37.58	5.43	8649
WB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	51	3601	1039	0	496	495	1270	0	-0.23	0.04	0
EB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	52	1039	3601	0	447	438	1270	-8	-2.07	0.43	64
NB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	53	1203	1165	0	603	561	1275	-41	-6.93	1.74	1681
SB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	54	1165	1203	0	778	717	1275	-60	-7.78	2.23	3600
NB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	55	1089	1122	0	976	960	1275	-15	-1.63	0.51	225
SB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	56	1122	1089	0	952	915	1275	-36	-3.94	1.21	1296
NB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	57	1058	1203	0	744	655	1275	-88	-11.96	3.37	7744
SB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	58	1203	1058	0	943	792	1275	-150	-15.98	5.13	22500
WB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	59	1226	1087	0	368	393	1270	25	6.75	1.28	625
EB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	60	1087	1226	0	294	242	1270	-51	-17.54	3.18	2601
WB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	61	1051	3610	0	121	62	1270	-58	-48.41	6.17	3364
EB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	62	3610	1051	0	78	73	1270	-4	-6.69	0.58	16
NB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	63	1180	1179	0	400	322	1270	-77	-19.6	4.11	5929
SB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	64	1179	1180	0	313	346	1270	33	10.62	1.82	1089
WB	ALFRISTON RD (Btn Brough and Shifnal) -930	65	1123	3347	0	874	839	1270	-34	-3.95	1.20	1156
EB	ALFRISTON RD (Btn Brough and Shifnal) -930	66	3347	1123	0	524	475	1270	-48	-9.41	2.19	2304
EB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	67	3221	3222	0	73	50	2180	-22	-31.88	2.93	484
WB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	68	3222	3221	0	125	123	2180	-1	-1.5	0.18	1
EB	Brookby Rd (120m from R/about) 3985	69	3223	3224	0	86	50	2180	-35	-42.18	4.37	1225
WB	Brookby Rd (120m from R/about) 3985	70	3224	3223	0	122	123	2180	1	0.93	0.09	1
EB	Browns Rd (btwn Jellicoe and Marr) 1180	71	3307	3321	0	640	546	1270	-93	-14.68	3.86	8649
EB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	72	1015	1031	0	61	102	2180	41	67.64	4.54	1681
WB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	73	1031	1015	0	137	137	2180	0	-0.1	0.00	0
NB	Dalgety Rd - btn Browns and Kerrs - 400m (Northbound)	74	3307	3327	0	801	765	1270	-35	-4.48	1.29	1225
SB	Dalgety Rd - btn Browns and Kerrs - 400m (Southbound)	75	3327	3307	0	334	333	1270	0	-0.2	0.05	0
SB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	76	3282	3291	0	445	438	1270	-6	-1.61	0.33	36
NB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	77	3291	3282	0	586	842	1270	256	43.65	9.58	65536
EB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	78	3346	3341	0	214	142	1270	-71	-33.41	5.40	5041
WB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	79	3341	3346	0	353	183	1270	-169	-48.19	10.38	28561
EB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	80	3342	3249	0	289	302	1270	13	4.52	0.76	169
WB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	81	3249	3342	0	346	274	1270	-71	-20.85	4.09	5041
NB	Gt Sth Rd -N Bd (btwn Rata Vine and Costar) 6932	82	3301	3271	0	985	1082	2050	97	9.84	3.02	9409
SB	Gt Sth Rd -S Bd (btwn Rata Vine and Costar) 6852	83	3271	3301	0	442	615	2050	173	39.09	7.53	29929
EB	Hill Rd (btwn Gt Sth and Scenic) 280	84	5174	3339	0	226	250	1270	24	10.82	1.56	576
WB	Hill Rd (btwn Gt Sth and Scenic) 280	85	3339	5174	0	335	335	1270	0	0.1	0.00	0
EB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	86	3344	3260	0	465	578	1270	113	24.39	4.95	12769
WB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	87	3260	3344	0	400	373	1270	-26	-6.86	1.37	676
EB	HILL RD (Btn Stratford and Wairere) - 2055	88	3408	3413	0	129	126	1270	-2	-2.05	0.27	4
WB	HILL RD (Btn Stratford and Wairere) - 2055	89	3413	3408	0	272	253	1270	-18	-6.85	1.17	324
EB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	90	3261	3407	0	411	484	1270	73	17.78	3.45	5329
WB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	91	3407	3261	0	945	875	1270	-69	-7.45	2.32	4761
WB	Hollyford Dr - btn Redoubt and Aspiring - 100m	92	3290	3282	0	979	681	1270	-297	-30.42	10.34	88209
EB	Hollyford Dr - btn Redoubt and Aspiring - 100m	93	3282	3290	0	793	758	1270	-34	-4.47	1.26	1156
NB	Lupton Rd- btn Russell and Selwyn - 100m	94	3334	3333	0	377	451	950	74	19.54	3.64	5476
SB	Lupton Rd- btn Russell and Selwyn - 100m	95	3333	3334	0	163	317	950	154	94.5	9.94	23716
WB	Mahia Road - 177m	96	1082	3387	0	1011	758	1270	-252	-25.03	8.51	63504
EB	Mahia Road - 177m	97	3387	1082	0	979	967	1270	-11	-1.2	0.38	121
WB	MAHIA RD Btwn Siska and Southview	98	3371	3369	0	709	479	1270	-229	-32.41	9.44	52441
EB	MAHIA RD Btwn Siska and Southview	99	3369	3371	0	523	525	1270	2	0.33	0.09	4
SB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	100	1008	1005	0	357	398	1380	41	11.5	2.11	1681
NB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	101	1005	1008	0	689	645	1380	-43	-6.44	1.70	1849
NB	MURPHYS RD (Btn Redoubt and Thomas) - 180	102	3404	3399	0	348	343	1380	-4	-1.34	0.27	16
SB	MURPHYS RD (Btn Redoubt and Thomas) - 180	103	3399	3404	0	240	290	1380	50	21.01	3.07	2500
NB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	104	3236	3234	0	124	100	2180	-23	-19.04	2.27	529
SB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	105	3234	3236	0	198	198	2180	0	0.11	0.00	0
NB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	106	3234	3235	0	128	131	2180	3	2.51	0.26	9
SB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	107	3235	3234	0	244	294	2180	50	20.59	3.05	2500
WB	Ranfurly Rd - W Bd (btwn Everlea and Wastney) 925	108	1007	1148	0	114	111	1380	-2	-2.73	0.28	4
EB	Ranfurly Rd -E Bd (130m before Everlea) 625	109	1148	1007	0	178	185	1380	7	3.76	0.52	49
EB	REDOUBT RD (Btn Hill Top and Murphys) -2600	110	3295	3399	0	248	184	1380	-63	-25.98	4.35	3969
WB	REDOUBT RD (Btn Hill Top and Murphys) -2600	111	3399	3295	0	585	483	1380	-101	-17.42	4.41	10201
EB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	112	3233	3234	0	31	31	2180	0	-0.57	0.00	0
WB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	113	3234	3233	0	96	96	2180	0	0.01	0.00	0
WB	Weymouth Rd - 700m	114	3313	3386	0	703	753	1270	50	7.16	1.85	2500
EB	Weymouth Rd - 700m	115	3386	3313	0	843	976	1270	133	15.78	4.41	17689
WB	Weymouth Rd Btwn Gainsborough and Rowandale	116	3308	3309	0	573	344	1270	-228	-39.89	10.69	51984
EB	Weymouth Rd Btwn Gainsborough and Rowandale	117	3309	3308	0	616	472	1270	-143	-23.4	6.17	20449
WB	Browns Rd (btwn Feasegate and Fellbrook) 2430	118	3310	3316	0	574	655	1270	81	14.1	3.27	6561
EB	Browns Rd (btwn Feasegate and Fellbrook) 2430	119	3316	3310	0	469	389	1270	-79	-17.11	3.86	6241
NB	ROSCOMMON RD (NTH BND) (Btn Browns and Bolderwood) - 3650	120	3316	5052	0	2442	2134	2100	-307	-12.61	6.44	94249
SB	ROSCOMMON RD (STH BND) (Btn Bolderwood and Browns) - 3650	121	5052	3316	0	762	747	2100	-14	-2	0.55	196
NB	SH1 Drury Off Ramp Northbound	122	3085	3059	0	148	144	1800	-3	-2.92	0.33	9
NB	SH1 Drury On Ramp Northbound	123	3059	3088	0	996	954	1800	-41	-4.18	1.35	1681
SB	SH1 Southern Motorway Hill Rd Off Ramp Southbound	124	3258	3261	0	452	542	1800	90	19.94	4.04	8100
NB	SH1 Southern Motorway Hill Rd On Ramp Northbound	125	3249	3251	0	1092	1167	1800	75	6.84	2.23	5625
SB	SH1 Papakura Off Ramp Southbound	126	3125	3131	0	609	669	1800	60	9.77	2.37	3600

Table 1 - Link Flow Comparison - AM Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
SB	SH1 Papakura On Ramp Southbound	127	3132	3128	0	171	187	1800	16	9.09	1.20	256
NB	SH1 Papakura On Ramp Northbound	128	3133	3118	0	1170	1310	1800	140	11.93	3.98	19600
SB	SH1 Ramarama Off Ramp Southbound	129	3012	3005	0	88	77	1800	-10	-12.03	1.21	100
NB	SH1 Ramarama Off Ramp Northbound	130	3016	3004	0	34	34	1800	0	0.51	0.00	0
NB	SH1 Ramarama On Ramp Northbound	131	3004	3008	0	255	254	1800	0	-0.45	0.06	0
NB	SH1 Takinini Off Ramp Northbound	132	1139	1132	0	817	865	1800	48	5.85	1.66	2304
NB	SH1 Manukau Interchange Northbound	133	3266	3276	0	2914	3075	4300	161	5.54	2.94	25921
SB	SH1 Manukau Interchange Southbound	134	3280	3283	0	1520	1533	4300	13	0.86	0.33	169
NB	SH1 Takinini Interchange Northbound	135	1126	1137	0	2514	2659	4300	145	5.75	2.85	21025
SB	SH1 Takinini Interchange Southbound	136	1143	1209	0	1407	1416	4300	9	0.63	0.24	81
NB	Gt South Rd 4100m Nth Bound.PDF between Araimu Rd & Kern Rd	137	5024	3025	0	124	44	2180	-79	-64.72	8.73	6241
SB	Gt South Rd 4100m Sth Bound.PDF between Araimu Rd & Kern Rd	138	3025	5024	0	58	59	2180	1	1.22	0.13	1
NB	SH22 Karaka Road	139	3138	3136	0	934	846	2180	-87	-9.42	2.95	7569
SB	SH22 Karaka Road	140	3136	3138	0	519	614	2180	95	18.32	3.99	9025
NB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	141	1175	1116	0	702	561	1275	-140	-20.06	5.61	19600
SB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	142	1116	1175	0	879	717	1275	-161	-18.37	5.73	25921
WB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	143	1204	1116	0	283	297	1270	14	4.97	0.82	196
EB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	144	1116	1204	0	219	251	1270	32	14.76	2.09	1024
NB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	145	1004	1005	0	531	460	1380	-70	-13.38	3.19	4900
SB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	146	1005	1004	0	310	287	1380	-22	-7.37	1.33	484
NB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	147	1064	1065	0	504	365	1270	-138	-27.59	6.67	19044
SB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	148	1065	1064	0	430	346	1270	-83	-19.42	4.26	6889
WB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	149	1087	1088	0	102	154	1270	52	51.01	4.60	2704
EB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	150	1088	1087	0	236	313	1270	77	32.58	4.65	5929
WB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	151	3193	3163	0	431	456	1270	25	5.82	1.19	625
EB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	152	3163	3193	0	286	304	1270	18	6.36	1.05	324
WB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	153	3163	3569	0	598	610	1270	12	2.03	0.49	144
EB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	154	3569	3163	0	478	486	1270	8	1.59	0.36	64
WB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	155	3164	3577	0	354	355	1270	1	0.26	0.05	1
EB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	156	3577	3164	0	216	213	1270	-2	-1.5	0.20	4
WB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	157	3152	3153	0	172	125	2180	-46	-27.33	3.86	2116
EB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	158	3153	3152	0	85	84	2180	0	-1.07	0.11	0
NB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	159	3062	3077	0	524	520	1270	-3	-0.77	0.18	9
SB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	160	3077	3062	0	346	343	1270	-2	-1	0.16	4
WB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	161	3057	3058	0	552	643	2180	91	16.49	3.72	8281
EB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	162	3058	3057	0	973	914	2180	-58	-6.1	1.92	3364
NB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	163	3063	3057	0	175	90	2180	-84	-48.38	7.38	7056
SB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	164	3057	3063	0	88	87	2180	0	-0.57	0.11	0
NB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	165	3074	3061	0	416	500	1270	84	20.18	3.93	7056
SB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	166	3061	3074	0	436	438	1270	2	0.5	0.10	4
NB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	167	1116	1091	0	808	960	1275	152	18.82	5.11	23104
SB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	168	1091	1116	0	924	915	1275	-8	-1.03	0.30	64
WB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	169	1202	1203	0	341	385	1270	44	12.84	2.31	1936
EB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	170	1203	1202	0	256	404	1270	148	57.73	8.15	21904
WB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	171	3112	3110	0	1043	1237	1270	194	18.59	5.75	37636
EB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	172	3110	3112	0	938	1020	1270	82	8.77	2.62	6724
SB	SH1 Ramarama On Ramp Southbound	173	3005	3019	0	38	38	1800	0	-1.24	0.00	0
SB	SH1 Takinini Off Ramp Southbound	174	1141	1145	0	588	489	1800	-98	-16.76	4.27	9604
SB	SH1 Takinini On Ramp Southbound	175	1206	1207	0	501	540	1800	39	7.72	1.71	1521
SB	SH1 Drury On Ramp Southbound	176	3060	3094	0	111	84	1800	-26	-24.75	2.73	676
NB	SH1 Papakura Off Ramp Northbound	177	3115	3114	0	267	268	1800	1	0.37	0.06	1
NB	Great South Road - North Bound between Caspar and Puhinui) 3400m	178	5087	5088	0	874	874	1960	0	0.05	0.00	0
SB	Great South Road - North Bound between Caspar and Puhinui) 3400m	179	5088	5087	0	721	722	1960	1	0.14	0.04	1
NB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	180	5198	5087	0	702	544	1960	-157	-22.49	6.33	24649
SB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	181	5087	5198	0	689	674	1960	-14	-2.15	0.57	196
WB	Sandstone Rd (200mfrom Whitford Park) 1772	182	5140	5139	0	370	527	2180	157	42.3	7.41	24649
EB	Sandstone Rd (200mfrom Whitford Park) 1772	183	5139	5140	0	129	163	2180	34	26.6	2.81	1156
WB	Te Irirangi Drive SB - 6800m	184	5192	5206	0	1106	930	2540	-175	-15.91	5.52	30625
EB	Te Irirangi Drive NB - 6825m	185	5206	5192	0	628	511	2540	-116	-18.63	4.90	13456
SB	Whitford ParkRd (btwn Rabout and Sandstone) 130	186	5141	5140	0	588	588	2180	0	-0.02	0.00	0
NB	Whitford ParkRd (btwn Rabout and Sandstone) 130	187	5140	5141	0	195	216	2180	21	11	1.46	441
WB	SH20 East of Ash Rd	188	3305	3330	0	991	1142	2050	151	15.26	4.62	22801
EB	SH20 East of Ash Rd	189	3330	3305	0	1433	1375	2050	-57	-4.02	1.55	3249
NB	SH20 North of Vogler Drive	190	5052	5071	0	2273	1976	2100	-296	-13.05	6.44	87616
SB	SH20 North of Vogler Drive	191	5071	5052	0	1656	1493	2100	-162	-9.85	4.11	26244
NB	Wylie Road - btn Gifford and Puhinui	192	5067	5068	0	309	332	1270	23	7.42	1.28	529
SB	Wylie Road - btn Gifford and Puhinui	193	5068	5067	0	474	473	1270	0	-0.15	0.05	0
WB	Puhinui Road - btn Orrs and Airport	194	5055	5056	0	930	939	2180	9	0.97	0.29	81
EB	Puhinui Road - btn Orrs and Airport	195	5056	5055	0	374	388	2180	14	3.81	0.72	196
WB	Puhinui Road - btn SH20 and Price	196	5157	5055	0	938	939	2180	1	0.11	0.03	1
EB	Puhinui Road - btn SH20 and Price	197	5055	5157	0	388	388	2180	0	0.06	0.00	0
WB	Puhunui Road - betn SH20 and Wylie	198	5067	5158	0	1066	1210	1270	144	13.54	4.27	20736
EB	Puhunui Road - betn SH20 and Wylie	199	5158	5067	0	831	767	1270	-63	-7.67	2.26	3969
NB	SH1 Drury Interchange Northbound	200	3086	3091	0	1488	1527	4300	39	2.65	1.00	1521
SB	SH1 Drury Interchange Southbound	201	3100	3095	0	865	791	4300	-73	-8.57	2.57	5329
NB	SH1 South of Ramarama Interchange Northbound	202	3021	3000	0	1415	1451	4300	36	2.57	0.95	1296
SB	SH1 South of Ramarama Interchange Southbound	203	3001	3022	0	927	835	4300	-91	-9.97	3.10	8281
WB	SH20 Wiri Station Road West of GSR Westbound	204	3272	5201	0	1232	1427	2050	195	15.81	5.35	38025
EB	SH20 Wiri Station Road West of GSR Eastbound	205	5201	3272	0	785	925	2050	140	17.86	4.79	19600
NB	Puhinui On Ramp Northbound	206	5157	5154	0	456	480	1800	24	5.36	1.11	576
NB	George Bolt Memorial Drive South of Montgomerie Road	207	5060	5061	0	1074	1074	4300	0	-0.05	0.00	0
SB	George Bolt Memorial Drive South of Montgomerie Road	208	5061	5060	0	1081	1079	4300	-1	-0.16	0.06	1
SB	S/W Motorway Puhinui to Massey Road	209	5066	5064	0	1555	1559	4300	4	0.24	0.10	16
NB	S/W Motorway Puhinui to Massey Road	210	5156	5065	0	1605	1658	4300	53	3.28	1.31	2809
NB	SH1 South of Bombay Interchange	211	5035	5036	0	1024	1087	4300	63	6.16	1.94	3969
SB	SH1 South of Bombay Interchange	212	5050	5051	0	898	724	4300	-173	-19.33	6.11	29929
SB	Mill Road On Ramp SB	213	5019	5048	0	140	140	1800	0	-0.04	0.00	0
NB	Charles Road between Glenbrook and Linwood Road-50	214	5002	5000	0	48	9	1380	-38	-82.09	7.31	1444
SB	Charles Road between Glenbrook and Linwood Road-50	215	5000	5002	0	42	13	1380	-28	-68.44	5.53	784
WB	Glenbrook Road between SH22 and Charles	216	5002	3138	0	447	443	2180	-3	-0.98	0.19	9
EB	Glenbrook Road between SH22 and Charles	217	3138	5002	0	211	187	2180	-23	-11.27	1.70	529
WB	Glenbrook Road between Ostrich and Batty	218	5002	5003	0	171	183	2180	12	7.27	0.90	144
EB	Glenbrook Road between Ostrich and Batty	219	5003	5002	0	342	434	2180	92	26.95	4.67	8464
WB	Linwood Road between Seal Join and Batty-2000	220	5000	5001	0	69	70	2180	1	1.88	0.12	1
EB	Linwood Road between Seal Join and Batty-2000	221	5001	5000	0	299	299	2180	0	0.01	0.00	0
WB	Mill Road between Road Narrows and Urban/Rural-1100	222	5017	5016	0	556	462	2180	-93	-16.98	4.17	8649
EB	Mill Road between Road Narrows and Urban/Rural-1100	223	5016	5017	0	524	553	2180	29	5.57	1.25	841
NB	Paerata Road between Adams and Bdy SH22	224	5009	5008	0	475	446	1270	-28	-6.16	1.35	784
SB	Paerata Road between Adams and Bdy SH22	225	5008	5009	0	375	469	1270	94	25.11	4.58	8836
WB	Pukekohe East Road between Runciman Road And Harrisville Road	226	5016	5014	0	458	369	2180	-88	-19.47	4.38	7744
EB	Pukekohe East Road between Runciman Road And Harrisville Road	227	5014	5016	0	364	398	2180	34	9.42	1.74	1156

C:\Projects\Southern Sector\Validation\[AM Validation.xls]Validation Data - AM

Total no. of Counts	227
Summation Observed Flows	121033
Summation (Modelled Flows - Observed Flows)^2	1597339
% RMSE	**16**

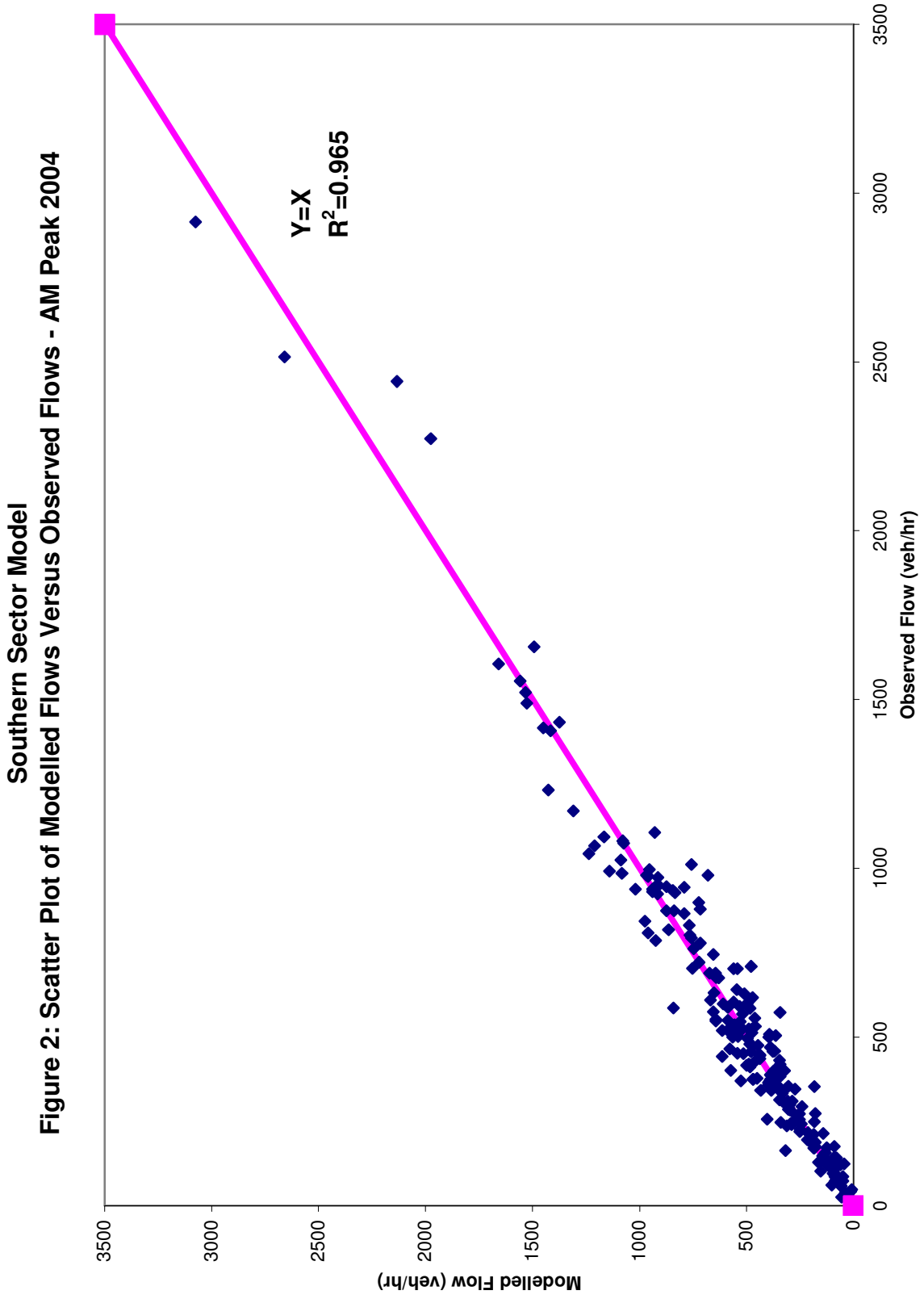


Figure 2: Scatter Plot of Modelled Flows Versus Observed Flows - AM Peak 2004

Table 2 - Link Flow Comparison - Inter Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
NB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	1	1015	1002	0	57	56	2180	0	-0.93	0.13	0
SB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	2	1002	1015	0	49	49	2180	0	-0.25	0.00	0
NB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	3	1027	1015	0	48	48	2180	0	-0.62	0.00	0
SB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	4	1015	1027	0	44	44	2180	0	-0.63	0.00	0
NB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	5	1101	1062	0	230	287	1660	57	24.76	3.55	3249
SB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	6	1062	1101	0	195	283	1660	88	45.05	5.69	7744
NB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	7	3448	3546	0	139	143	1270	4	3.02	0.34	16
SB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	8	3546	3448	0	149	149	1270	0	-0.04	0.00	0
WB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	9	1002	1003	0	112	87	2180	-24	-22.18	2.51	576
EB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	10	1003	1002	0	111	88	2180	-22	-20.84	2.31	484
WB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	11	1009	1065	0	254	320	1270	66	25.8	3.90	4356
EB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	12	1065	1009	0	248	295	1270	47	19.05	2.85	2209
NB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	13	3035	3063	0	88	85	2180	-2	-3.47	0.32	4
SB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	14	3063	3035	0	81	80	2180	0	-1.24	0.11	0
WB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	15	3066	3136	0	454	440	2180	-13	-3.06	0.66	169
EB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	16	3136	3066	0	500	573	2180	73	14.66	3.15	5329
WB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	17	3243	3241	0	95	95	1660	0	-0.3	0.00	0
EB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	18	3241	3243	0	90	90	1660	0	0.41	0.00	0
NB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	19	3184	3163	0	223	219	1270	-3	-1.59	0.27	9
SB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	20	3163	3184	0	213	214	1270	1	0.25	0.07	1
WB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	21	3141	3142	0	18	22	1660	4	23.99	0.89	16
EB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	22	3142	3141	0	14	18	1660	4	26.49	1.00	16
WB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	23	3113	3134	0	180	179	2180	0	-0.34	0.07	0
EB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	24	3134	3113	0	197	197	2180	0	0.23	0.00	0
WB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	25	3111	3113	0	209	179	1380	-29	-14.17	2.15	841
EB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	26	3113	3111	0	223	197	1380	-25	-11.45	1.79	625
NB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	27	3112	3463	0	332	339	1270	7	2.04	0.38	49
SB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	28	3463	3112	0	342	336	1270	-5	-1.75	0.33	25
NB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	29	3433	3432	0	510	422	1275	-87	-17.21	4.08	7569
SB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	30	3432	3433	0	511	444	1275	-66	-13.02	3.07	4356
WB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	31	3205	3204	0	398	409	1270	11	2.84	0.55	121
EB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	32	3204	3205	0	357	391	1270	34	9.46	1.76	1156
NB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	33	3617	3220	0	280	296	1380	16	5.55	0.94	256
SB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	34	3220	3617	0	311	316	1380	5	1.46	0.28	25
NB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	35	1034	1033	0	317	282	1270	-34	-11.01	2.02	1156
SB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	36	1033	1034	0	287	289	1270	2	0.57	0.12	4
WB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	37	3438	3206	0	307	321	1270	14	4.68	0.79	196
EB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	38	3206	3438	0	286	302	1270	16	5.53	0.93	256
WB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	39	1162	1042	0	596	538	1270	-57	-9.68	2.44	3249
EB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	40	1042	1162	0	587	569	1270	-17	-3.02	0.75	289
NB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	41	3451	1039	0	271	274	1270	3	1.26	0.18	9
SB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	42	1039	3451	0	237	246	1270	9	3.84	0.58	81
WB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	43	5234	1055	0	156	122	1380	-33	-21.92	2.88	1089
EB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	44	1055	5234	0	154	146	1380	-7	-5.14	0.65	49
NB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	45	1055	1103	0	298	340	1380	42	14.04	2.35	1764
SB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	46	1103	1055	0	271	273	1380	2	0.72	0.12	4
NB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	47	1029	1004	0	246	351	1660	105	42.71	6.08	11025
SB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	48	1004	1029	0	230	298	1660	68	29.44	4.19	4624
NB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	49	1032	1024	0	193	294	1660	101	52.5	6.47	10201
SB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	50	1024	1032	0	178	247	1660	69	38.95	4.73	4761
WB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	51	3601	1039	0	357	353	1270	-3	-1.02	0.21	9
EB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	52	1039	3601	0	361	358	1270	-2	-0.91	0.16	4
NB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	53	1203	1165	0	623	613	1275	-9	-1.57	0.40	81
SB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	54	1165	1203	0	756	701	1275	-54	-7.24	2.04	2916
NB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	55	1089	1122	0	938	835	1275	-102	-11.03	3.46	10404
SB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	56	1122	1089	0	910	877	1275	-32	-3.58	1.10	1024
NB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	57	1058	1203	0	728	668	1275	-59	-8.2	2.27	3481
SB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	58	1203	1058	0	838	790	1275	-47	-5.68	1.68	2209
WB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	59	1226	1087	0	324	295	1270	-28	-8.89	1.65	784
EB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	60	1087	1226	0	326	251	1270	-74	-22.94	4.42	5476
WB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	61	1051	3610	0	94	66	1270	-27	-29.86	3.13	729
EB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	62	3610	1051	0	96	44	1270	-51	-54.01	6.22	2601
NB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	63	1180	1179	0	324	298	1270	-25	-8.07	1.47	625
SB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	64	1179	1180	0	298	248	1270	-49	-16.94	3.03	2401
WB	ALFRISTON RD (Btn Brough and Shifnal) -930	65	1123	3347	0	395	402	1270	7	1.89	0.35	49
EB	ALFRISTON RD (Btn Brough and Shifnal) -930	66	3347	1123	0	399	399	1270	0	-0.1	0.00	0
EB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	67	3221	3222	0	68	63	2180	-4	-7.12	0.62	16
WB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	68	3222	3221	0	55	55	2180	0	-0.25	0.00	0
EB	Brookby Rd (120m from R/about) 3985	69	3223	3224	0	60	63	2180	3	5.26	0.38	9
WB	Brookby Rd (120m from R/about) 3985	70	3224	3223	0	52	55	2180	3	5.51	0.41	9
EB	Browns Rd (btwn Jellicoe and Marr) 1180	71	3307	3321	0	360	349	1270	-10	-3.03	0.58	100
EB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	72	1015	1031	0	69	73	2180	4	6.37	0.47	16
WB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	73	1031	1015	0	70	77	2180	7	10.01	0.82	49
NB	Dalgety Rd - btn Browns and Kerrs - 400m (Northbound)	74	3307	3327	0	402	389	1270	-12	-3.14	0.65	144
SB	Dalgety Rd - btn Browns and Kerrs - 400m (Southbound)	75	3327	3307	0	434	388	1270	-45	-10.61	2.27	2025
SB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	76	3282	3291	0	269	268	1270	0	-0.49	0.06	0
NB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	77	3291	3282	0	254	255	1270	1	0.49	0.06	1
EB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	78	3346	3341	0	133	115	1270	-17	-13.4	1.62	289
WB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	79	3341	3346	0	115	53	1270	-61	-54.35	6.76	3721
EB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	80	3342	3249	0	188	162	1270	-25	-13.84	1.97	625
WB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	81	3249	3342	0	138	125	1270	-12	-9.33	1.13	144
NB	Gt Sth Rd -N Bd (btwn Rata Vine and Costar) 6932	82	3301	3271	0	681	736	2050	55	8.1	2.07	3025
SB	Gt Sth Rd -S Bd (btwn Rata Vine and Costar) 6852	83	3271	3301	0	817	824	2050	7	0.87	0.24	49
EB	Hill Rd (btwn Gt Sth and Scenic) 280	84	5174	3339	0	180	227	1270	47	26.15	3.29	2209
WB	Hill Rd (btwn Gt Sth and Scenic) 280	85	3339	5174	0	256	272	1270	16	6.29	0.98	256
EB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	86	3344	3260	0	391	433	1270	42	10.75	2.07	1764
WB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	87	3260	3344	0	371	371	1270	0	-0.04	0.00	0
EB	HILL RD (Btn Stratford and Wairere) - 2055	88	3408	3413	0	96	77	1270	-18	-19.88	2.04	324
WB	HILL RD (Btn Stratford and Wairere) - 2055	89	3413	3408	0	89	75	1270	-13	-15.89	1.55	169
EB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	90	3261	3407	0	429	507	1270	78	18.13	3.61	6084
WB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	91	3407	3261	0	407	504	1270	97	23.88	4.54	9409
WB	Hollyford Dr - btn Redoubt and Aspiring - 100m	92	3290	3282	0	558	572	1270	14	2.59	0.59	196
EB	Hollyford Dr - btn Redoubt and Aspiring - 100m	93	3282	3290	0	480	487	1270	7	1.54	0.32	49
NB	Lupton Rd- btn Russell and Selwyn - 100m	94	3334	3333	0	259	332	950	73	28.13	4.25	5329
SB	Lupton Rd- btn Russell and Selwyn - 100m	95	3333	3334	0	241	310	950	69	28.55	4.16	4761
WB	Mahia Road - 177m	96	1082	3387	0	689	677	1270	-11	-1.72	0.46	121
EB	Mahia Road - 177m	97	3387	1082	0	661	591	1270	-69	-10.58	2.80	4761
WB	MAHIA RD Btwn Siska and Southview	98	3371	3369	0	391	368	1270	-22	-5.76	1.18	484
EB	MAHIA RD Btwn Siska and Southview	99	3369	3371	0	402	379	1270	-22	-5.83	1.16	484
SB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	100	1008	1005	0	228	218	1380	-9	-4.35	0.67	81
NB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	101	1005	1008	0	238	228	1380	-9	-4.05	0.66	81
NB	MURPHYS RD (Btn Redoubt and Thomas) - 180	102	3404	3399	0	129	135	1380	6	4.65	0.52	36
SB	MURPHYS RD (Btn Redoubt and Thomas) - 180	103	3399	3404	0	108	133	1380	25	22.71	2.28	625
NB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	104	3236	3234	0	115	100	2180	-14	-12.86	1.45	196
SB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	105	3234	3236	0	123	105	2180	-17	-14.62	1.69	289
NB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	106	3234	3235	0	131	132	2180	1	1	0.09	1
SB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	107	3235	3234	0	130	137	2180	7	5.34	0.61	49
WB	Ranfurly Rd - W Bd (btwn Everlea and Wastney) 925	108	1007	1148	0	63	45	1380	-17	-27.87	2.45	289
EB	Ranfurly Rd -E Bd (130m before Everlea) 625	109	1148	1007	0	78	45	1380	-32	-41.95	4.21	1024
EB	REDOUBT RD (Btn Hill Top and Murphys) -2600	110	3295	3399	0	240	175	1380	-64	-27.09	4.51	4096
WB	REDOUBT RD (Btn Hill Top and Murphys) -2600	111	3399	3295	0	222	188	1380	-33	-15.43	2.37	1089
EB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	112	3233	3234	0	32	32	2180	0	0.31	0.00	0
WB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	113	3234	3233	0	32	32	2180	0	-0.24	0.00	0
WB	Weymouth Rd - 700m	114	3313	3386	0	630	615	1270	-14	-2.32	0.60	196
EB	Weymouth Rd - 700m	115	3386	3313	0	585	654	1270	69	11.77	2.77	4761
WB	Weymouth Rd Btwn Gainsborough and Rowandale	116	3308	3309	0	460	286	1270	-173	-37.92	9.01	29929
EB	Weymouth Rd Btwn Gainsborough and Rowandale	117	3309	3308	0	454	284	1270	-169	-37.52	8.85	28561
WB	Browns Rd (btwn Feasegate and Fellbrook) 2430	118	3310	3316	0	367	320	1270	-46	-12.82	2.54	2116
EB	Browns Rd (btwn Feasegate and Fellbrook) 2430	119	3316	3310	0	361	318	1270	-42	-11.81	2.33	1764
NB	ROSCOMMON RD (NTH BND) (Btn Browns and Bolderwood) - 3650	120	3316	5052	0	910	892	2100	-17	-1.98	0.60	289
SB	ROSCOMMON RD (STH BND) (Btn Bolderwood and Browns) - 3650	121	5052	3316	0	834	823	2100	-10	-1.38	0.38	100
NB	SH1 Drury Off Ramp Northbound	122	3085	3059	0	77	69	1800	-7	-10.37	0.94	49
NB	SH1 Drury On Ramp Northbound	123	3059	3088	0	543	573	1800	30	5.6	1.27	900
SB	SH1 Southern Motorway Hill Rd Off Ramp Southbound	124	3258	3261	0	503	637	1800	134	26.73	5.61	17956
NB	SH1 Southern Motorway Hill Rd On Ramp Northbound	125	3249	3251	0	555	734	1800	179	32.24	7.05	32041
SB	SH1 Papakura Off Ramp Southbound	126	3125	3131	0	494	527	1800	33	6.68	1.46	1089

Table 2 - Link Flow Comparison - Inter Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
SB	SH1 Papakura On Ramp Southbound	127	3132	3128	0	132	167	1800	35	26.25	2.86	1225
NB	SH1 Papakura On Ramp Northbound	128	3133	3118	0	509	537	1800	28	5.57	1.22	784
SB	SH1 Ramarama Off Ramp Southbound	129	3012	3005	0	82	72	1800	-9	-11.6	1.14	81
NB	SH1 Ramarama Off Ramp Northbound	130	3016	3004	0	27	27	1800	0	-0.43	0.00	0
NB	SH1 Ramarama On Ramp Northbound	131	3004	3008	0	86	78	1800	-7	-9.5	0.88	49
NB	SH1 Takinini Off Ramp Northbound	132	1139	1132	0	382	333	1800	-48	-12.92	2.59	2304
NB	SH1 Manukau Interchange Northbound	133	3266	3276	0	1933	1942	4300	9	0.45	0.20	81
SB	SH1 Manukau Interchange Southbound	134	3280	3283	0	1534	1559	4300	25	1.63	0.64	625
NB	SH1 Takinini Interchange Northbound	135	1126	1137	0	1552	1561	4300	9	0.61	0.23	81
SB	SH1 Takinini Interchange Southbound	136	1143	1209	0	1284	1419	4300	135	10.53	3.67	18225
NB	Gt South Rd 4100m Nth Bound.PDF between Araimu Rd & Kern Rd	137	5024	3025	0	57	58	2180	1	0.9	0.13	1
SB	Gt South Rd 4100m Sth Bound.PDF between Araimu Rd & Kern Rd	138	3025	5024	0	62	60	2180	-1	-3.91	0.26	1
NB	SH22 Karaka Road	139	3138	3136	0	461	518	2180	57	12.28	2.58	3249
SB	SH22 Karaka Road	140	3136	3138	0	411	401	2180	-9	-2.51	0.50	81
NB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	141	1175	1116	0	740	613	1275	-126	-17.13	4.88	15876
SB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	142	1116	1175	0	798	701	1275	-96	-12.12	3.54	9216
WB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	143	1204	1116	0	186	136	1270	-49	-26.98	3.94	2401
EB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	144	1116	1204	0	201	177	1270	-23	-12.12	1.75	529
NB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	145	1004	1005	0	192	183	1380	-8	-4.64	0.66	64
SB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	146	1005	1004	0	181	173	1380	-7	-4.61	0.60	49
NB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	147	1064	1065	0	278	279	1270	1	0.19	0.06	1
SB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	148	1065	1064	0	224	285	1270	61	27.32	3.82	3721
WB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	149	1087	1088	0	210	212	1270	2	0.72	0.14	4
EB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	150	1088	1087	0	193	229	1270	36	18.73	2.48	1296
WB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	151	3193	3163	0	237	238	1270	1	0.25	0.06	1
EB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	152	3163	3193	0	217	219	1270	2	0.99	0.14	4
WB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	153	3163	3569	0	431	392	1270	-38	-9.13	1.92	1444
EB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	154	3569	3163	0	383	367	1270	-15	-4.1	0.83	225
WB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	155	3164	3577	0	189	189	1270	0	0.12	0.00	0
EB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	156	3577	3164	0	195	195	1270	0	0.13	0.00	0
WB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	157	3152	3153	0	85	81	2180	-3	-4.97	0.44	9
EB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	158	3153	3152	0	81	81	2180	0	0.17	0.00	0
NB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	159	3062	3077	0	291	296	1270	5	1.56	0.29	25
SB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	160	3077	3062	0	268	316	1270	48	17.74	2.81	2304
WB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	161	3057	3058	0	457	440	2180	-16	-3.7	0.80	256
EB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	162	3058	3057	0	488	573	2180	85	17.48	3.69	7225
NB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	163	3063	3057	0	90	85	2180	-4	-5.62	0.53	16
SB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	164	3057	3063	0	86	80	2180	-5	-6.98	0.66	25
NB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	165	3074	3061	0	334	338	1270	4	1.11	0.22	16
SB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	166	3061	3074	0	349	408	1270	59	16.87	3.03	3481
NB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	167	1116	1091	0	926	835	1275	-90	-9.88	3.07	8100
SB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	168	1091	1116	0	996	877	1275	-118	-11.91	3.89	13924
WB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	169	1202	1203	0	262	375	1270	113	43.07	6.33	12769
EB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	170	1203	1202	0	281	341	1270	60	21.29	3.40	3600
WB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	171	3112	3110	0	684	693	1270	9	1.31	0.34	81
EB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	172	3110	3112	0	644	669	1270	25	3.88	0.98	625
SB	SH1 Ramarama On Ramp Southbound	173	3005	3019	0	28	28	1800	0	1.11	0.00	0
SB	SH1 Takinini Off Ramp Southbound	174	1141	1145	0	607	552	1800	-54	-9.11	2.28	2916
SB	SH1 Takinini On Ramp Southbound	175	1206	1207	0	305	321	1800	16	5.32	0.90	256
SB	SH1 Drury On Ramp Southbound	176	3060	3094	0	91	97	1800	6	6.98	0.62	36
NB	SH1 Papakura Off Ramp Northbound	177	3115	3114	0	145	135	1800	-9	-6.93	0.85	81
NB	Great South Road - North Bound between Caspar and Puhinui) 3400m	178	5087	5088	0	687	688	1960	1	0.13	0.04	1
SB	Great South Road - North Bound between Caspar and Puhinui) 3400m	179	5088	5087	0	743	745	1960	2	0.22	0.07	4
NB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	180	5198	5087	0	1022	828	1960	-193	-19	6.38	37249
SB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	181	5087	5198	0	1036	837	1960	-198	-19.21	6.50	39204
WB	Sandstone Rd (200mfrom Whitford Park) 1772	182	5140	5139	0	132	135	2180	3	2.27	0.26	9
EB	Sandstone Rd (200mfrom Whitford Park) 1772	183	5139	5140	0	144	143	2180	0	-0.48	0.08	0
WB	Te Irirangi Drive SB - 6800m	184	5192	5206	0	583	570	2540	-12	-2.25	0.54	144
EB	Te Irirangi Drive NB - 6825m	185	5206	5192	0	648	640	2540	-7	-1.22	0.32	49
SB	Whitford ParkRd (btwn Rabout and Sandstone) 130	186	5141	5140	0	168	168	2180	0	0.26	0.00	0
NB	Whitford ParkRd (btwn Rabout and Sandstone) 130	187	5140	5141	0	185	185	2180	0	-0.07	0.00	0
WB	SH20 East of Ash Rd	188	3305	3330	0	948	1011	2050	63	6.62	2.01	3969
EB	SH20 East of Ash Rd	189	3330	3305	0	1113	1185	2050	72	6.44	2.12	5184
NB	SH20 North of Vogler Drive	190	5052	5071	0	1380	1186	2100	-193	-14.03	5.42	37249
SB	SH20 North of Vogler Drive	191	5071	5052	0	1425	1201	2100	-223	-15.72	6.18	49729
NB	Wylie Road - btn Gifford and Puhinui	192	5067	5068	0	258	258	1270	0	-0.17	0.00	0
SB	Wylie Road - btn Gifford and Puhinui	193	5068	5067	0	277	277	1270	0	0.06	0.00	0
WB	Puhinui Road - btn Orrs and Airport	194	5055	5056	0	599	599	2180	0	0.04	0.00	0
EB	Puhinui Road - btn Orrs and Airport	195	5056	5055	0	682	678	2180	-3	-0.65	0.15	9
WB	Puhinui Road - btn SH20 and Price	196	5157	5055	0	598	599	2180	1	0.21	0.04	1
EB	Puhinui Road - btn SH20 and Price	197	5055	5157	0	677	678	2180	1	0.08	0.04	1
WB	Puhunui Road - betn SH20 and Wylie	198	5067	5158	0	696	697	1270	1	0.2	0.04	1
EB	Puhunui Road - betn SH20 and Wylie	199	5158	5067	0	741	724	1270	-16	-2.25	0.63	256
NB	SH1 Drury Interchange Northbound	200	3086	3091	0	954	918	4300	-35	-3.74	1.18	1225
SB	SH1 Drury Interchange Southbound	201	3100	3095	0	988	987	4300	0	-0.14	0.03	0
NB	SH1 South of Ramarama Interchange Northbound	202	3021	3000	0	899	936	4300	37	4.16	1.22	1369
SB	SH1 South of Ramarama Interchange Southbound	203	3001	3022	0	1003	1040	4300	37	3.67	1.16	1369
WB	SH20 Wiri Station Road West of GSR Westbound	204	3272	5201	0	896	924	2050	28	3.16	0.93	784
EB	SH20 Wiri Station Road West of GSR Eastbound	205	5201	3272	0	976	1036	2050	60	6.12	1.89	3600
NB	Puhinui On Ramp Northbound	206	5157	5154	0	345	333	1800	-11	-3.34	0.65	121
NB	George Bolt Memorial Drive South of Montgomerie Road	207	5060	5061	0	1302	1302	4300	0	0	0.00	0
SB	George Bolt Memorial Drive South of Montgomerie Road	208	5061	5060	0	1505	1504	4300	0	-0.09	0.03	0
SB	S/W Motorway Puhinui to Massey Road	209	5066	5064	0	1085	1086	4300	1	0.1	0.03	1
NB	S/W Motorway Puhinui to Massey Road	210	5156	5065	0	959	958	4300	0	-0.07	0.03	0
NB	SH1 South of Bombay Interchange	211	5035	5036	0	817	818	4300	1	0.16	0.03	1
SB	SH1 South of Bombay Interchange	212	5050	5051	0	836	836	4300	0	0.04	0.00	0
SB	Mill Road On Ramp SB	213	5019	5048	0	149	128	1800	-20	-14.37	1.78	400
NB	Charles Road between Glenbrook and Linwood Road-50	214	5002	5000	0	29	14	1380	-14	-53.32	3.23	196
SB	Charles Road between Glenbrook and Linwood Road-50	215	5000	5002	0	27	11	1380	-15	-61	3.67	225
WB	Glenbrook Road between SH22 and Charles	216	5002	3138	0	198	199	2180	1	0.65	0.07	1
EB	Glenbrook Road between SH22 and Charles	217	3138	5002	0	191	164	2180	-26	-14.11	2.03	676
WB	Glenbrook Road between Ostrich and Batty	218	5002	5003	0	153	151	2180	-1	-1.22	0.16	1
EB	Glenbrook Road between Ostrich and Batty	219	5003	5002	0	161	189	2180	28	17.63	2.12	784
WB	Linwood Road between Seal Join and Batty-2000	220	5000	5001	0	65	79	2180	14	21.89	1.65	196
EB	Linwood Road between Seal Join and Batty-2000	221	5001	5000	0	92	92	2180	0	0.23	0.00	0
WB	Mill Road between Road Narrows and Urban/Rural-1100	222	5017	5016	0	395	430	2180	35	8.85	1.72	1225
EB	Mill Road between Road Narrows and Urban/Rural-1100	223	5016	5017	0	418	347	2180	-70	-16.87	3.63	4900
NB	Paerata Road between Adams and Bdy SH22	224	5009	5008	0	337	407	1270	70	20.79	3.63	4900
SB	Paerata Road between Adams and Bdy SH22	225	5008	5009	0	353	325	1270	-27	-7.82	1.52	729
WB	Pukekohe East Road between Runciman Road And Harrisville Road	226	5016	5014	0	302	339	2180	37	12.26	2.07	1369
EB	Pukekohe East Road between Runciman Road And Harrisville Road	227	5014	5016	0	301	240	2180	-60	-20.14	3.71	3600

C:\Projects\Southern Sector\Validation\[IP Validation.xls]Validation Data - IP

Total no. of Counts	227
Summation Observed Flows	89693
Summation (Modelled Flows - Observed Flows)^2	603074
% RMSE	**13**

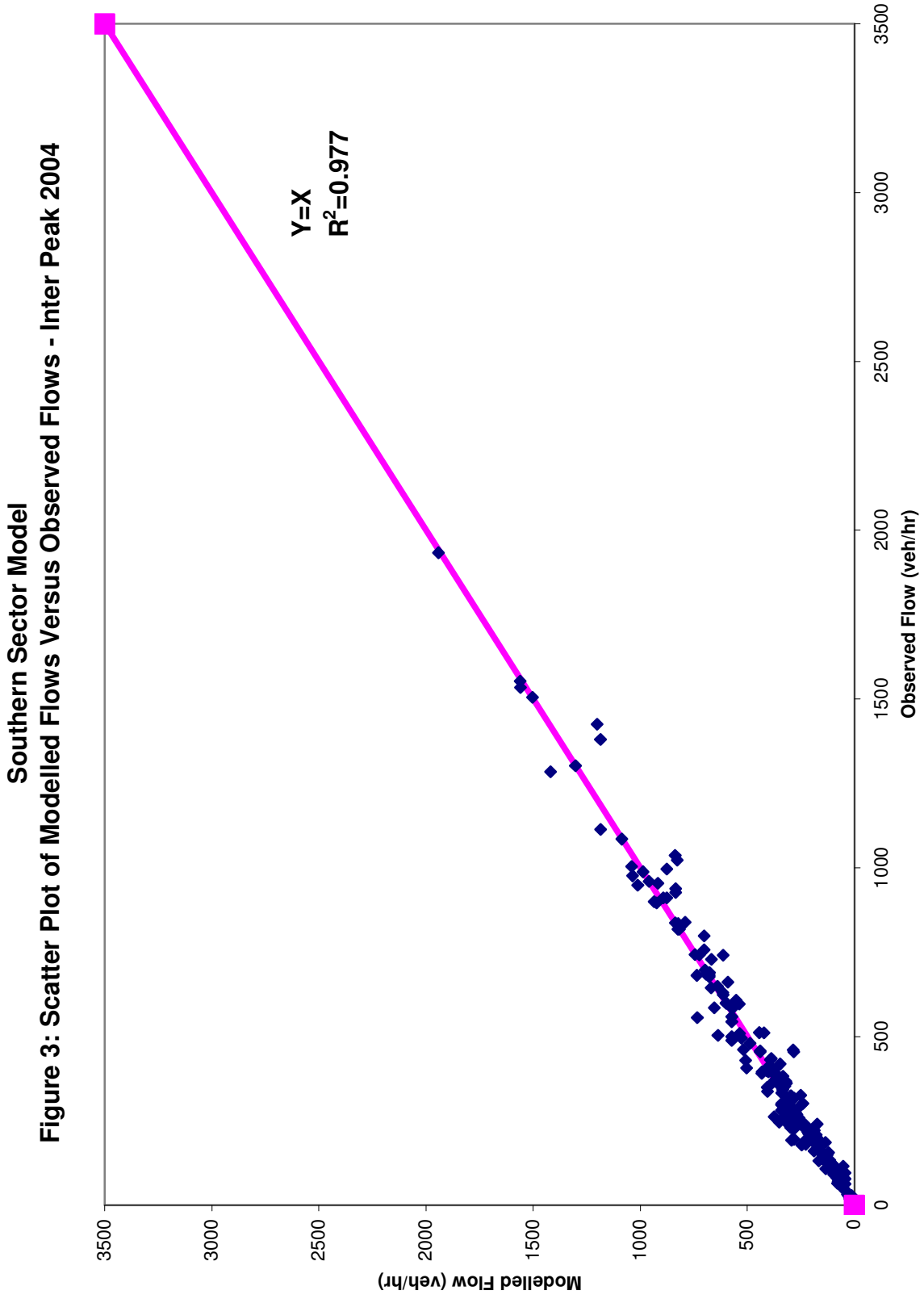


Figure 3: Scatter Plot of Modelled Flows Versus Observed Flows - Inter Peak 2004

Table 3 - Link Flow Comparison - PM Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
NB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	1	1015	1002	0	89	44	2180	-44	-51.09	5.52	1936
SB	ALFRISTON - ARDMORE ROAD, 200M NORTH OF CLEVEDON - TAKANIN RD	2	1002	1015	0	148	84	2180	-63	-43.01	5.94	3969
NB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	3	1027	1015	0	92	88	2180	-3	-4.82	0.42	9
SB	MULLINS ROAD, BTWN AIRFIELD RD & TAKANINI - CLEVEDON RD	4	1015	1027	0	75	58	2180	-16	-22.91	2.08	256
NB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	5	1101	1062	0	396	402	1660	6	1.59	0.30	36
SB	PORCHESTER ROAD, BTWN POPES RD & MANUROA RD (AT # 333) PAPAKURA	6	1062	1101	0	520	649	1660	129	24.73	5.34	16641
NB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	7	3448	3546	0	208	208	1270	0	0.24	0.00	0
SB	[PEDX9] OPAHEKE ROAD, SOUTH OF CALLIS AVENUE (AT # 44) PAPAKURA	8	3546	3448	0	346	341	1270	-4	-1.36	0.27	16
WB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	9	1002	1003	0	178	89	2180	-88	-49.96	7.70	7744
EB	ALFRISTON ROAD, 200M WEST OF ALFRISTON - ARDMORE ROAD	10	1003	1002	0	256	191	2180	-64	-25.2	4.35	4096
WB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	11	1009	1065	0	474	698	1270	224	47.15	9.25	50176
EB	ALFRISTON ROAD, BTWN PORCHESTER RD & RANFURLY RD, PAPAKURA	12	1065	1009	0	656	456	1270	-199	-30.45	8.48	39601
NB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	13	3035	3063	0	78	80	2180	2	2.14	0.23	4
SB	GT SOUTH ROAD, 100M NORTH OF QUARRY ROAD (AT # 661) PAPAKURA	14	3063	3035	0	132	132	2180	0	-0.28	0.00	0
WB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	15	3066	3136	0	1177	1079	2180	-97	-8.34	2.92	9409
EB	KARAKA ROAD, WEST OF OIRA ROAD (AT # 270) PAPAKURA	16	3136	3066	0	641	698	2180	57	8.96	2.20	3249
WB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	17	3243	3241	0	122	116	1660	-5	-4.93	0.55	25
EB	PAPAKURA - CLEVEDON ROAD, BTWN PARISH LINE RD & BURNSIDES RD	18	3241	3243	0	148	148	1660	0	0.22	0.00	0
NB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	19	3184	3163	0	269	269	1270	0	-0.18	0.00	0
SB	HUNUA ROAD, SOUTH OF SETTLEMENT (AT # 15) PAPAKURA	20	3163	3184	0	205	230	1270	25	12.29	1.70	625
WB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	21	3141	3142	0	20	23	1660	3	12.63	0.65	9
EB	PONGA ROAD, EAST OF COAL MINE RD (AT # 562-564) PAPAKURA	22	3142	3141	0	36	48	1660	12	32.27	1.85	144
WB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	23	3113	3134	0	530	612	2180	82	15.47	3.43	6724
EB	HINGAIA ROAD, 20M WEST OF TOWAI ROAD, PAPAKURA	24	3134	3113	0	220	221	2180	1	0.23	0.07	1
WB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	25	3111	3113	0	588	612	1380	24	4.08	0.98	576
EB	HINGAIA ROAD, WEST OF OAKLAND ROAD (AT # 204) PAPAKURA	26	3113	3111	0	239	221	1380	-17	-7.74	1.19	289
NB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	27	3112	3463	0	540	629	1270	89	16.52	3.68	7921
SB	ELLIOT STREET, NORTH OF BEACH RD (AT # 148) PAPAKURA	28	3463	3112	0	618	513	1270	-104	-16.97	4.42	10816
NB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	29	3433	3432	0	528	419	1275	-108	-20.67	5.01	11664
SB	GT SOUTH ROAD, SOUTH OF WELLINGTON (AT # 327) PAPAKURA	30	3432	3433	0	892	717	1275	-174	-19.59	6.17	30276
WB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	31	3205	3204	0	515	606	1270	91	17.58	3.84	8281
EB	BEACH ROAD, WEST OF GT SOUTH (AT # 13) PAPAKURA	32	3204	3205	0	495	516	1270	21	4.25	0.93	441
NB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	33	3617	3220	0	419	353	1380	-65	-15.78	3.36	4225
SB	GT SOUTH ROAD, 700M SOUTH OF GATLAND (AT # 569) GATLAND - SLIPPERY CRK	34	3220	3617	0	578	491	1380	-86	-14.98	3.76	7396
NB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	35	1034	1033	0	500	465	1270	-34	-7.03	1.59	1156
SB	PORCHESTER ROAD, OLD WAIROA RD - SUBWAY (AT # 21) PAPAKURA	36	1033	1034	0	554	594	1270	40	7.15	1.67	1600
WB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	37	3438	3206	0	487	546	1270	59	12.14	2.60	3481
EB	SETTLEMENT ROAD, OPAHEKE RD - LIVERPOOL ST (AT # 15) PAPAKURA	38	3206	3438	0	479	462	1270	-16	-3.49	0.78	256
WB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	39	1162	1042	0	774	828	1270	54	6.94	1.91	2916
EB	CLEVEDON ROAD, 25 METRES WEST OF RON KEAT, PAPAKURA	40	1042	1162	0	826	798	1270	-27	-3.41	0.98	729
NB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	41	3451	1039	0	434	439	1270	5	1.24	0.24	25
SB	MARNE ROAD, SOUTH OF CLEVEDON RD (AT # 8) PAPAKURA	42	1039	3451	0	582	576	1270	-5	-1.06	0.25	25
WB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	43	5234	1055	0	212	182	1380	-29	-14.36	2.14	841
EB	WALTERS ROAD (220 METRES EAST OF PORCHESTER) PAPAKURA	44	1055	5234	0	335	209	1380	-125	-37.65	7.64	15625
NB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	45	1055	1103	0	470	452	1380	-17	-3.76	0.84	289
SB	PORCHESTER ROAD, WALTERS RD - AIRFIELD RD (AT # 225) PAPAKURA	46	1103	1055	0	640	701	1380	61	9.46	2.36	3721
NB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	47	1029	1004	0	472	494	1660	22	4.7	1.00	484
SB	MILL ROAD, 250 METRES NORTH OF PHILLIP, PAPAKURA	48	1004	1029	0	906	878	1660	-27	-3.05	0.94	729
NB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	49	1032	1024	0	282	407	1660	125	44.26	6.73	15625
SB	MILL ROAD, HAMLIN - COSGROVE (90 M SOUTH OF HAMLIN) PAPAKURA	50	1024	1032	0	724	728	1660	4	0.6	0.15	16
WB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	51	3601	1039	0	537	520	1270	-16	-3.24	0.74	256
EB	CLEVEDON ROAD, EAST OF MARNE RD (AT # 32) PAPAKURA	52	1039	3601	0	612	583	1270	-28	-4.71	1.19	784
NB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	53	1203	1165	0	655	702	1275	47	7.16	1.80	2209
SB	GT SOUTH ROAD, NORTH OF SUBWAY ROAD (AT # 69) PAPAKURA	54	1165	1203	0	1055	823	1275	-231	-21.97	7.57	53361
NB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	55	1089	1122	0	976	900	1275	-75	-7.8	2.48	5625
SB	GT SOUTH ROAD, NORTH OF TAKA STREET (AT # 152) PAPAKURA	56	1122	1089	0	1183	998	1275	-184	-15.66	5.60	33856
NB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	57	1058	1203	0	870	900	1275	30	3.47	1.01	900
SB	GT SOUTH ROAD, SOUTH OF SUBWAY ROAD (AT MEDLAB) PAPAKURA	58	1203	1058	0	1221	991	1275	-229	-18.88	6.92	52441
WB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	59	1226	1087	0	460	418	1270	-41	-9.16	2.00	1681
EB	MANUROA ROAD, GSR - RAILWAY (AT # 6) PAPAKURA	60	1087	1226	0	421	310	1270	-110	-26.38	5.81	12100
WB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	61	1051	3610	0	143	93	1270	-49	-35.11	4.60	2401
EB	OLD WAIROA ROAD, WEST OF HALBERG STREET (AT # 60) PAPAKURA	62	3610	1051	0	151	93	1270	-57	-38.26	5.25	3249
NB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	63	1180	1179	0	422	403	1270	-18	-4.59	0.94	324
SB	PORCHESTER ROAD, SOUTH OF GLENBURN PLACE (AT # 131) PAPAKURA	64	1179	1180	0	605	680	1270	75	12.47	2.96	5625
WB	ALFRISTON RD (Btn Brough and Shifnal) -930	65	1123	3347	0	676	620	1270	-55	-8.35	2.20	3025
EB	ALFRISTON RD (Btn Brough and Shifnal) -930	66	3347	1123	0	769	833	1270	64	8.37	2.26	4096
EB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	67	3221	3222	0	133	137	2180	4	3.34	0.34	16
WB	Brookby Rd (btwn Alfriston-Ardmore and Fitzpatrick)	68	3222	3221	0	79	76	2180	-2	-3.97	0.34	4
EB	Brookby Rd (120m from R/about) 3985	69	3223	3224	0	125	137	2180	12	9.96	1.05	144
WB	Brookby Rd (120m from R/about) 3985	70	3224	3223	0	73	76	2180	3	3.92	0.35	9
EB	Browns Rd (btwn Jellicoe and Marr) 1180	71	3307	3321	0	759	463	1270	-295	-38.94	11.97	87025
EB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	72	1015	1031	0	143	142	2180	0	-0.46	0.08	0
WB	Clevedon-Takanini Rd (btwnAlfriston and Burnside) 707	73	1031	1015	0	66	72	2180	6	8.74	0.72	36
NB	Dalgety Rd - btn Browns and Kerrs - 400m (Northbound)	74	3307	3327	0	338	325	1270	-12	-3.87	0.71	144
SB	Dalgety Rd - btn Browns and Kerrs - 400m (Southbound)	75	3327	3307	0	655	583	1270	-71	-11.01	2.89	5041
SB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	76	3282	3291	0	648	646	1270	-1	-0.34	0.08	1
NB	Everglade Dr - btn Flaming and Ransom Smythe - 150m	77	3291	3282	0	414	393	1270	-20	-4.95	1.05	400
EB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	78	3346	3341	0	339	286	1270	-52	-15.76	3.00	2704
WB	Grand Vue Rd - btn Great Sth Rd and Tampin - 200m	79	3341	3346	0	168	125	1270	-42	-25.31	3.55	1764
EB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	80	3342	3249	0	465	462	1270	-2	-0.56	0.14	4
WB	Grand Vue Rd - btn Lawence and M/way on Ramp - 1000m	81	3249	3342	0	255	253	1270	-1	-0.72	0.13	1
NB	Gt Sth Rd -N Bd (btwn Rata Vine and Costar) 6932	82	3301	3271	0	580	624	2050	44	7.63	1.79	1936
SB	Gt Sth Rd -S Bd (btwn Rata Vine and Costar) 6852	83	3271	3301	0	1354	1425	2050	71	5.26	1.90	5041
EB	Hill Rd (btwn Gt Sth and Scenic) 280	84	5174	3339	0	253	322	1270	69	27.4	4.07	4761
WB	Hill Rd (btwn Gt Sth and Scenic) 280	85	3339	5174	0	442	544	1270	102	23.15	4.59	10404
EB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	86	3344	3260	0	400	413	1270	13	3.36	0.64	169
WB	Hill Rd (btwn Hillcrest and GrandeVue) 1103	87	3260	3344	0	673	858	1270	185	27.44	6.69	34225
EB	HILL RD (Btn Stratford and Wairere) - 2055	88	3408	3413	0	241	199	1270	-41	-17.33	2.83	1681
WB	HILL RD (Btn Stratford and Wairere) - 2055	89	3413	3408	0	158	89	1270	-68	-43.54	6.21	4624
EB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	90	3261	3407	0	1200	1200	1270	0	0.01	0.00	0
WB	Hill Rd - btn M/way off ramp and Charles Prevost - 3600m	91	3407	3261	0	453	518	1270	65	14.29	2.95	4225
WB	Hollyford Dr - btn Redoubt and Aspiring - 100m	92	3290	3282	0	616	742	1270	126	20.42	4.84	15876
EB	Hollyford Dr - btn Redoubt and Aspiring - 100m	93	3282	3290	0	671	467	1270	-203	-30.47	8.55	41209
NB	Lupton Rd- btn Russell and Selwyn - 100m	94	3334	3333	0	317	506	950	189	59.47	9.32	35721
SB	Lupton Rd- btn Russell and Selwyn - 100m	95	3333	3334	0	360	498	950	138	38.29	6.66	19044
WB	Mahia Road - 177m	96	1082	3387	0	1050	949	1270	-100	-9.57	3.19	10000
EB	Mahia Road - 177m	97	3387	1082	0	1113	892	1270	-220	-19.9	6.98	48400
WB	MAHIA RD Btwn Siska and Southview	98	3371	3369	0	558	532	1270	-25	-4.68	1.11	625
EB	MAHIA RD Btwn Siska and Southview	99	3369	3371	0	772	611	1270	-160	-20.81	6.12	25600
SB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	100	1008	1005	0	895	735	1380	-159	-17.84	5.60	25281
NB	MILL RD (Btn Polo Prince and Ranfurly) - 1360	101	1005	1008	0	436	438	1380	2	0.56	0.10	4
NB	MURPHYS RD (Btn Redoubt and Thomas) - 180	102	3404	3399	0	322	213	1380	-108	-33.83	6.66	11664
SB	MURPHYS RD (Btn Redoubt and Thomas) - 180	103	3399	3404	0	420	303	1380	-116	-27.87	6.15	13456
NB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	104	3236	3234	0	216	175	2180	-40	-18.76	2.93	1600
SB	Papakura-Clevedon Rd (btwn Takanini and West) 3640	105	3234	3236	0	124	125	2180	1	0.63	0.09	1
NB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	106	3234	3235	0	266	277	2180	11	4.07	0.67	121
SB	Pakakura-Clevedon Rd (btwn Monument and West) 4785	107	3235	3234	0	136	165	2180	29	21.12	2.36	841
WB	Ranfurly Rd - W Bd (btwn Everlea and Wastney) 925	108	1007	1148	0	205	91	1380	-113	-55.79	9.37	12769
EB	Ranfurly Rd -E Bd (130m before Everlea) 625	109	1148	1007	0	132	118	1380	-13	-10.8	1.25	169
EB	REDOUBT RD (Btn Hill Top and Murphys) -2600	110	3295	3399	0	723	622	1380	-100	-14.02	3.89	10000
WB	REDOUBT RD (Btn Hill Top and Murphys) -2600	111	3399	3295	0	303	235	1380	-67	-22.51	4.15	4489
EB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	112	3233	3234	0	109	101	2180	-7	-7.02	0.78	49
WB	West Rd, Clevedon (btwn Papakura-Clevedon and Tyldens)	113	3234	3233	0	40	40	2180	0	-0.15	0.00	0
WB	Weymouth Rd - 700m	114	3313	3386	0	1016	1061	1270	45	4.41	1.40	2025
EB	Weymouth Rd - 700m	115	3386	3313	0	763	791	1270	28	3.73	1.00	784
WB	Weymouth Rd Btwn Gainsborough and Rowandale	116	3308	3309	0	656	433	1270	-222	-34.01	9.56	49284
EB	Weymouth Rd Btwn Gainsborough and Rowandale	117	3309	3308	0	552	431	1270	-120	-21.92	5.46	14400
WB	Browns Rd (btwn Feasegate and Fellbrook) 2430	118	3310	3316	0	516	447	1270	-68	-13.35	3.14	4624
EB	Browns Rd (btwn Feasegate and Fellbrook) 2430	119	3316	3310	0	753	716	1270	-36	-4.88	1.37	1296
NB	ROSCOMMON RD (NTH BND) (Btn Browns and Bolderwood) - 3650	120	3316	5052	0	980	967	2100	-12	-1.35	0.42	144
SB	ROSCOMMON RD (STH BND) (Btn Bolderwood and Browns) - 3650	121	5052	3316	0	1922	1786	2100	-135	-7.08	3.16	18225
NB	SH1 Drury Off Ramp Northbound	122	3085	3059	0	60	50	1800	-9	-16.51	1.35	81
NB	SH1 Drury On Ramp Northbound	123	3059	3088	0	622	720	1800	98	15.73	3.78	9604
SB	SH1 Southern Motorway Hill Rd Off Ramp Southbound	124	3258	3261	0	1302	1606	1800	304	23.32	7.97	92416
NB	SH1 Southern Motorway Hill Rd On Ramp Northbound	125	3249	3251	0	599	688	1800	89	14.89	3.51	7921
SB	SH1 Papakura Off Ramp Southbound	126	3125	3131	0	1057	1168	1800	111	10.48	3.33	12321

Table 3 - Link Flow Comparison - PM Peak

DIR	DESCRIPTION	NO.	ANODE	BNODE	CNODE	COUNT	MODELLED	CAPACITY	DIFFER-	% DIFF	GEH	DIFF SQ
SB	SH1 Papakura On Ramp Southbound	127	3132	3128	0	224	167	1800	-56	-25.22	4.08	3136
NB	SH1 Papakura On Ramp Northbound	128	3133	3118	0	547	567	1800	20	3.73	0.85	400
SB	SH1 Ramarama Off Ramp Southbound	129	3012	3005	0	266	267	1800	1	0.46	0.06	1
NB	SH1 Ramarama Off Ramp Northbound	130	3016	3004	0	40	40	1800	0	0.59	0.00	0
NB	SH1 Ramarama On Ramp Northbound	131	3004	3008	0	87	87	1800	0	-0.05	0.00	0
NB	SH1 Takinini Off Ramp Northbound	132	1139	1132	0	588	585	1800	-2	-0.47	0.12	4
NB	SH1 Manukau Interchange Northbound	133	3266	3276	0	1676	1706	4300	30	1.81	0.73	900
SB	SH1 Manukau Interchange Southbound	134	3280	3283	0	3743	3877	4300	134	3.59	2.17	17956
NB	SH1 Takinini Interchange Northbound	135	1126	1137	0	1474	1729	4300	255	17.27	6.37	65025
SB	SH1 Takinini Interchange Southbound	136	1143	1209	0	3121	3328	4300	207	6.62	3.65	42849
NB	Gt South Rd 4100m Nth Bound.PDF between Araimu Rd & Kern Rd	137	5024	3025	0	51	44	2180	-6	-14.37	1.02	36
SB	Gt South Rd 4100m Sth Bound.PDF between Araimu Rd & Kern Rd	138	3025	5024	0	164	72	2180	-91	-56.37	8.47	8281
NB	SH22 Karaka Road	139	3138	3136	0	593	647	2180	54	9.18	2.17	2916
SB	SH22 Karaka Road	140	3136	3138	0	1165	1054	2180	-110	-9.52	3.33	12100
NB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	141	1175	1116	0	705	702	1275	-2	-0.44	0.11	4
SB	[Site 1] GSR, SOUTH OF WALTERS RD (AT # 305) PAPAKURA	142	1116	1175	0	1052	823	1275	-228	-21.74	7.48	51984
WB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	143	1204	1116	0	220	193	1270	-26	-12.35	1.88	676
EB	[Site 3] WALTERS ROAD, EAST OF GSR (AT # 15) PAPAKURA	144	1116	1204	0	304	250	1270	-53	-17.83	3.24	2809
NB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	145	1004	1005	0	320	321	1380	1	0.21	0.06	1
SB	[Site 5] MILL ROAD, 150m NORTH OF ALFRISTON RD, PAPAKURA	146	1005	1004	0	731	645	1380	-85	-11.8	3.28	7225
NB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	147	1064	1065	0	413	371	1270	-41	-10.22	2.12	1681
SB	[Site 6] PORCHESTER ROAD, 50m SOUTH OF ALFRISTON RD, PAPAKURA	148	1065	1064	0	662	701	1270	39	5.83	1.49	1521
WB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	149	1087	1088	0	296	512	1270	216	73.03	10.75	46656
EB	[Site 7] BEAUMARIS WAY, WEST OF GSR (At # 6) PAPAKURA	150	1088	1087	0	162	240	1270	78	48.13	5.50	6084
WB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	151	3193	3163	0	316	327	1270	11	3.47	0.61	121
EB	[Site 9] SETTLEMENT ROAD, EAST OF HUNUA RD (AT # 73) PAPAKURA	152	3163	3193	0	401	387	1270	-13	-3.44	0.71	169
WB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	153	3163	3569	0	484	479	1270	-4	-1.1	0.23	16
EB	[Site 10] SETTLEMENT ROAD, WEST OF HUNUA ROAD (AT # 64) PAPAKURA	154	3569	3163	0	516	501	1270	-14	-2.98	0.67	196
WB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	155	3164	3577	0	248	248	1270	0	0.06	0.00	0
EB	[Site 11] SETTLEMENT ROAD, WEST OF DOMINION RD (AT # 32) PAPAKURA	156	3577	3164	0	354	354	1270	0	-0.09	0.00	0
WB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	157	3152	3153	0	59	58	2180	0	-2.32	0.13	0
EB	[Site 12] HUNUA ROAD, 300m EAST OF DOMINION RD, PAPAKURA	158	3153	3152	0	155	117	2180	-37	-24.79	3.26	1369
NB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	159	3062	3077	0	422	353	1270	-68	-16.38	3.51	4624
SB	[Site 14] GSR, NORTH OF SUTTON RD (AT # 155) DRURY	160	3077	3062	0	370	491	1270	121	32.82	5.83	14641
WB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	161	3057	3058	0	1218	1079	2180	-138	-11.42	4.10	19044
EB	[Site 20] KARAKA ROAD, WEST OF GSR (Jesmond-Burberry) PAPAKURA	162	3058	3057	0	632	698	2180	66	10.51	2.56	4356
NB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	163	3063	3057	0	93	80	2180	-12	-14.33	1.40	144
SB	[Site 22] GSR, 250m SOUTH OF KARAKA RD, PAPAKURA	164	3057	3063	0	153	132	2180	-20	-13.97	1.76	400
NB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	165	3074	3061	0	551	483	1270	-67	-12.36	2.99	4489
SB	[Site 23] GSR, 100m SOUTH OF WAIHOEHOE RD, DRURY	166	3061	3074	0	680	645	1270	-34	-5.15	1.36	1156
NB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	167	1116	1091	0	899	900	1275	1	0.1	0.03	1
SB	GT SOUTH ROAD (WALTERS RD - THE FURLONG) PAPAKURA	168	1091	1116	0	1229	998	1275	-230	-18.82	6.92	52900
WB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	169	1202	1203	0	456	496	1270	40	8.7	1.83	1600
EB	SUBWAY ROAD, EAST OF GSR (AT KFC ENTRANCE) PAPAKURA	170	1203	1202	0	459	527	1270	68	14.74	3.06	4624
WB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	171	3112	3110	0	974	935	1270	-38	-4	1.26	1444
EB	BEACH ROAD, WEST OF ELLIOT ST (AT # 131) PAPAKURA	172	3110	3112	0	1011	1170	1270	159	15.72	4.81	25281
SB	SH1 Ramarama On Ramp Southbound	173	3005	3019	0	31	26	1800	-4	-15.92	0.94	16
SB	SH1 Takinini Off Ramp Southbound	174	1141	1145	0	1109	787	1800	-321	-29	10.45	103041
SB	SH1 Takinini On Ramp Southbound	175	1206	1207	0	791	767	1800	-23	-3.08	0.86	529
SB	SH1 Drury On Ramp Southbound	176	3060	3094	0	171	150	1800	-20	-12.3	1.66	400
NB	SH1 Papakura Off Ramp Northbound	177	3115	3114	0	176	194	1800	18	10	1.32	324
NB	Great South Road - North Bound between Caspar and Puhinui) 3400m	178	5087	5088	0	725	727	1960	2	0.21	0.07	4
SB	Great South Road - North Bound between Caspar and Puhinui) 3400m	179	5088	5087	0	969	967	1960	-1	-0.18	0.06	1
NB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	180	5198	5087	0	1102	771	1960	-330	-30.04	10.82	108900
SB	Great South Road - South Bound between Cavendish and Puhinui - 4000m	181	5087	5198	0	982	917	1960	-64	-6.61	2.11	4096
WB	Sandstone Rd (200mfrom Whitford Park) 1772	182	5140	5139	0	122	116	2180	-5	-4.86	0.55	25
EB	Sandstone Rd (200mfrom Whitford Park) 1772	183	5139	5140	0	435	424	2180	-10	-2.47	0.53	100
WB	Te Irirangi Drive SB - 6800m	184	5192	5206	0	606	599	2540	-6	-1.08	0.29	36
EB	Te Irirangi Drive NB - 6825m	185	5206	5192	0	1237	1315	2540	78	6.3	2.18	6084
SB	Whitford ParkRd (btwn Rabout and Sandstone) 130	186	5141	5140	0	174	177	2180	3	1.52	0.23	9
NB	Whitford ParkRd (btwn Rabout and Sandstone) 130	187	5140	5141	0	485	485	2180	0	0	0.00	0
WB	SH20 East of Ash Rd	188	3305	3330	0	1326	1295	2050	-30	-2.32	0.86	900
EB	SH20 East of Ash Rd	189	3330	3305	0	1039	1162	2050	123	11.79	3.71	15129
NB	SH20 North of Vogler Drive	190	5052	5071	0	1641	1631	2100	-9	-0.6	0.25	81
SB	SH20 North of Vogler Drive	191	5071	5052	0	1700	1831	2100	131	7.71	3.12	17161
NB	Wylie Road - btn Gifford and Puhinui	192	5067	5068	0	566	566	1270	0	0.01	0.00	0
SB	Wylie Road - btn Gifford and Puhinui	193	5068	5067	0	348	224	1270	-123	-35.73	7.33	15129
WB	Puhinui Road - btn Orrs and Airport	194	5055	5056	0	312	311	2180	0	-0.29	0.06	0
EB	Puhinui Road - btn Orrs and Airport	195	5056	5055	0	1045	1058	2180	13	1.23	0.40	169
WB	Puhinui Road - btn SH20 and Price	196	5157	5055	0	311	311	2180	0	0.03	0.00	0
EB	Puhinui Road - btn SH20 and Price	197	5055	5157	0	1058	1058	2180	0	-0.01	0.00	0
WB	Puhunui Road - betn SH20 and Wylie	198	5067	5158	0	674	678	1270	4	0.52	0.15	16
EB	Puhunui Road - betn SH20 and Wylie	199	5158	5067	0	1003	1023	1270	20	2.04	0.63	400
NB	SH1 Drury Interchange Northbound	200	3086	3091	0	1267	1220	4300	-46	-3.7	1.33	2116
SB	SH1 Drury Interchange Southbound	201	3100	3095	0	1943	2004	4300	61	3.14	1.37	3721
NB	SH1 South of Ramarama Interchange Northbound	202	3021	3000	0	1280	1224	4300	-55	-4.41	1.58	3025
SB	SH1 South of Ramarama Interchange Southbound	203	3001	3022	0	1894	1913	4300	19	1	0.44	361
WB	SH20 Wiri Station Road West of GSR Westbound	204	3272	5201	0	804	860	2050	56	6.97	1.94	3136
EB	SH20 Wiri Station Road West of GSR Eastbound	205	5201	3272	0	991	1378	2050	387	39.08	11.24	149769
NB	Puhinui On Ramp Northbound	206	5157	5154	0	525	394	1800	-130	-25	6.11	16900
NB	George Bolt Memorial Drive South of Montgomerie Road	207	5060	5061	0	904	904	4300	0	0	0.00	0
SB	George Bolt Memorial Drive South of Montgomerie Road	208	5061	5060	0	1311	1311	4300	0	0.02	0.00	0
SB	S/W Motorway Puhinui to Massey Road	209	5066	5064	0	1619	1614	4300	-4	-0.31	0.12	16
NB	S/W Motorway Puhinui to Massey Road	210	5156	5065	0	1458	1459	4300	1	0.04	0.03	1
NB	SH1 South of Bombay Interchange	211	5035	5036	0	949	948	4300	0	-0.08	0.03	0
SB	SH1 South of Bombay Interchange	212	5050	5051	0	1324	1331	4300	7	0.5	0.19	49
SB	Mill Road On Ramp SB	213	5019	5048	0	233	236	1800	3	1.5	0.20	9
NB	Charles Road between Glenbrook and Linwood Road-50	214	5002	5000	0	34	4	1380	-29	-88.03	6.88	841
SB	Charles Road between Glenbrook and Linwood Road-50	215	5000	5002	0	50	77	1380	27	53.72	3.39	729
WB	Glenbrook Road between SH22 and Charles	216	5002	3138	0	252	221	2180	-30	-12.45	2.02	900
EB	Glenbrook Road between SH22 and Charles	217	3138	5002	0	619	611	2180	-7	-1.29	0.32	49
WB	Glenbrook Road between Ostrich and Batty	218	5002	5003	0	509	678	2180	169	33.2	6.94	28561
EB	Glenbrook Road between Ostrich and Batty	219	5003	5002	0	205	215	2180	10	4.78	0.69	100
WB	Linwood Road between Seal Join and Batty-2000	220	5000	5001	0	273	273	2180	0	-0.16	0.00	0
EB	Linwood Road between Seal Join and Batty-2000	221	5001	5000	0	102	102	2180	0	-0.36	0.00	0
WB	Mill Road between Road Narrows and Urban/Rural-1100	222	5017	5016	0	688	736	2180	48	6.94	1.80	2304
EB	Mill Road between Road Narrows and Urban/Rural-1100	223	5016	5017	0	555	484	2180	-70	-12.8	3.12	4900
NB	Paerata Road between Adams and Bdy SH22	224	5009	5008	0	389	462	1270	73	18.89	3.54	5329
SB	Paerata Road between Adams and Bdy SH22	225	5008	5009	0	527	479	1270	-47	-9.15	2.14	2209
WB	Pukekohe East Road between Runciman Road And Harrisville Road	226	5016	5014	0	514	568	2180	54	10.45	2.32	2916
EB	Pukekohe East Road between Runciman Road And Harrisville Road	227	5014	5016	0	456	387	2180	-68	-15.03	3.36	4624

C:\Projects\Southern Sector\Validation\[PM Validation.xls]Validation Data - PM

Total no. of Counts	227
Summation Observed Flows	134954
Summation (Modelled Flows - Observed Flows)^2	2024344
% RMSE	**16**

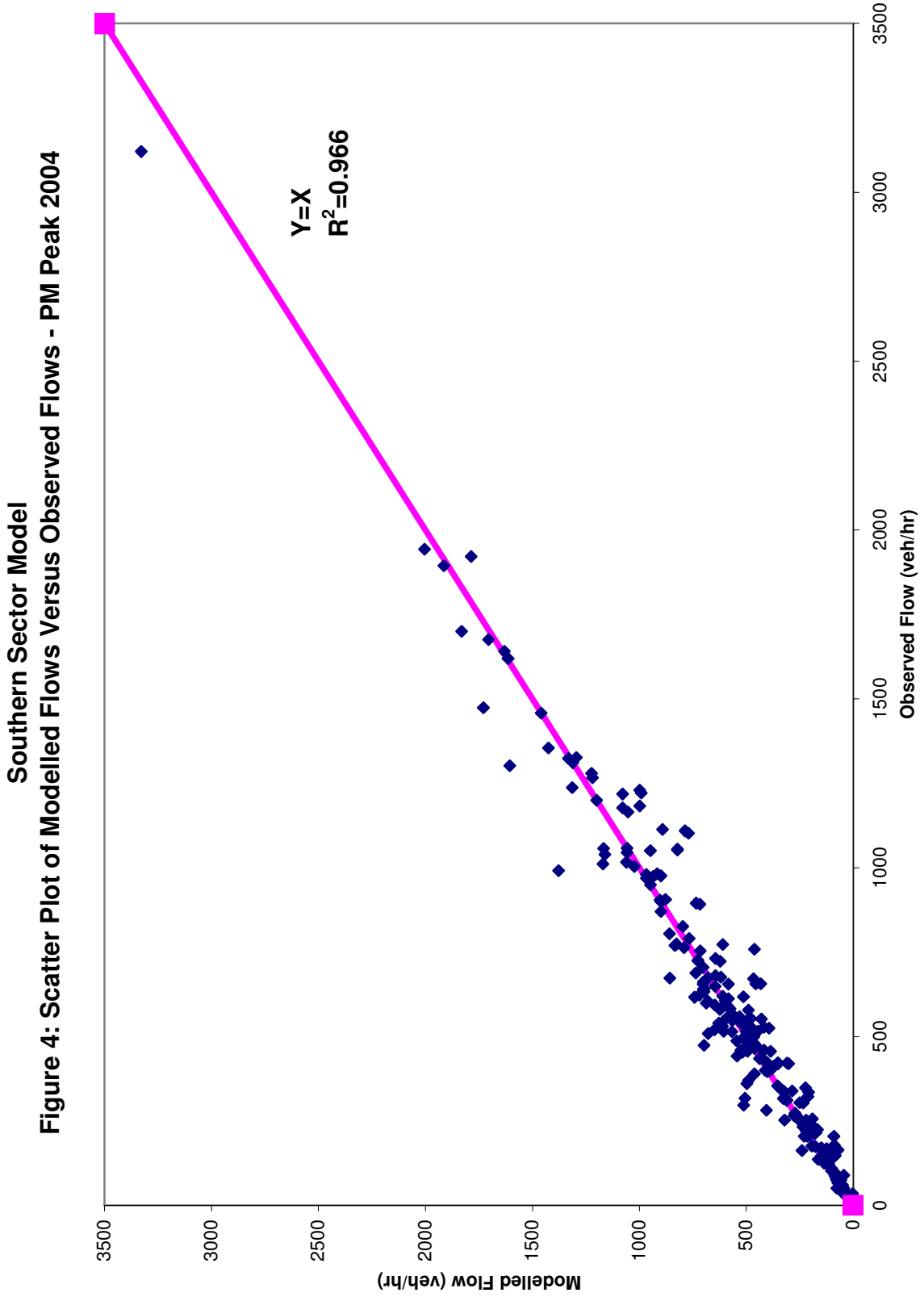


Figure 4: Scatter Plot of Modelled Flows Versus Observed Flows - PM Peak 2004

2004 Base Model Journey Time Comparison

Table 5 - AM Peak Southbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Te Irirangi Drive Off Ramp	Takanini Off Ramp	249	260	276	225	-35	-13%
Takanini Off Ramp	Ramarama Off Ramp	498	522	548	455	-67	-13%
Te Irirangi Drive Off Ramp	**Ramarama Off Ramp**	**747**	**782**	**824**	**680**	**-102**	**-13%**

Table 6 - AM Peak Northbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Ramarama On Ramp	Takanini On Ramp	605	665	731	512	-153	-23%
Takanini On Ramp	Te Irirangi Drive On Ramp	204	222	276	260	38	17%
Ramarama On Ramp	**Te Irirangi Drive On Ramp**	**809**	**887**	**1007**	**772**	**-115**	**-13%**

Table 7 - Inter Peak Southbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Te Irirangi Drive Off Ramp	Takanini Off Ramp	228	257	294	225	-32	-12%
Takanini Off Ramp	Ramarama Off Ramp	488	511	575	455	-56	-11%
Te Irirangi Drive Off Ramp	**Ramarama Off Ramp**	**716**	**768**	**869**	**680**	**-88**	**-11%**

Table 8 - Inter Peak Northbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Ramarama On Ramp	Takanini On Ramp	463	471	478	454	-17	-4%
Takanini On Ramp	Te Irirangi Drive On Ramp	186	193	198	227	34	18%
Ramarama On Ramp	**Te Irirangi Drive On Ramp**	**649**	**664**	**676**	**681**	**17**	**3%**

Table 9 - PM Peak Southbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Te Irirangi Drive Off Ramp	Takanini Off Ramp	240	268	303	364	96	36%
Takanini Off Ramp	Ramarama Off Ramp	499	525	597	622	97	18%
Te Irirangi Drive Off Ramp	**Ramarama Off Ramp**	**739**	**793**	**900**	**986**	**193**	**24%**

Table 10 - PM Peak Northbound Journey Times

FROM	TO	Minimum JT	Average JT	Maximum JT	Modelled JT	Average Difference	% Difference
Ramarama On Ramp	Takanini On Ramp	433	444	454	456	12	3%
Takanini On Ramp	Te Irirangi Drive On Ramp	231	238	246	228	-10	-4%
Ramarama On Ramp	**Te Irirangi Drive On Ramp**	**664**	**682**	**700**	**684**	**2**	**0%**

C:\Projects\Southern Sector\Validation\[Journey Time Comparison.xls]2004 JT Validation

Appendix B – Rough Order Cost Estimates

Auckland Office
Level 3, The Westhaven
100 Beaumont Street, Westhaven
PO Box 5848, Auckland

Telephone +64 9 355 9500
Fax +64 9 355 9585

TO	Phil Haizelden
COPY	Grant Gordon
FROM	Carl Brodrick,
DATE	22 June 2005 (update 5)
FILE	1-36246.06
SUBJECT	**Southern Sector Strategic Transportation Study - Rough Order Cost Estimate**

Costs per Option

The following table shows the different options proposed in the report with associated costs. These costs include estimates for property. Refer to page 2 for a detailed breakdown of costs. Refer to drawing for plan of routes.

Option	1	2a	2b	2c	2d	3a	3b	3c	4
Makeup	13+14	8+9+10	14+15	2b+13+14	Option 2c+$20M	1+2+3	Option 3a+13+14	Option 3a+13	Option 2d+11-14
Costs	$475M	$700	$505M	$980M	$1,000M	$650M	$1,125M	$860M	$1,010M

General

In developing estimates for the routes, it has been assumed that the new roads will be constructed as dual carriageways. The new roads are assumed to have total access control and grade separation, rather than at grade junctions. This has been done to provide a facility that is fit for purpose (i.e. an arterial). It is noted that in several areas the alignment is shown following existing streets with frequent intersections. These streets have dense levels of access for adjacent properties. These are quite inconsistent with arterial traffic function and are likely to pose ongoing safety and capacity issues unless the route minimises at grade intersections.

While this may be regarded as severing communities, at grade facilities will do this to the same or greater extent. Providing a higher standard arterial route allows some scope for mitigation and engineering solutions such as grade separated community lines.

This estimate is based on the sketch plans provided by Phil Haizelden and a short meeting on 10 May 2005. Contingencies have not been assessed. Rates have been derived from consideration of recent project costs in similar terrain and conditions.

Typical Cross Section Used

The typical cross section of the corridor is 28m wide and consists of:

- A 3m flush median
- Four 3.5m traffic lanes
- Two 2.5m cycle paths
- Two 3m shoulders

Costs

The costs for each section of road is outlined below. The section numbers refer to the original plan provided and attached to this memo.

Eastern Link

	Section	Distance	Cost / km	Construction Costs	Land & Building Costs	Total Cost
1	Browns Road to Weymouth	4.25km	$20M	$85M	$15M	$100M
2	Bridge from Weymouth	1.30km	$90M	$117M	N/A	$117
3	Bridge to Paerata	20km	$20M	$400M	$30M	$430M

Western Link

	Section	Distance	Cost / km	Construction Costs	Land & Building Costs	Total Cost
4	Neilson to Panama	5km	$40M	$200M	$38M	$238M
5	Bridge	0.7km	$90M	$63M	N/A	$63M
6	Bridge to Stancomb Road	9km	$40M	$360M	$13M	$373M
7	Stancomb to Thomas	5km	$30M	$150M	$32M	$182M
8	Thomas to Papakura	12km	$20M	$220M	$75M	$315M
9	Papakura Bypass	6km	$30M	$189M	$33M	$213M
10	Papakura to Runciman	8km	$20M	$160M	$8M	$168M
11	Runciman to Pukekohe	10km	$25M	$250M	$20M	$270M
12	Pukekohe to Pokeno	17km	$20M	$340M	$35M	$375M

SH 1 - Motorway Widening – One lane in Each Direction

	Section	Distance	Cost / km	Construction Costs	Land & Building Costs	Total Cost
13	Manurewa to Drury	20km	$7M	$140M	$72M	$212M
14	Drury to Karaka (22)	12km	$20M	$240M	$20M	$260M

Mill Road 50km Alternative – Option 2b

	Section	Distance	Cost / km	Construction Costs	Land & Building Costs	Total Cost
15	Mill Road (Thomas to Quarry) 50km alternative	18km	11	$198M	$45M	$243M

Construction Assumptions

Eastern and Western Link

The following assumptions have been used in producing this estimate:

1. The design speed of the corridor is assumed to be 80km/h
2. No facilities for pedestrians have been allowed for in the estimate
3. No facilities for buses have been allowed for in the estimate, other than the corridor shoulder
4. That the existing pavement (if any) will need to be completely rebuilt
5. We have assumed that cycle paths will need to be on both sides of the corridor. A 4m wide cycle path separated from the corridor, on one side, will be adequate to cater for 2 way cyclist movement and pedestrians.

Motorway Widening

Notes on motorway widening cost estimate:

1. We have not allowed for property costs
2. We have not allowed for complete resurfacing of the motorway, only the widened section of road.
3. The above estimate is based on widening the motorway and associated bridges by 1 lane in each direction. See spreadsheet for detailed breakdown of rates.
4. The above rate includes 3 interchanges as detailed in the spreadsheet.

Mill Road 50km alternative – Option 2b

This analysis is to consider widening with a 50km/h restriction. This option considers a less restricted section of road from Neilson St to Papakura. For example grade separation will not be considered.

We have used the recent example of Fanshawe Street improvements as the basis for the cost estimate. Fanshawe Street improvements includes services and access ways, but minimal widening. Therefore we have increased the estimate to include greater pavement widening and associated works. We have included rates for design fees.

The total estimated cost is $11 million per km. This estimate does not include land. With an approximate distance of 26km, total cost is $286 million. This estimate does not include bridges (i.e. Weymouth crossing). We have not allowed for any strengthening of the

existing pavement. We have allowed a small sum for widening any existing structures (stream bridges), we do not have information on the number of existing structures.

Property Assumptions

1. Desktop Assessment based on estimate of affected properties and contingencies that have been built into the above land costs.
2. Compensation assessments made utilising Government Valuation details and recent sales data and appropriate median costs derived.
3. All required land areas have been calculated by the additional width figures provided by Engineers and multiplied by the length of section.
4. Properties owned by the Local Authorities have not been identified.
5. Allowances have been made where roads cross water.
6. Injurious Affection for part purchase of properties assessed based on impacts derived from the options and averaged from other similar exercises.
7. Properties that will have the building affected thus not allowing the present use to remain have not been identified but a percentage has been included based on similar exercises where full purchases costs are included and residue sale value less costs are put into the overall figure. This assumption includes reinstatement costs for buildings and land retention where necessary.
8. An appropriate Solatium has been assessed for properties that will be purchased outright and relocation costs calculated and compared with costs charged on other acquisition projects.
9. Generally, the above assessments were made in accordance with the Public Works Act 1981 Pt V: Compensation (Sections 62, 66 & 68 Public Works Act 1981).
10. Residential properties are assumed to be GST Inclusive, Commercial, Industrial assumed to be Plus GST if any.
11. All valuations include chattels.
12. All costs include a contingency sum and risk factor.
13. Section 40 Offer Back costs have been included in the disposal figures but they are normally waived by the councils.
14. No land allowance has been made for bridges.
15. Should a period of three months or more pass and the land costs estimates are still required, they should be re-assessed in accordance with current market sales, to reflect the latest sales trends.

Mill Road (Neilson Street to Papakura) 50km/h alternative

Approximate distance of 26 km with and extra 10.00 metre width **– land costs as above estimated at $45M.**

Appendix C – Detailed Option Evaluation Tables

1 Assisting Economic Development

	Option 1[1]	Option 2a[2]	Option 2b[3]	Option 2c[4]	Option 2d[5]	Option 3a[6]	Option 3b[7]	Option 3c[8]	Option 4[9]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth – Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as Option 2d, extended to Pukekohe**
(a) Accessibility to employment opportunities	Minor Positive	Minor Positive	Moderate Positive	Moderate Positive	Moderate Positive	Minor Positive	Minor Positive	Minor Positive	Moderate Positive
(b) Accessibility to, between and within key economic and knowledge centres	Minor Positive	Moderate Positive	Minor Positive	Moderate Positive	Moderate Positive	Minor Positive	Minor Positive	Minor Positive	Moderate Positive
(c) General accessibility	Minor Positive	Minor Positive	Moderate Positive	Moderate Positive	Moderate Positive	Minor Positive	Moderate Positive	Moderate Positive	Moderate Positive
(d) Reliability	Minor Positive	Moderate Positive	Moderate Positive	Significant Positive	Significant Positive	Moderate Positive	Significant Positive	Significant Positive	Significant Positive
(e) Transport network resilience	Minor Positive	Moderate Positive	Moderate Positive	Significant Positive	Significant Positive	Moderate Positive	Significant Positive	Significant Positive	Significant Positive
Overall	**Minor Positive**	**Min-Mod Positive**	**Min-Mod Positive**	**Mod-Sig Positive**	**Mod Sig Positive**	**Min-Mod Positive**	**Moderate Positive**	**Moderate Positive**	**Mod Sig Positive**

[1] Minor positive effects attributed to improvements on existing highways, no new corridors provided, overall minor net benefit to existing conditions, connects existing business areas, but does not improve connections to business areas in Takinini and Flatbush

[2] Minor benefits based on new corridor being provided, moderate benefits due to redistribution of traffic flows on extended network allowing an increase in reliability and network resilience. Connects commercial areas in Takinini and Flatbush, but vehicle access only, will not encourage PT access

[3] As above with greater benefits attributed to local employment access via links to existing side roads, frontage access reduces high speed access to economic centres

[4] Mill Road full access combined with SH1 improvements causes significant benefits (from moderate) to reliability and resilience, access to key centres and employment opportunities improved by SH1 improvements

[5] Inclusion of Quarry Road interchange has insignificant effect from option 2c

[6] New corridor provides minor benefits in connections to key centres, moderate positive benefits to do-min road network in terms of traffic redistribution

[7] As above with greater benefits attributed to reliability and network resilience and general accessibility due to a new connection being provided and an existing key links being enhanced

[8] As option 3b

[9] As option 2d, inclusion of Quarry Road provides no measurable benefits of significance

2 Assisting Safety and Personal Security

	Option 1[10]	Option 2a[11]	Option 2b[12]	Option 2c[13]	Option 2d[14]	Option 3a[15]	Option 3b[16]	Option 3c[17]	Option 4[18]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth - Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as option 2d, extended to Pukekohe**
(a) Accidents, injuries, death	Minor Positive	Moderate Positive	Minor Positive	Moderate Positive	Moderate Positive	Minor Positive	Minor Positive	Minor Positive	Moderate Positive
(b) Actual and perceived levels of security	Insignificant	Moderate Negative	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant	Insignificant
(c) Effect on vulnerable users	Minor Positive	Minor Positive	Moderate Positive	Moderate Positive	Moderate Positive	Minor Positive	Moderate Positive	Minor Positive	Moderate Positive
Overall	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**	**Minor Positive**

[10] Enhancements should result in minor accident benefits, minor effects to vulnerable users via traffic redistribution from local roads

[11] Lower perceptions of safety via reduced access, smoother traffic flows with limited crossing should reduce accidents, minor positive benefits to vulnerable users via redistribution of traffic

[12] Frontage access lowers accident related benefits due to increase in intersection movements, no perceivable change to security from do-min, increased accessibility on Mill Road will allow pedestrian and cycle schemes to form part of the corridor thus allowing increased benefits to vulnerable users

[13] Benefits accident reduction increase due to inclusion of SH1 improvements, benefits to vulnerable users stays moderate positive due to increased access off a low speed environment Mill Road, no change in regard to security levels.

[14] As option 2c, Quarry Road interchange is perceived to have no positive or negative impact on option.

[15] Weymouth-Karaka connection would allow minor benefits to accidents via smoother traffic flows, a new link is considered to offer no benefits to perceived levels of safety and security but would although better than minor benefits to vulnerable road users due to the new corridor being designed to accommodate pedestrians and cyclists although the benefits to commuter based active mode trips are likely to be insignificant.

[16] As option 3a but with increased positive benefits to vulnerable users due to SH1 and SH22 improvements and redistribution of traffic from local roads.

[17] As option 3b but with less benefits to vulnerable users due to exclusion of SH22 from this option.

[18] As option 2d, Quarry Road considered to offer no changes to benefits either way to option 2d.

3 Improving Access and Mobility

	Option 1[19]	Option 2a[20]	Option 2b[21]	Option 2c[22]	Option 2d[23]	Option 3a[24]	Option 3b[25]	Option 3c[26]	Option 4[27]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl Option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth - Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as option 2d, extended to Pukekohe**
(a) Connectivity	Insignificant	Insignificant	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive
(b) Availability of travel choices to key destinations	Minor Positive	Moderate Positive	Minor Positive	Moderate Positive	Moderate Positive	Minor Positive	Minor Positive	Minor Positive	Moderate Positive
(c) General accessibility	Minor Positive	Moderate Positive	Moderate Positive	Moderate Positive)	Moderate Positive	Minor Positive	Minor Positive	Minor Positive)	Moderate Positive
(d) Impact on those without access to a car	Insignificant	Insignificant	Minor Positive	Minor Positive	Minor Positive	Insignificant	Insignificant	Insignificant	Minor Positive
(e) Share of trips by PT	Minor Negative	Minor Negative	Minor Positive	Minor Positive	Minor Positive	Minor Negative	Minor Negative	Minor Negative	Minor Positive
Overall	**Insig-Min Positive**	**Minor Positive**	**Minor Positive**	**Min-Mod Positive**	**Min-Mod Positive**	**Insig-Min Positive**	**Minor Positive**	**Insig-Min Positive**	**Min-Mod Positive**

[19] Option 1 does not provide connections to new areas, minor benefits to travel choices and accessibility via improvements to existing infrastructure and benefits to adjacent roads e.g. Great South Road.
[20] Limited access will offer no PT or non-car benefits, connectivity is not improved by this new link considering SH1. Creation of a new link will improve accessibility and travel choice.
[21] A lower speed environment and the creation of a new link will result in net positive benefits. Connectivity is improved due to wider local access from Mill Road as is travel choice and accessibility (to a greater degree). Benefits exist for non-car trips due to allowance for PT and walking and cycling schemes in a lower speed corridor that could not exist in a higher speed environment.
[22] Limited access on Mill Road with SH1 improvements would allow minor benefits to connectivity and accessibility via the creation of a new link, minor benefits to non-car trips via redistribution of traffic from adjacent roads e.g. Great South Road
[23] Inclusion of Quarry Road not considered to reflect any changes in benefits from option 2c.
[24] New link will provide improved connectivity and travel choice, minor benefits to accessibility and insignificant benefits to those without a car. New link not likely to provide benefits to PT as not considered to be a natural route for PT and other PT corridors exist that already serve a north-south function.
[25] It is not considered that the inclusion of SH1/SH22 improvements to the Weymouth-Karaka option would have any significant change in benefits obtained in option 3a
[26] As option 3b, exclusion of SH22 would not result in any significant change in benefits to a Weymouth-Karaka link
[27] As option 2d, inclusion of Quarry Road would have negligible effects on benefits obtained in option 2d.

4 Protecting and Promoting Public Health

	Option 1[28]	Option 2a[29]	Option 2b[30]	Option 2c[31]	Option 2d[32]	Option 3a[33]	Option 3b[34]	Option 3c[35]	Option 4[36]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth - Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as option 2d, extended to Pukekohe**
(a) Share of trips by active modes: walking, cycling	Insignificant	Insignificant	Minor Positive	Minor Positive	Minor Positive	Insignificant	Insignificant	Insignificant	Minor Positive
(b) Emissions to air and water	Insignificant	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive	Minor Positive
(c) Noise and vibration	Insignificant	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Moderate Negative	Moderate Negative	Moderate Negative	Minor Negative
Overall	**Insignificant**	**Insignificant**	**Minor Positive**	**Insig-Minor Positive**	**Minor Positive**	**Minor Negative**	**Minor Negative**	**Minor Negative**	**Minor Positive**

[28] Improvements contained in option 1 are considered to generate no significant changes to benefits over the do-min in any category, improvements do not allow for direct facilities for active modes although some benefits may be derived from trip redistribution from local roads, emissions and noise changes are considered to be negligible.

[29] Mill Road higher speed environment would offer no benefits to active modes, less congestion may allow minor benefits to emissions, new high speed connection would act as a negative to noise and vibration due to its implementation in combination with do-min improvements.

[30] Mill Road with a lower speed environment would give benefits to active modes as specific facilities can be provided in new corridor, as option 2a noise and vibration will be increased by the provision of a new highway and emissions should allow some benefits as route is less likely to suffer from congestion over prolonged periods.

[31] Slower Mill Road option with motorway improvements would allow the same benefits as attributed to option 2b. SH1 and SH22 improvements therefore considered to have no significant effect on this Mill Road option.

[32] Inclusion of Quarry Road to option 2c is considered to generate no significant changes to benefits.

[33] Whilst the Weymouth-Karaka link could offer benefits to active modes this is considered to have very little effect on commuter based trips and will provide more a recreational function for cyclists. Minor benefits are gained in terms of emissions to trip redistribution and reduced expose to population centres and reduced congestion on existing links. Disbenefits occur in relation to noise and vibration through the creation of a new road link over primarily greenfield sites.

[34] Inclusion of option 1 to Weymouth-Karaka link is considered to offer no significant changes to benefits from option 3a (stand alone link)

[35] As previous option

[36] As option 2d, inclusion of Quarry Road is considered to offer no change in benefits from those previously obtained.

5 Ensuring Environmental Sustainability

	Option 1[37]	Option 2a[38]	Option 2b[39]	Option 2c[40]	Option 2d[41]	Option 3a[42]	Option 3b[43]	Option 3c[44]	Option 4[45]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70kph route with frontage access**	**Mill Road: as 2b but incl Option 1**	**Mill Road: as 2C but incl connection to Quarry Road I/C**	**Weymouth – Karaka**	**Weymouth – Karaka +Option 1**	**Weymouth - Karaka, with SH1 widening but without SH22**	**Quarry Road as Option 2d, extended to Pukekohe**
(a) Emissions to air, water and land	Insignificant	Minor Negative	Minor Negative	Moderate Negative	Minor Negative	Moderate Negative	Moderate Negative	Moderate Negative	Minor Negative
(b) Use of non renewable resources	Insignificant	Moderate Negative	Minor Negative	Minor Negative	Minor Negative	Moderate Negative	Moderate Negative	Moderate Negative	Minor Negative
(c) Impact on heritage, cultural, visual, landscape and ecological sites	Insignificant	Minor Negative	Minor Negative	Minor Negative	Moderate Negative	Moderate Negative	Moderate Negative	Moderate Negative	Moderate Negative
(d) Energy efficiency and greenhouse gas emissions	Insignificant	Minor Negative	Minor Negative	Minor Negative	Minor Negative	Moderate Negative	Moderate Negative	Moderate Negative	Minor Negative
(e) Community severance	Insignificant	Minor Negative	Minor Positive	Minor Positive	Minor Positive	Moderate Negative	Moderate Negative	Moderate Negative	Minor Positive
Overall	**Insignificant**	**Minor Negative**	**Minor Negative**	**Minor Negative**	**Minor Negative**	**Moderate Negative**	**Moderate Negative**	**Moderate Negative**	**Minor Negative**

[37] Option 1 is improvements to existing links, in each category related to ensuring environmental sustainability the net benefits are considered to be insignificant in each case

[38] Mill Road limited access would offer a range disbenefits to each category due to new road construction, more than minor benefits can be attributed to use of non-renewable resources

[39] Mill Road with frontage access is still creating a new link and will have similar negative benefits to a higher speed option, the one positive is that community severance issues are less of a concern in the frontage access option than the limited access option.

[40] Mill Road with frontage access and SH1 improvements as option 1 still has local and regional sustainable disbenefits. Community severance remains a positive but the inclusion of SH1 increase disbenefits associated with increased emissions and maintains the minor disbenefits of the previous option.

[41] As option 2c with some potential minor benefits to emissions through construction of a new interchange and subsequent effects on traffic flows, increased disbenefits to heritage and cultural considerations via construction of new interchange

[42] The construction of this new link across greenfield sites and existing established residential areas in Weymouth gives moderate disbenefits to each category, severance issues would be a particular concern in the Weymouth area

[43] As option 3a, SH1 improvements considered to have no significant effect on Weymouth-Karaka link for these categories

[44] As option 3b

[45] As option 2d

6 Supporting the Growth Strategy

	Option 1[46]	Option 2a[47]	Option 2b[48]	Option 2c[49]	Option 2d[50]	Option 3a[51]	Option 3b[52]	Option 3c[53]	Option 4[54]
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth - Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as option 2d, extended to Pukekohe**
(a) Relative accessibility to, within and between key RGS growth centres	Minor Positive	Insignificant	Moderate Positive	Moderate Positive	Moderate Positive	Moderate Negative	Moderate Negative	Moderate Negative	Moderate Positive
(b) Community coherence	Insignificant	Moderate Negative	Minor Positive)	Minor Positive)	Minor Positive	Minor Negative	Minor Negative	Minor Negative	Minor Positive
Overall	**Minor Positive**	**Moderate Negative**	**Moderate Positive**	**Moderate Positive**	**Min-Mod Positive**	**Moderate Negative**	**Moderate Negative**	**Moderate Negative**	**Min-Mod Positive**

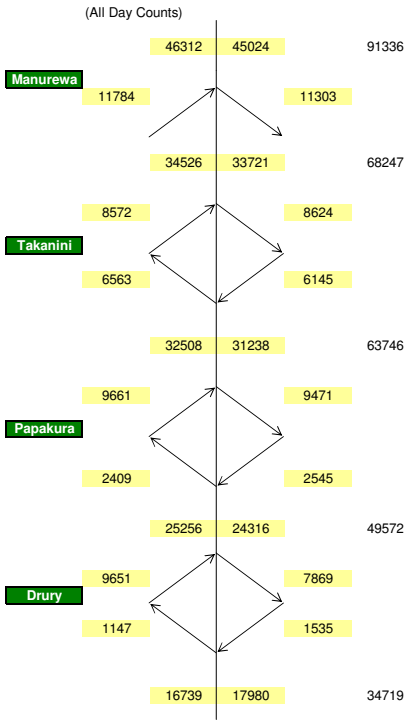
[46] Development of future urban and areas of intensification need strategic transport links integrated with urban design. Over reliance on SH1 will not give a regional framework
[47] Increase private vehicle connections, but does not improve PT connections
[48] This would be sigpos for a transit boulevard with slip roads for residential and commercial access, a transit corridor with slip roads can become the basis for urban form for the future urban area. This will rise to modpos with transit boulevard planning, essentially intensification around PT infrastructure and services
[49] Ad 2b, motorway improvements considered to have no effect on benefits
[50] As 2c, Quarry Road considered to have no effect on existing benefits
[51] Does not connect future urban growth areas, modelling shows traffic goes to SH1
[52] As option 3a, inclusion of option 1 considered to have no effect to benefits from option 3a
[53] As option 3b
[54] As option 2d, inclusion of Quarry Road considered to have no effect on benefits previously established

7 Economic Efficiency

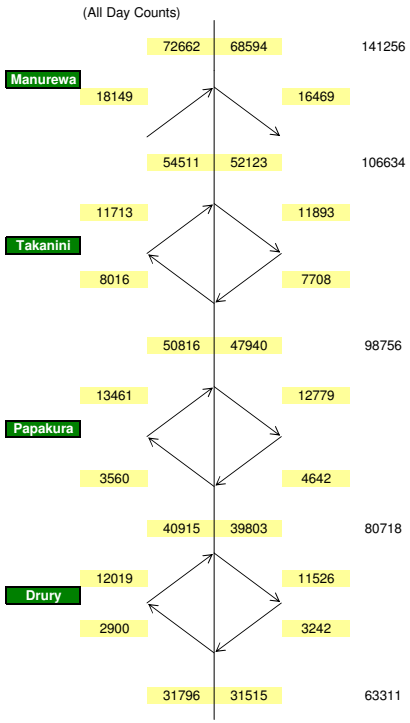
	Option 1	Option 2a	Option 2b	Option 2c	Option 2d	Option 3a	Option 3b	Option 3c	Option 4
	SH1 & SH22	**Mill Road (Limited Access Road)**	**Mill Road: 70 kph route with frontage access**	**Mill Road: as 2b but incl option 1**	**Mill Road: as 2C but incl connection to Quarry Road Interchange**	**Weymouth - Karaka**	**Weymouth - Karaka + option 1**	**Weymouth - Karaka, with SH1 widening, but without SH22**	**Quarry Road as option 2d, extended to Pukekohe**
(a) Affordability	High	Med	Med	Low	Low	Med	Low	Med	Low
(b) Benefit/cost ratio	Med	Low	Low	Low	Low	Low	Low	Low	Low
Overall	**Med-High**	**Low-Med**	**Low-Med**	**Low**	**Low**	**Low-Med**	**Low**	**Low-Med**	**Low**

Appendix D – SATURN Modelling Results

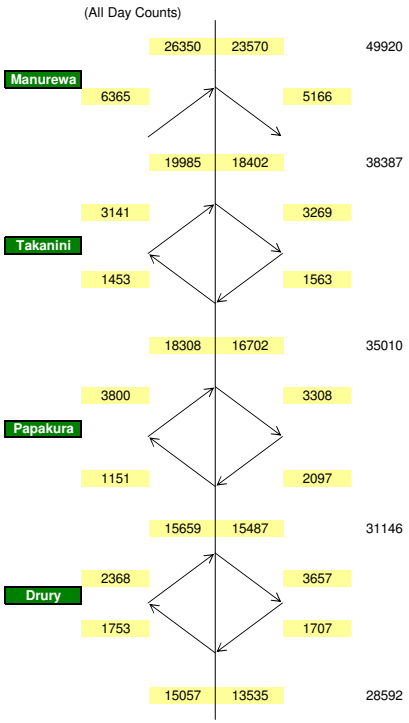
2004 Do Min



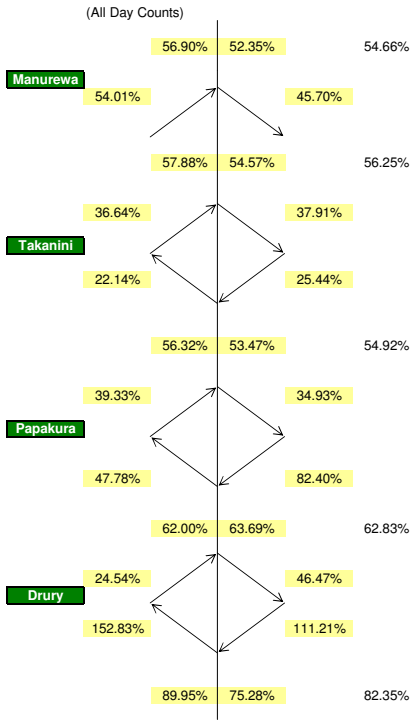
2021 Do Min



2021 - 2004 Do Min Traffic Changes

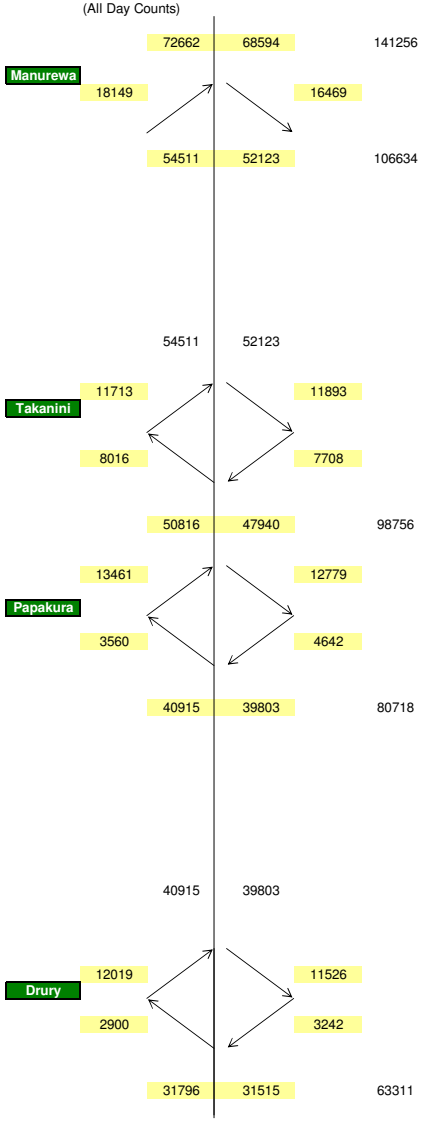


2021 - 2004 Do Min Traffic Percentage Changes



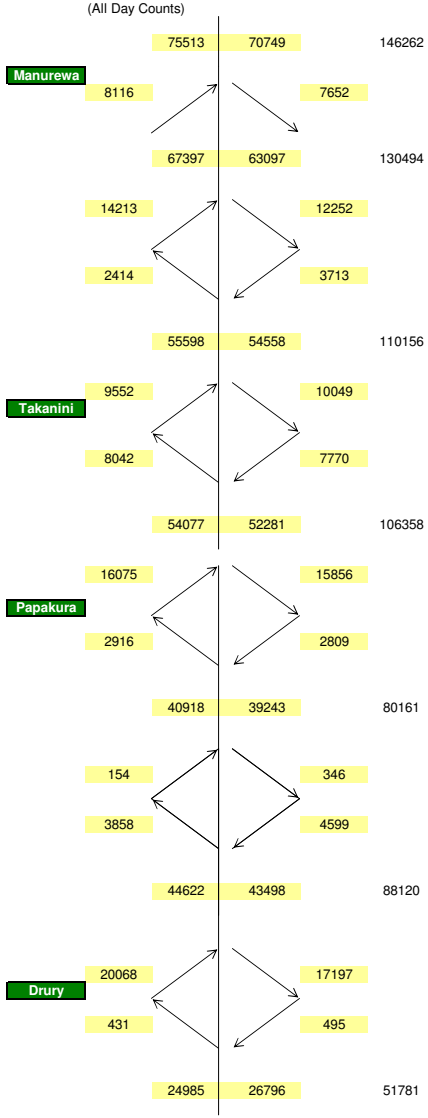
2021 Do Min

(All Day Counts)



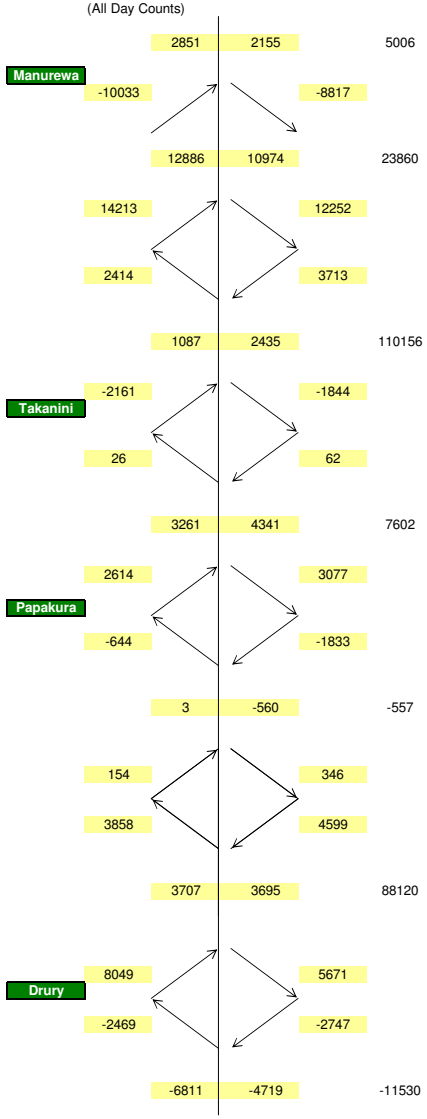
2021 Opt 1

(All Day Counts)



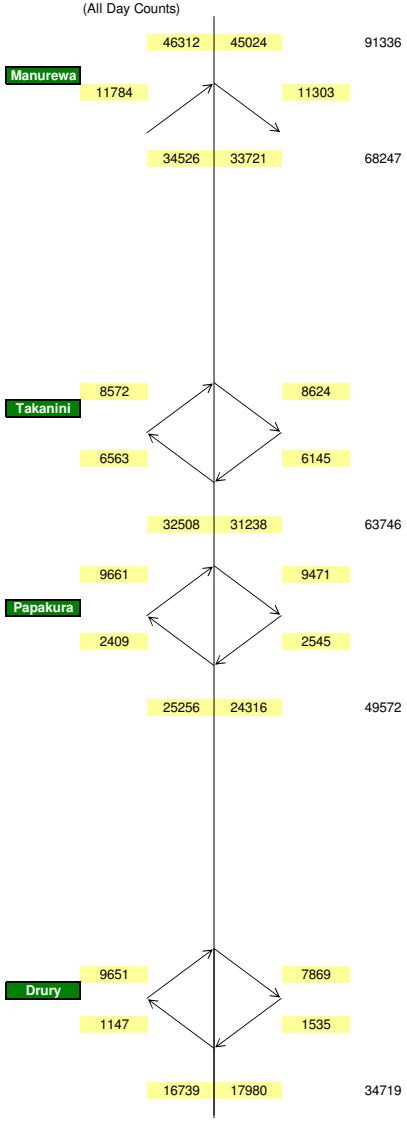
2021 Opt 1 - 2021 Do Min Traffic Changes

(All Day Counts)



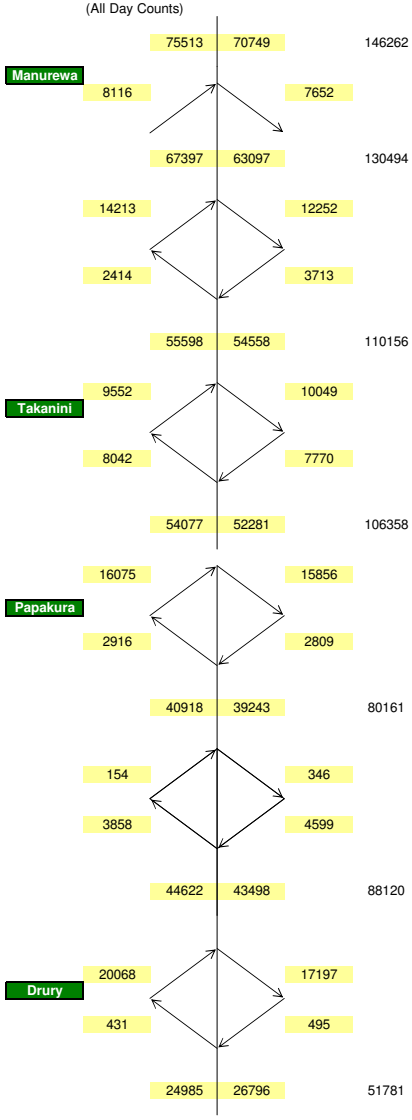
2004 Do Min

(All Day Counts)



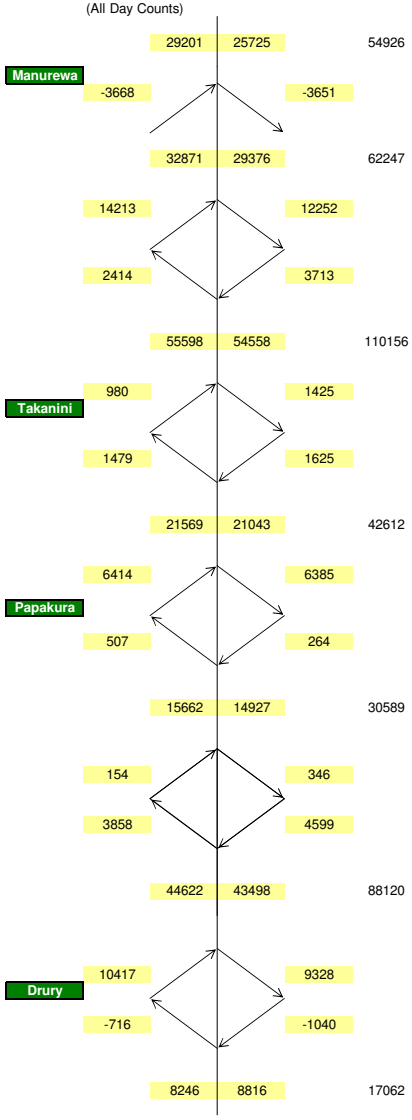
2021 Opt 1

(All Day Counts)

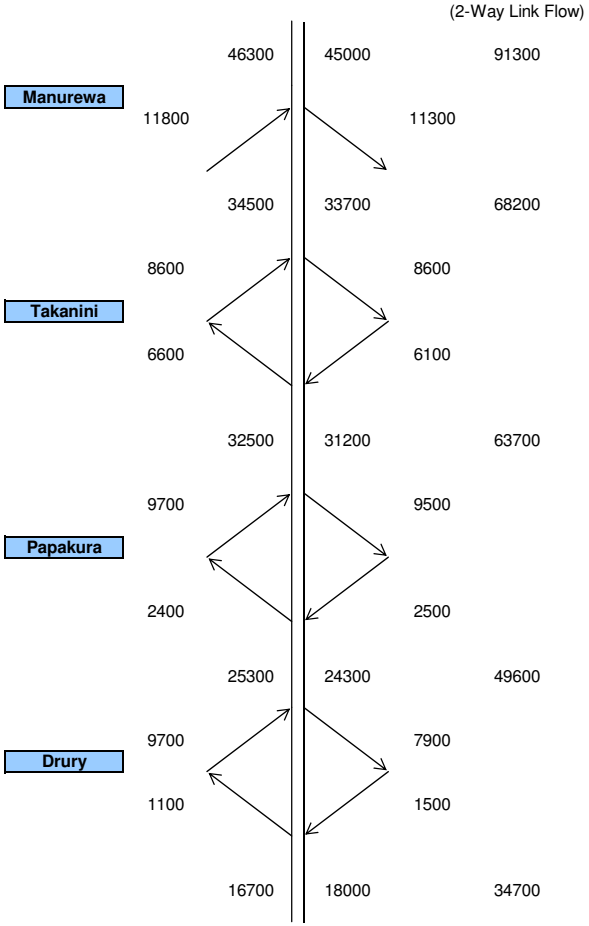


2021 Opt 1 - 2004 Do Min Traffic Changes

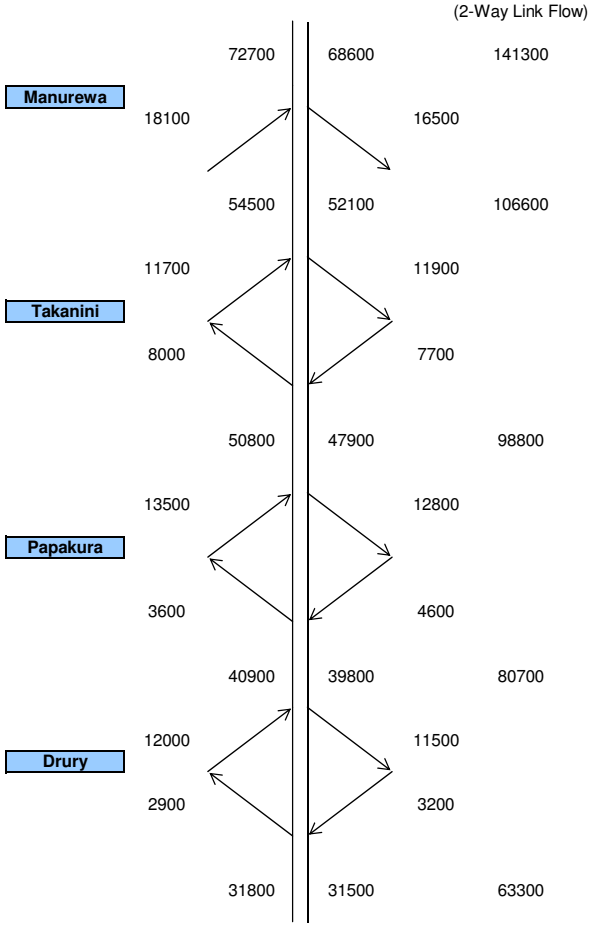
(All Day Counts)



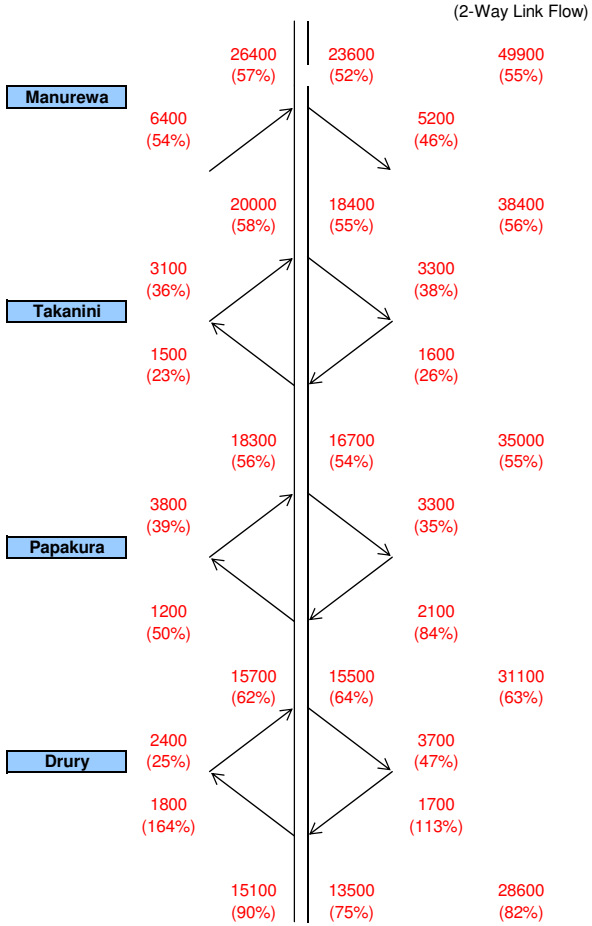
2004 Do Minimum ADT Flows



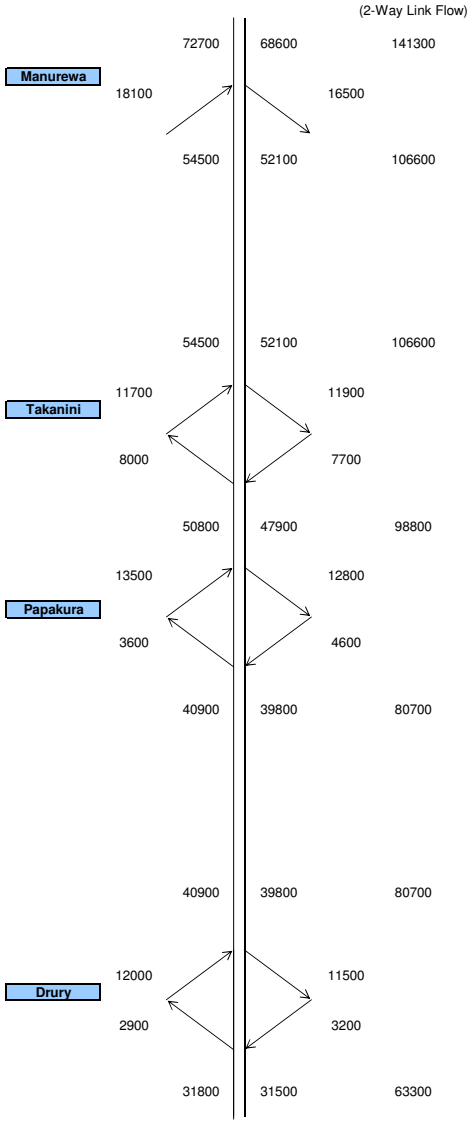
2021 Do Minimum ADT Flows



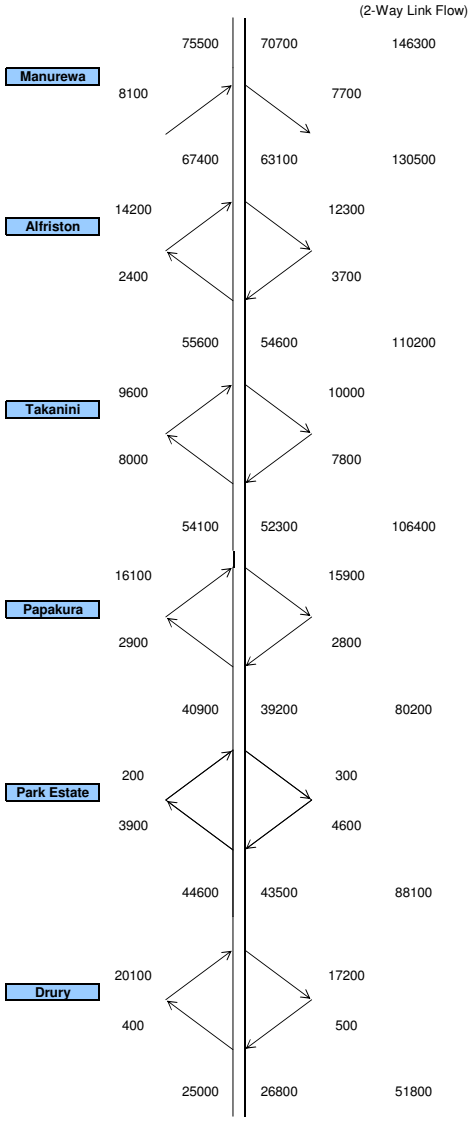
2021 - 2004 Do Minimum ADT Increases



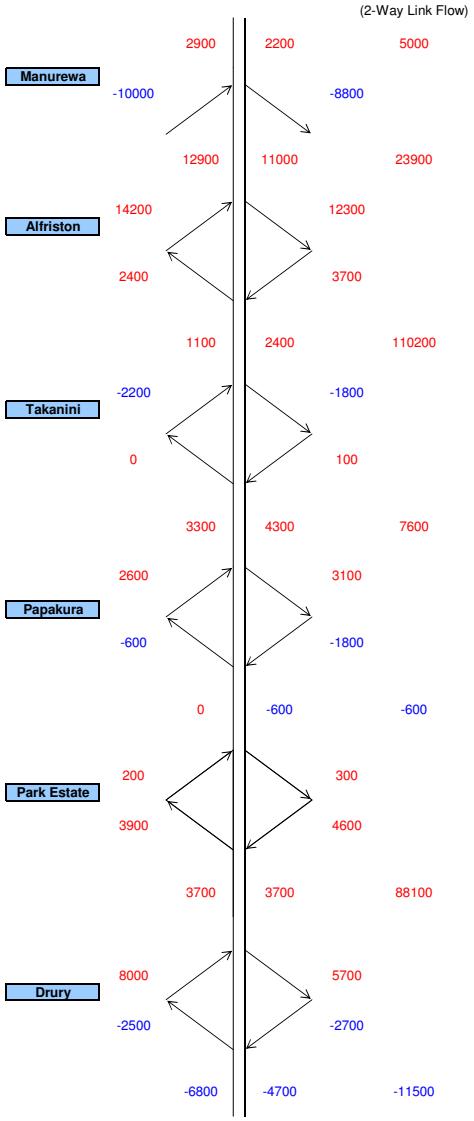
2021 Do Minimum ADT Flows



2021 Option 1 ADT Flows



2021 Option 1 - Do Minimum ADT Changes



	DESCRIPTION	DIRECTION	DMAM21	DMIP21	DMPM21	DM21ADT
1	New Weymouth - Karaka Link	NB				
		SB				
		BOTH	0	0	0	0
2	Hingia Road	EB	871	341	351	6195
		WB	200	300	1098	5896
		BOTH	1071	641	1449	12091
3	Karaka Road SH22	EB	1134	743	987	12415
		WB	807	664	1521	11960
		BOTH	1941	1407	2508	24375
4	New SH22	EB				
		WB				
		BOTH	0	0	0	0
5	SH1 South of Quarry Road Overbridge	NB	2649	1952	2175	31120
		SB	1461	1995	3286	31439
		BOTH	4110	3947	5461	62559
6	New Drury - Papakura Link	NB				
		SB				
		BOTH	0	0	0	0
7	Great South Road North of Drury	NB	832	412	595	7386
		SB	443	419	1195	7885
		BOTH	1275	831	1790	15271
8	SH1 North of Drury Interchange	NB	3398	2556	2860	40632
		SB	2419	2450	4006	39800
		BOTH	5817	5006	6866	80432
9	SH1 South of Takanini	NB	4256	3091	3021	48555
		SB	2523	2938	4738	46840
		BOTH	6779	6029	7759	95395
10	Mill Road	NB	963	505	787	9055
		SB	615	459	1378	9035
		BOTH	1578	964	2165	18090
11	Redoubt Road	NB	1215	449	779	8927
		SB	731	398	1465	8770
		BOTH	1946	847	2244	17697
12	Roscommon Road North of Weymouth Road	NB	1340	863	969	14111
		SB	764	834	1524	13750
		BOTH	2104	1697	2493	27861

	DESCRIPTION	DIRECTION	O1AM21	O1IP21	O1PM21	O121ADT	DIFF	DIFF%
1	New Weymouth - Karaka Link	NB						
		SB						
		BOTH	0	0	0	0	0	
2	Hingia Road	EB	766	345	362	6051	-144	-2%
		WB	204	302	1011	5752	-144	-2%
		BOTH	970	647	1373	11803	-288	-2%
3	Karaka Road SH22	EB	681	306	361	5450	-6965	-56%
		WB	294	201	854	4507	-7453	-62%
		BOTH	975	507	1215	9957	-14418	-59%
4	New SH22	EB	1042	814	997	13032	13032	
		WB	857	755	1035	12089	12089	
		BOTH	1899	1569	2032	25121	25121	
5	SH1 South of Quarry Road Overbridge	NB	2123	1571	1707	24941	-6179	-20%
		SB	1094	1702	2965	26840	-4599	-15%
		BOTH	3217	3273	4672	51781	-10778	-17%
6	New Drury - Papakura Link	NB						
		SB						
		BOTH	0	0	0	0	0	
7	Great South Road North of Drury	NB	437	195	307	3633	-3753	-51%
		SB	249	208	549	3884	-4001	-51%
		BOTH	686	403	856	7517	-7754	-51%
8	SH1 North of Drury Interchange	NB	3903	2776	3141	44624	3992	10%
		SB	2345	2666	4745	43506	3706	9%
		BOTH	6248	5442	7886	88130	7698	10%
9	SH1 South of Takanini	NB	5101	3224	3512	52690	4135	9%
		SB	2701	2974	5979	50074	3234	7%
		BOTH	7802	6198	9491	102764	7369	8%
10	Mill Road	NB	663	420	616	7178	-1877	-21%
		SB	516	403	999	7463	-1572	-17%
		BOTH	1179	823	1615	14641	-3449	-19%
11	Redoubt Road	NB	827	355	641	6841	-2086	-23%
		SB	655	365	1491	8307	-463	-5%
		BOTH	1482	720	2132	15148	-2549	-14%
12	Roscommon Road North of Weymouth Road	NB	1316	856	953	13954	-157	-1%
		SB	766	836	1476	13680	-70	-1%
		BOTH	2082	1692	2429	27634	-227	-1%

	DESCRIPTION	DIRECTION	O2AM21	O2IP21	O2PM21	O221ADT	DIFF	DIFF%
1	New Weymouth - Karaka Link	NB						
		SB						
		BOTH	0	0	0	0	0	
2	Hingia Road	EB	740	339	356	5921	-274	-4%
		WB	201	297	858	5385	-511	-9%
		BOTH	941	636	1214	11306	-785	-6%
3	Karaka Road SH22	EB	707	311	366	5567	-6848	-55%
		WB	297	206	968	4796	-7164	-60%
		BOTH	1004	517	1334	10363	-14012	-57%
4	New SH22	EB	1100	814	997	13148	13148	
		WB	857	755	1165	12349	12349	
		BOTH	1957	1569	2162	25497	25497	
5	SH1 South of Quarry Road Overbridge	NB	2065	1571	1707	24825	-6295	-20%
		SB	1094	1702	2872	26654	-4785	-15%
		BOTH	3159	3273	4579	51479	-11080	-18%
6	New Drury - Papakura Link	NB	555	309	482	5473	5473	
		SB	385	319	873	6025	6025	
		BOTH	940	628	1355	11498	11498	
7	Great South Road North of Drury	NB	292	93	95	1797	-5589	-76%
		SB	70	104	260	1804	-6081	-77%
		BOTH	362	197	355	3601	-11670	-76%
8	SH1 North of Drury Interchange	NB	3519	2574	2875	41102	470	1%
		SB	2141	2456	4310	39918	118	0%
		BOTH	5660	5030	7185	81020	588	1%
9	SH1 South of Takanini	NB	2963	3188	3429	47852	-703	-1%
		SB	2626	2959	5656	49113	2273	5%
		BOTH	5589	6147	9085	96965	1570	2%
10	Mill Road	NB	855	517	716	8829	-226	-2%
		SB	632	518	1326	9614	579	6%
		BOTH	1487	1035	2042	18443	353	2%
11	Redoubt Road	NB	991	495	756	8939	12	0%
		SB	834	397	2096	10227	1457	17%
		BOTH	1825	892	2852	19166	1469	8%
12	Roscommon Road North of Weymouth Road	NB	1315	853	922	13857	-254	-2%
		SB	749	826	1383	13350	-400	-3%
		BOTH	2064	1679	2305	27207	-654	-2%

	DESCRIPTION	DIRECTION	O3AAM21	O3AIP21	O3APM21	O3A21ADT	DIFF	DIFF%
1	New Weymouth - Karaka Link	NB	919	381	466	6961	6961	
		SB	468	298	1345	6904	6904	
		BOTH	1387	679	1811	13865	13865	
2	Hingia Road	EB	707	312	379	5604	-591	-10%
		WB	182	255	702	4573	-1323	-22%
		BOTH	889	567	1081	10177	-1914	-16%
3	Karaka Road SH22	EB	176	129	209	2189	-10226	-82%
		WB	142	118	374	2330	-9630	-81%
		BOTH	318	247	583	4519	-19856	-81%
4	New SH22	EB	770	643	679	9971	9971	
		WB	567	586	618	8816	8816	
		BOTH	1337	1229	1297	18787	18787	
5	SH1 South of Quarry Road Overbridge	NB	2039	1571	1706	24771	-6349	-20%
		SB	1090	1702	2836	26574	-4865	-15%
		BOTH	3129	3273	4542	51345	-11214	-18%
6	New Drury - Papakura Link	NB						
		SB						
		BOTH	0	0	0	0	0	
7	Great South Road North of Drury	NB	313	195	271	3313	-4073	-55%
		SB	248	208	261	3306	-4579	-58%
		BOTH	561	403	532	6619	-8652	-57%
8	SH1 North of Drury Interchange	NB	3167	2427	2704	38439	-2193	-5%
		SB	1900	2415	4005	38375	-1425	-4%
		BOTH	5067	4842	6709	76814	-3618	-4%
9	SH1 South of Takanini	NB	4271	2861	3136	46285	-2270	-5%
		SB	2247	2701	5045	44295	-2545	-5%
		BOTH	6518	5562	8181	90580	-4815	-5%
10	Mill Road	NB	582	411	570	6825	-2230	-25%
		SB	510	396	790	6956	-2079	-23%
		BOTH	1092	807	1360	13781	-4309	-24%
11	Redoubt Road	NB	626	337	629	6217	-2710	-30%
		SB	626	356	1378	7924	-846	-10%
		BOTH	1252	693	2007	14141	-3556	-20%
12	Roscommon Road North of Weymouth Road	NB	2078	1180	1331	19798	5687	40%
		SB	1139	1087	2549	19333	5583	41%
		BOTH	3217	2267	3880	39131	11270	40%

	DESCRIPTION	DIRECTION	O3BAM21	O3BIP21	O3BPM21	O3B21AD	DIFF	DIFF%
1	New Weymouth - Karaka Link	NB	1049	514	600	8952	8952	
		SB	635	536	1439	10044	10044	
		BOTH	1684	1050	2039	18996	18996	
2	Hingia Road	EB	775	486	539	7974	1779	29%
		WB	266	335	679	5575	-321	-5%
		BOTH	1041	821	1218	13549	1458	12%
3	Karaka Road SH22	EB	261	142	222	2528	-9887	-80%
		WB	164	176	581	3426	-8534	-71%
		BOTH	425	318	803	5954	-18421	-76%
4	New SH22	EB						
		WB						
		BOTH	0	0	0	0	0	
5	SH1 South of Quarry Road Overbridge	NB	2526	1893	2072	30019	-1101	-4%
		SB	1384	1912	3172	30144	-1295	-4%
		BOTH	3910	3805	5244	60163	-2396	-4%
6	New Drury - Papakura Link	NB						
		SB						
		BOTH	0	0	0	0	0	
7	Great South Road North of Drury	NB	313	194	271	3302	-4084	-55%
		SB	247	208	256	3294	-4591	-58%
		BOTH	560	402	527	6596	-8675	-57%
8	SH1 North of Drury Interchange	NB	2969	2120	2406	34070	-6562	-16%
		SB	1649	2096	3935	34224	-5576	-14%
		BOTH	4618	4216	6341	68294	-12138	-15%
9	SH1 South of Takanini	NB	4154	2729	3020	44367	-4188	-9%
		SB	2083	2443	4960	40959	-5881	-13%
		BOTH	6237	5172	7980	85326	-10069	-11%
10	Mill Road	NB	573	414	567	6834	-2221	-25%
		SB	506	397	788	6955	-2080	-23%
		BOTH	1079	811	1355	13789	-4301	-24%
11	Redoubt Road	NB	620	346	623	6292	-2635	-30%
		SB	633	354	1383	7926	-844	-10%
		BOTH	1253	700	2006	14218	-3479	-20%
12	Roscommon Road North of Weymouth Road	NB	2136	1269	1431	21093	6982	49%
		SB	1282	1315	2575	22179	8429	61%
		BOTH	3418	2584	4006	43272	15411	55%

	DESCRIPTION	DIRECTION	O4AM21	O4IP21	O4PM21	O421ADT	DIFF	DIFF%
1	New Weymouth - Karaka Link	NB						
		SB						
		BOTH	0	0	0	0	0	
2	Hingia Road	EB	727	339	356	5895	-300	-5%
		WB	201	297	795	5259	-637	-11%
		BOTH	928	636	1151	11154	-937	-8%
3	Karaka Road SH22	EB	720	311	367	5595	-6820	-55%
		WB	297	206	1074	5008	-6952	-58%
		BOTH	1017	517	1441	10603	-13772	-57%
4	New SH22	EB	1126	814	997	13200	13200	
		WB	857	755	1253	12525	12525	
		BOTH	1983	1569	2250	25725	25725	
5	SH1 South of Quarry Road Overbridge	NB	1918	1545	1630	24091	-7029	-23%
		SB	1117	1716	2538	26186	-5253	-17%
		BOTH	3035	3261	4168	50277	-12282	-20%
6	New Drury - Papakura Link	NB	644	335	547	6067	6067	
		SB	425	346	1025	6706	6706	
		BOTH	1069	681	1572	12773	12773	
7	Great South Road North of Drury	NB	151	93	96	1517	-5869	-79%
		SB	70	104	142	1568	-6317	-80%
		BOTH	221	197	238	3085	-12186	-80%
8	SH1 North of Drury Interchange	NB	3585	3186	2810	47836	7204	18%
		SB	2102	2911	4340	44905	5105	13%
		BOTH	5687	6097	7150	92741	12309	15%
9	SH1 South of Takanini	NB	4915	3186	3383	51642	3087	6%
		SB	2595	2911	5595	48401	1561	3%
		BOTH	7510	6097	8978	100043	4648	5%
10	Mill Road	NB	905	541	750	9261	206	2%
		SB	661	530	1367	9886	851	9%
		BOTH	1566	1071	2117	19147	1057	6%
11	Redoubt Road	NB	1000	433	790	8343	-584	-7%
		SB	848	402	2053	10224	1454	17%
		BOTH	1848	835	2843	18567	870	5%
12	Roscommon Road North of Weymouth Road	NB	1294	861	908	13875	-236	-2%
		SB	751	834	1388	13452	-298	-2%
		BOTH	2045	1695	2296	27327	-534	-2%

DO MINIMUM 2021

NUMBER	DESCRIPTION	DIRECTION	DMAM21	DMIP21	DMPM21	DM21ADT
1	New Weymouth - Karaka Link	NB				0
		SB				0
		BOTH	0	0	0	0
2	Hingia Road	EB	851	344	359	6204
		WB	200	299	1063	5815
		BOTH	1051	643	1422	12019
3	Karaka Road SH22	EB	1115	678	895	11478
		WB	786	672	1433	11830
		BOTH	1901	1350	2328	23308
4	New SH22	EB				0
		WB				0
		BOTH	0	0	0	0
5	SH1 South of Quarry Road Overbridge	NB	2646	2014	2175	31796
		SB	1463	1987	3366	31515
		BOTH	4109	4001	5541	63311
6	New Drury - Papakura Link	NB				0
		SB				0
		BOTH	0	0	0	0
7	Great South Road North of Drury	NB	861	391	561	7145
		SB	406	389	1185	7461
		BOTH	1267	780	1746	14606
8	SH1 North of Drury Interchange	NB	3388	2577	2896	40915
		SB	2185	2483	4060	39803
		BOTH	5573	5060	6956	80718
9	SH1 South of Takanini	NB	4375	3258	3114	50816
		SB	2601	3018	4770	47940
		BOTH	6976	6276	7884	98756
10	Mill Road	NB	858	424	673	7726
		SB	503	389	1214	7713
		BOTH	1361	813	1887	15439
11	New Mill Road Limited Access	NB				0
		SB				0
		BOTH	0	0	0	0
12	Redoubt Road	NB	1199	390	765	8218
		SB	721	384	1458	8582
		BOTH	1920	774	2223	16800
13	Roscommon Road North of Weymouth R	NB	1343	873	981	14251
		SB	771	844	1540	13906
		BOTH	2114	1717	2521	28157
14	Great South Road North of Mahia Road	NB	1139	723	897	12025
		SB	761	699	1216	11643
		BOTH	1900	1422	2113	23668
15	Great South Road North of Walters Road	NB	1232	961	1258	15551
		SB	1092	972	1277	15430
		BOTH	2324	1933	2535	30981
16	Porchester Road South of Airfield Road	NB	702	373	609	6725
		SB	455	358	1130	7108
		BOTH	1157	731	1739	13833

OPTION 1 2021

NUMBER	DESCRIPTION	DIRECTION	O1AM21	O1IP21	O1PM21	O121ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
2	Hingia Road	EB	771	345	362	6061	6204	-143	-2%
		WB	204	302	1014	5758	5815	-57	-1%
		BOTH	975	647	1376	11819	12019	-200	-2%
3	Karaka Road SH22	EB	676	306	361	5440	11478	-6038	-53%
		WB	294	201	850	4499	11830	-7331	-62%
		BOTH	970	507	1211	9939	23308	-13369	-57%
4	New SH22	EB	1019	814	997	12986	0	12986	#DIV/0!
		WB	857	755	1057	12133	0	12133	#DIV/0!
		BOTH	1876	1569	2054	25119	0	25119	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2145	1571	1707	24985	31796	-6811	-21%
		SB	1094	1702	2943	26796	31515	-4719	-15%
		BOTH	3239	3273	4650	51781	63311	-11530	-18%
6	New Drury - Papakura Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
7	Great South Road North of Drury	NB	443	192	309	3616	7145	-3529	-49%
		SB	244	208	553	3882	7461	-3579	-48%
		BOTH	687	400	862	7498	14606	-7108	-49%
8	SH1 North of Drury Interchange	NB	3892	2778	3140	44622	40915	3707	9%
		SB	2350	2666	4736	43498	39803	3695	9%
		BOTH	6242	5444	7876	88120	80718	7402	9%
9	SH1 South of Takanini	NB	5168	3313	3649	54077	50816	3261	6%
		SB	2861	3125	6092	52281	47940	4341	9%
		BOTH	8029	6438	9741	106358	98756	7602	8%
10	Mill Road	NB	596	442	539	7132	7726	-594	-8%
		SB	437	348	870	6442	7713	-1271	-16%
		BOTH	1033	790	1409	13574	15439	-1865	-12%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
12	Redoubt Road	NB	846	348	619	6758	8218	-1460	-18%
		SB	642	340	1431	7886	8582	-696	-8%
		BOTH	1488	688	2050	14644	16800	-2156	-13%
13	Roscommon Road North of Weymouth R	NB	1318	864	969	14078	14251	-173	-1%
		SB	769	838	1468	13692	13906	-214	-2%
		BOTH	2087	1702	2437	27770	28157	-387	-1%
14	Great South Road North of Mahia Road	NB	927	686	909	11218	12025	-807	-7%
		SB	736	675	1208	11313	11643	-330	-3%
		BOTH	1663	1361	2117	22531	23668	-1137	-5%
15	Great South Road North of Walters Road	NB	1017	894	986	13840	15551	-1711	-11%
		SB	975	921	1173	14427	15430	-1003	-7%
		BOTH	1992	1815	2159	28267	30981	-2714	-9%
16	Porchester Road South of Airfield Road	NB	440	366	503	5912	6725	-813	-12%
		SB	394	342	688	5926	7108	-1182	-17%
		BOTH	834	708	1191	11838	13833	-1995	-14%
								-2338	

OPTION 2A 2021

NUMBER	DESCRIPTION	DIRECTION	O2AAM21	O2AIP21	O2APM21	O2A21ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
2	Hingia Road	EB	772	339	359	5991	6204	-213	-3%
		WB	198	295	903	5447	5815	-368	-6%
		BOTH	970	634	1262	11438	12019	-581	-5%
3	Karaka Road SH22	EB	1220	764	919	12682	11478	1204	10%
		WB	824	714	1616	12734	11830	904	8%
		BOTH	2044	1478	2535	25416	23308	2108	9%
4	New SH22	EB				0	0	0	#DIV/0!
		WB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2620	1932	2153	30798	31796	-998	-3%
		SB	1427	1951	3343	31001	31515	-514	-2%
		BOTH	4047	3883	5496	61799	63311	-1512	-2%
6	New Drury - Papakura Link	NB	841	358	581	6782	0	6782	#DIV/0!
		SB	491	343	1735	8225	0	8225	#DIV/0!
		BOTH	1332	701	2316	15007	0	15007	#DIV/0!
7	Great South Road North of Drury	NB	418	219	232	3709	7145	-3436	-48%
		SB	121	187	378	3055	7461	-4406	-59%
		BOTH	539	406	610	6764	14606	-7842	-54%
8	SH1 North of Drury Interchange	NB	3073	2397	2652	37817	40915	-3098	-8%
		SB	1983	2349	3301	36407	39803	-3396	-9%
		BOTH	5056	4746	5953	74224	80718	-6494	-8%
9	SH1 South of Takanini	NB	4232	3058	3069	48240	50816	-2576	-5%
		SB	2453	2856	4319	44960	47940	-2980	-6%
		BOTH	6685	5914	7388	93200	98756	-5556	-6%
10	Mill Road	NB	181	101	95	1663	7726	-6063	-78%
		SB	65	53	272	1257	7713	-6456	-84%
		BOTH	246	154	367	2920	15439	-12519	-81%
11	New Mill Road Limited Access	NB	1471	726	1109	13146	0	13146	#DIV/0!
		SB	951	689	2662	14805	0	14805	#DIV/0!
		BOTH	2422	1415	3771	27951	0	27951	#DIV/0!
12	Redoubt Road	NB	1463	547	963	10869	8218	2651	32%
		SB	991	498	2241	11942	8582	3360	39%
		BOTH	2454	1045	3204	22811	16800	6011	36%
13	Roscommon Road North of Weymouth R	NB	1336	862	952	14058	14251	-193	-1%
		SB	758	836	1447	13606	13906	-300	-2%
		BOTH	2094	1698	2399	27664	28157	-493	-2%
14	Great South Road North of Mahia Road	NB	925	657	905	10887	12025	-1138	-9%
		SB	735	661	1124	10989	11643	-654	-6%
		BOTH	1660	1318	2029	21876	23668	-1792	-8%
15	Great South Road North of Walters Road	NB	1057	898	1086	14164	15551	-1387	-9%
		SB	941	923	1143	14321	15430	-1109	-7%
		BOTH	1998	1821	2229	28485	30981	-2496	-8%
16	Porchester Road South of Airfield Road	NB	317	249	378	4129	6725	-2596	-39%
		SB	280	229	582	4243	7108	-2865	-40%
		BOTH	597	478	960	8372	13833	-5461	-39%
								6331	

OPTION 2B 2021

NUMBER	DESCRIPTION	DIRECTION	O2BAM21	O2BIP21	O2BPM21	O2B21ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
2	Hingia Road	EB	776	339	351	5983	6204	-221	-4%
		WB	196	295	890	5417	5815	-398	-7%
		BOTH	972	634	1241	11400	12019	-619	-5%
3	Karaka Road SH22	EB	1181	777	933	12775	11478	1297	11%
		WB	807	610	1581	11486	11830	-344	-3%
		BOTH	1988	1387	2514	24261	23308	953	4%
4	New SH22	EB				0	0	0	#DIV/0!
		WB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2654	1919	2144	30705	31796	-1091	-3%
		SB	1446	2055	3392	32281	31515	766	2%
		BOTH	4100	3974	5536	62986	63311	-325	-1%
6	New Drury - Papakura Link	NB	759	307	508	5911	0	5911	#DIV/0!
		SB	391	324	1408	7162	0	7162	#DIV/0!
		BOTH	1150	631	1916	13073	0	13073	#DIV/0!
7	Great South Road North of Drury	NB	443	230	248	3912	7145	-3233	-45%
		SB	133	188	455	3244	7461	-4217	-57%
		BOTH	576	418	703	7156	14606	-7450	-51%
8	SH1 North of Drury Interchange	NB	3125	2436	2724	38494	40915	-2421	-6%
		SB	2075	2366	3571	37318	39803	-2485	-6%
		BOTH	5200	4802	6295	75812	80718	-4906	-6%
9	SH1 South of Takanini	NB	4329	3216	3194	50422	50816	-394	-1%
		SB	2667	2954	4515	46858	47940	-1082	-2%
		BOTH	6996	6170	7709	97280	98756	-1476	-1%
10	Mill Road	NB	1189	590	818	10504	7726	2778	36%
		SB	677	583	1896	11559	7713	3846	50%
		BOTH	1866	1173	2714	22063	15439	6624	43%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
12	Redoubt Road	NB	1277	427	833	8917	8218	699	9%
		SB	849	423	2066	10483	8582	1901	22%
		BOTH	2126	850	2899	19400	16800	2600	15%
13	Roscommon Road North of Weymouth R	NB	1336	863	962	14089	14251	-162	-1%
		SB	765	835	1431	13577	13906	-329	-2%
		BOTH	2101	1698	2393	27666	28157	-491	-2%
14	Great South Road North of Mahia Road	NB	1033	707	917	11677	12025	-348	-3%
		SB	771	688	1217	11544	11643	-99	-1%
		BOTH	1804	1395	2134	23221	23668	-447	-2%
15	Great South Road North of Walters Road	NB	1184	929	1172	14931	15551	-620	-4%
		SB	981	929	1243	14667	15430	-763	-5%
		BOTH	2165	1858	2415	29598	30981	-1383	-4%
16	Porchester Road South of Airfield Road	NB	495	269	436	4821	6725	-1904	-28%
		SB	335	258	977	5462	7108	-1646	-23%
		BOTH	830	527	1413	10283	13833	-3550	-26%
								2603	

OPTION 2C 2021

NUMBER	DESCRIPTION	DIRECTION	O2CAM21	O2CIP21	O2CPM21	O2C21ADT	DM21ADT	DIFF	% DIFF	O2C21ADT	O121ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
2	Hingia Road	EB	742	339	356	5925	6204	-279	-4%	5925	6061	-136	-2%
		WB	201	297	880	5429	5815	-386	-7%	5429	5758	-329	-6%
		BOTH	943	636	1236	11354	12019	-665	-6%	11354	11819	-465	-4%
3	Karaka Road SH22	EB	705	311	366	5563	11478	-5915	-52%	5563	5440	123	2%
		WB	297	206	941	4742	11830	-7088	-60%	4742	4499	243	5%
		BOTH	1002	517	1307	10305	23308	-13003	-56%	10305	9939	366	4%
4	New SH22	EB	1096	814	997	13140	0	13140	#DIV/0!	13140	12986	154	1%
		WB	857	755	1173	12365	0	12365	#DIV/0!	12365	12133	232	2%
		BOTH	1953	1569	2170	25505	0	25505	#DIV/0!	25505	25119	386	2%
5	SH1 South of Quarry Road Overbridge	NB	2068	1571	1707	24831	31796	-6965	-22%	24831	24985	-154	-1%
		SB	1094	1702	2870	26650	31515	-4865	-15%	26650	26796	-146	-1%
		BOTH	3162	3273	4577	51481	63311	-11830	-19%	51481	51781	-300	-1%
6	New Drury - Papakura Link	NB	513	301	455	5247	0	5247	#DIV/0!	5247	0	5247	#DIV/0!
		SB	353	299	787	5569	0	5569	#DIV/0!	5569	0	5569	#DIV/0!
		BOTH	866	600	1242	10816	0	10816	#DIV/0!	10816	0	10816	#DIV/0!
7	Great South Road North of Drury	NB	314	94	99	1860	7145	-5285	-74%	1860	3616	-1756	-49%
		SB	73	105	276	1853	7461	-5608	-75%	1853	3882	-2029	-52%
		BOTH	387	199	375	3713	14606	-10893	-75%	3713	7498	-3785	-50%
8	SH1 North of Drury Interchange	NB	3537	2581	2899	41263	40915	348	1%	41263	44622	-3359	-8%
		SB	2170	2474	4359	40272	39803	469	1%	40272	43498	-3226	-7%
		BOTH	5707	5055	7258	81535	80718	817	1%	81535	88120	-6585	-7%
9	SH1 South of Takanini	NB	5103	3274	3528	53276	50816	2460	5%	53276	54077	-801	-1%
		SB	2812	3053	5801	50809	47940	2869	6%	50809	52281	-1472	-3%
		BOTH	7915	6327	9329	104085	98756	5329	5%	104085	106358	-2273	-2%
10	Mill Road	NB	793	593	739	9587	7726	1861	24%	9587	7132	2455	34%
		SB	596	520	1263	9438	7713	1725	22%	9438	6442	2996	47%
		BOTH	1389	1113	2002	19025	15439	3586	23%	19025	13574	5451	40%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
12	Redoubt Road	NB	876	394	713	7512	8218	-706	-9%	7512	6758	754	11%
		SB	792	372	1981	9638	8582	1056	12%	9638	7886	1752	22%
		BOTH	1668	766	2694	17150	16800	350	2%	17150	14644	2506	17%
13	Roscommon Road North of Weymouth R	NB	1317	858	935	13942	14251	-309	-2%	13942	14078	-136	-1%
		SB	763	828	1399	13432	13906	-474	-3%	13432	13692	-260	-2%
		BOTH	2080	1686	2334	27374	28157	-783	-3%	27374	27770	-396	-1%
14	Great South Road North of Mahia Road	NB	883	673	880	10929	12025	-1096	-9%	10929	11218	-289	-3%
		SB	732	662	1163	11072	11643	-571	-5%	11072	11313	-241	-2%
		BOTH	1615	1335	2043	22001	23668	-1667	-7%	22001	22531	-530	-2%
15	Great South Road North of Walters Road	NB	1028	876	947	13586	15551	-1965	-13%	13586	13840	-254	-2%
		SB	951	893	1122	13969	15430	-1461	-9%	13969	14427	-458	-3%
		BOTH	1979	1769	2069	27555	30981	-3426	-11%	27555	28267	-712	-3%
16	Porchester Road South of Airfield Road	NB	282	260	407	4238	6725	-2487	-37%	4238	5912	-1674	-28%
		SB	300	258	562	4562	7108	-2546	-36%	4562	5926	-1364	-23%
		BOTH	582	518	969	8800	13833	-5033	-36%	8800	11838	-3038	-26%
								-897				1441	

OPTION 2D 2021

NUMBER	DESCRIPTION	DIRECTION	O2DAM21	O2DIP21	O2DPM21	O2D21ADT	DM21ADT	DIFF	% DIFF	O2D21ADT	O121ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
2	Hingia Road	EB	727	339	356	5895	6204	-309	-5%	5895	6061	-166	-3%
		WB	201	297	795	5259	5815	-556	-10%	5259	5758	-499	-9%
		BOTH	928	636	1151	11154	12019	-865	-7%	11154	11819	-665	-6%
3	Karaka Road SH22	EB	720	311	366	5593	11478	-5885	-51%	5593	5440	153	3%
		WB	297	206	1022	4904	11830	-6926	-59%	4904	4499	405	9%
		BOTH	1017	517	1388	10497	23308	-12811	-55%	10497	9939	558	6%
4	New SH22	EB	1095	814	997	13138	0	13138	#DIV/0!	13138	12986	152	1%
		WB	857	755	1187	12393	0	12393	#DIV/0!	12393	12133	260	2%
		BOTH	1952	1569	2184	25531	0	25531	#DIV/0!	25531	25119	412	2%
5	SH1 South of Quarry Road Overbridge	NB	1949	1545	1630	24153	31796	-7643	-24%	24153	24985	-832	-3%
		SB	1118	1716	2601	26314	31515	-5201	-17%	26314	26796	-482	-2%
		BOTH	3067	3261	4231	50467	63311	-12844	-20%	50467	51781	-1314	-3%
6	New Drury - Papakura Link	NB	451	258	354	4448	0	4448	#DIV/0!	4448	0	4448	#DIV/0!
		SB	215	241	788	4657	0	4657	#DIV/0!	4657	0	4657	#DIV/0!
		BOTH	666	499	1142	9105	0	9105	#DIV/0!	9105	0	9105	#DIV/0!
7	Great South Road North of Drury	NB	276	152	239	2702	7145	-4443	-62%	2702	3616	-914	-25%
		SB	226	194	336	3258	7461	-4203	-56%	3258	3882	-624	-16%
		BOTH	502	346	575	5960	14606	-8646	-59%	5960	7498	-1538	-21%
8	SH1 North of Drury Interchange	NB	3652	2565	2860	41239	40915	324	1%	41239	44622	-3383	-8%
		SB	2156	2444	4382	39960	39803	157	0%	39960	43498	-3538	-8%
		BOTH	5808	5009	7242	81199	80718	481	1%	81199	88120	-6921	-8%
9	SH1 South of Takanini	NB	5083	3278	3540	53304	50816	2488	5%	53304	54077	-773	-1%
		SB	2820	3038	5774	50606	47940	2666	6%	50606	52281	-1675	-3%
		BOTH	7903	6316	9314	103910	98756	5154	5%	103910	106358	-2448	-2%
10	Mill Road	NB	837	576	722	9454	7726	1728	22%	9454	7132	2322	33%
		SB	592	495	1309	9247	7713	1534	20%	9247	6442	2805	44%
		BOTH	1429	1071	2031	18701	15439	3262	21%	18701	13574	5127	38%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
12	Redoubt Road	NB	868	385	724	7419	8218	-799	-10%	7419	6758	661	10%
		SB	794	374	1966	9634	8582	1052	12%	9634	7886	1748	22%
		BOTH	1662	759	2690	17053	16800	253	2%	17053	14644	2409	16%
13	Roscommon Road North of Weymouth R	NB	1321	849	939	13859	14251	-392	-3%	13859	14078	-219	-2%
		SB	757	828	1407	13436	13906	-470	-3%	13436	13692	-256	-2%
		BOTH	2078	1677	2346	27295	28157	-862	-3%	27295	27770	-475	-2%
14	Great South Road North of Mahia Road	NB	895	671	878	10927	12025	-1098	-9%	10927	11218	-291	-3%
		SB	730	664	1162	11088	11643	-555	-5%	11088	11313	-225	-2%
		BOTH	1625	1335	2040	22015	23668	-1653	-7%	22015	22531	-516	-2%
15	Great South Road North of Walters Road	NB	986	877	952	13523	15551	-2028	-13%	13523	13840	-317	-2%
		SB	949	927	1126	14347	15430	-1083	-7%	14347	14427	-80	-1%
		BOTH	1935	1804	2078	27870	30981	-3111	-10%	27870	28267	-397	-1%
16	Porchester Road South of Airfield Road	NB	309	276	416	4486	6725	-2239	-33%	4486	5912	-1426	-24%
		SB	304	265	538	4599	7108	-2509	-35%	4599	5926	-1327	-22%
		BOTH	613	541	954	9085	13833	-4748	-34%	9085	11838	-2753	-23%
								-1754				584	

OPTION 2E 2021

NUMBER	DESCRIPTION	DIRECTION	O2EAM21	O2EIP21	O2EPM21	O2E21ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
2	Hingia Road	EB	772	339	357	5987	6204	-217	-3%
		WB	198	295	873	5387	5815	-428	-7%
		BOTH	970	634	1230	11374	12019	-645	-5%
3	Karaka Road SH22	EB	1194	701	922	11943	11478	465	4%
		WB	822	652	1618	12052	11830	222	2%
		BOTH	2016	1353	2540	23995	23308	687	3%
4	New SH22	EB				0	0	0	#DIV/0!
		WB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2645	1995	2149	31533	31796	-263	-1%
		SB	1429	2013	3371	31743	31515	228	1%
		BOTH	4074	4008	5520	63276	63311	-35	0%
6	New Drury - Papakura Link	NB	790	326	551	6268	0	6268	#DIV/0!
		SB	436	330	1495	7492	0	7492	#DIV/0!
		BOTH	1226	656	2046	13760	0	13760	#DIV/0!
7	Great South Road North of Drury	NB	429	215	233	3689	7145	-3456	-48%
		SB	127	187	424	3159	7461	-4302	-58%
		BOTH	556	402	657	6848	14606	-7758	-53%
8	SH1 North of Drury Interchange	NB	3113	2432	2679	38336	40915	-2579	-6%
		SB	2033	2361	3521	37079	39803	-2724	-7%
		BOTH	5146	4793	6200	75415	80718	-5303	-7%
9	SH1 South of Takanini	NB	4303	3143	3128	49435	50816	-1381	-3%
		SB	2574	2937	4458	46371	47940	-1569	-3%
		BOTH	6877	6080	7586	95806	98756	-2950	-3%
10	Mill Road	NB	172	51	71	1047	7726	-6679	-86%
		SB	63	41	441	1459	7713	-6254	-81%
		BOTH	235	92	512	2506	15439	-12933	-84%
11	New Mill Road Limited Access	NB	1191	618	849	10878	0	10878	#DIV/0!
		SB	779	589	1805	11647	0	11647	#DIV/0!
		BOTH	1970	1207	2654	22525	0	22525	#DIV/0!
12	Redoubt Road	NB	1350	472	919	9730	8218	1512	18%
		SB	917	457	2137	11135	8582	2553	30%
		BOTH	2267	929	3056	20865	16800	4065	24%
13	Roscommon Road North of Weymouth R	NB	1323	858	954	13992	14251	-259	-2%
		SB	761	834	1450	13596	13906	-310	-2%
		BOTH	2084	1692	2404	27588	28157	-569	-2%
14	Great South Road North of Mahia Road	NB	989	685	894	11301	12025	-724	-6%
		SB	750	668	1124	11096	11643	-547	-5%
		BOTH	1739	1353	2018	22397	23668	-1271	-5%
15	Great South Road North of Walters Road	NB	1127	961	1135	15095	15551	-456	-3%
		SB	968	944	1264	14848	15430	-582	-4%
		BOTH	2095	1905	2399	29943	30981	-1038	-3%
16	Porchester Road South of Airfield Road	NB	429	258	422	4540	6725	-2185	-32%
		SB	304	239	831	4899	7108	-2209	-31%
		BOTH	733	497	1253	9439	13833	-4394	-32%
								4141	

OPTION 2F 2021

NUMBER	DESCRIPTION	DIRECTION	O2FAM21	O2FIP21	O2FPM21	O2F21ADT	DM21ADT	DIFF	% DIFF	O2F21ADT	O121ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
2	Hingia Road	EB	727	339	346	5875	6204	-329	-5%	5875	6061	-186	-3%
		WB	189	297	790	5225	5815	-590	-10%	5225	5758	-533	-9%
		BOTH	916	636	1136	11100	12019	-919	-8%	11100	11819	-719	-6%
3	Karaka Road SH22	EB	720	311	375	5611	11478	-5867	-51%	5611	5440	171	3%
		WB	309	206	1033	4950	11830	-6880	-58%	4950	4499	451	10%
		BOTH	1029	517	1408	10561	23308	-12747	-55%	10561	9939	622	6%
4	New SH22	EB	1088	814	997	13124	0	13124	#DIV/0!	13124	12986	138	1%
		WB	857	755	1191	12401	0	12401	#DIV/0!	12401	12133	268	2%
		BOTH	1945	1569	2188	25525	0	25525	#DIV/0!	25525	25119	406	2%
5	SH1 South of Quarry Road Overbridge	NB	1955	1545	1630	24165	31796	-7631	-24%	24165	24985	-820	-3%
		SB	1117	1716	2527	26164	31515	-5351	-17%	26164	26796	-632	-2%
		BOTH	3072	3261	4157	50329	63311	-12982	-21%	50329	51781	-1452	-3%
6	New Drury - Papakura Link	NB	651	344	564	6214	0	6214	#DIV/0!	6214	0	6214	#DIV/0!
		SB	454	346	1075	6864	0	6864	#DIV/0!	6864	0	6864	#DIV/0!
		BOTH	1105	690	1639	13078	0	13078	#DIV/0!	13078	0	13078	#DIV/0!
7	Great South Road North of Drury	NB	173	93	120	1609	7145	-5536	-77%	1609	3616	-2007	-56%
		SB	91	104	179	1684	7461	-5777	-77%	1684	3882	-2198	-57%
		BOTH	264	197	299	3293	14606	-11313	-77%	3293	7498	-4205	-56%
8	SH1 North of Drury Interchange	NB	3555	2539	2778	40595	40915	-320	-1%	40595	44622	-4027	-9%
		SB	2064	2428	4258	39352	39803	-451	-1%	39352	43498	-4146	-10%
		BOTH	5619	4967	7036	79947	80718	-771	-1%	79947	88120	-8173	-9%
9	SH1 South of Takanini	NB	4751	3174	3325	51066	50816	250	0%	51066	54077	-3011	-6%
		SB	2644	2980	5451	48970	47940	1030	2%	48970	52281	-3311	-6%
		BOTH	7395	6154	8776	100036	98756	1280	1%	100036	106358	-6322	-6%
10	Mill Road	NB	149	52	74	1018	7726	-6708	-87%	1018	7132	-6114	-86%
		SB	57	46	295	1210	7713	-6503	-84%	1210	6442	-5232	-81%
		BOTH	206	98	369	2228	15439	-13211	-86%	2228	13574	-11346	-84%
11	New Mill Road Limited Access	NB	904	594	838	10018	0	10018	#DIV/0!	10018	0	10018	#DIV/0!
		SB	745	565	1427	10559	0	10559	#DIV/0!	10559	0	10559	#DIV/0!
		BOTH	1649	1159	2265	20577	0	20577	#DIV/0!	20577	0	20577	#DIV/0!
12	Redoubt Road	NB	960	403	777	7907	8218	-311	-4%	7907	6758	1149	17%
		SB	841	389	2022	10005	8582	1423	17%	10005	7886	2119	27%
		BOTH	1801	792	2799	17912	16800	1112	7%	17912	14644	3268	22%
13	Roscommon Road North of Weymouth R	NB	1312	861	928	13951	14251	-300	-2%	13951	14078	-127	-1%
		SB	764	832	1381	13442	13906	-464	-3%	13442	13692	-250	-2%
		BOTH	2076	1693	2309	27393	28157	-764	-3%	27393	27770	-377	-1%
14	Great South Road North of Mahia Road	NB	838	658	859	10632	12025	-1393	-12%	10632	11218	-586	-5%
		SB	704	652	1115	10810	11643	-833	-7%	10810	11313	-503	-4%
		BOTH	1542	1310	1974	21442	23668	-2226	-9%	21442	22531	-1089	-5%
15	Great South Road North of Walters Road	NB	1090	938	1013	14524	15551	-1027	-7%	14524	13840	684	5%
		SB	966	917	1165	14349	15430	-1081	-7%	14349	14427	-78	-1%
		BOTH	2056	1855	2178	28873	30981	-2108	-7%	28873	28267	606	2%
16	Porchester Road South of Airfield Road	NB	328	274	402	4474	6725	-2251	-33%	4474	5912	-1438	-24%
		SB	278	242	482	4182	7108	-2926	-41%	4182	5926	-1744	-29%
		BOTH	606	516	884	8656	13833	-5177	-37%	8656	11838	-3182	-27%
								-646				1692	

OPTION 3A 2021

NUMBER	DESCRIPTION	DIRECTION	O3AAM21	O3AIP21	O3APM21	O3A21ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB	1143	552	659	9676	0	9676	#DIV/0!
		SB	690	621	1734	11679	0	11679	#DIV/0!
		BOTH	1833	1173	2393	21355	0	21355	#DIV/0!
2	Hingia Road	EB	743	445	558	7497	6204	1293	21%
		WB	213	346	665	5562	5815	-253	-4%
		BOTH	956	791	1223	13059	12019	1040	9%
3	Karaka Road SH22	EB	293	171	248	2963	11478	-8515	-74%
		WB	258	201	440	3607	11830	-8223	-70%
		BOTH	551	372	688	6570	23308	-16738	-72%
4	New SH22	EB				0	0	0	#DIV/0!
		WB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2434	1867	1979	29363	31796	-2433	-8%
		SB	1291	1792	3036	28366	31515	-3149	-10%
		BOTH	3725	3659	5015	57729	63311	-5582	-9%
6	New Drury - Papakura Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
7	Great South Road North of Drury	NB	682	372	583	6622	7145	-523	-7%
		SB	500	369	770	6599	7461	-862	-12%
		BOTH	1182	741	1353	13221	14606	-1385	-9%
8	SH1 North of Drury Interchange	NB	2531	1940	2002	30406	40915	-10509	-26%
		SB	1388	1834	3126	29202	39803	-10601	-27%
		BOTH	3919	3774	5128	59608	80718	-21110	-26%
9	SH1 South of Takanini	NB	3739	2728	2814	43114	50816	-7702	-15%
		SB	2017	2453	4061	39139	47940	-8801	-18%
		BOTH	5756	5181	6875	82253	98756	-16503	-17%
10	Mill Road	NB	627	387	572	6655	7726	-1071	-14%
		SB	467	353	953	6723	7713	-990	-13%
		BOTH	1094	740	1525	13378	15439	-2061	-13%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
12	Redoubt Road	NB	1005	383	693	7609	8218	-609	-7%
		SB	381	377	1394	7697	8582	-885	-10%
		BOTH	1386	760	2087	15306	16800	-1494	-9%
13	Roscommon Road North of Weymouth R	NB	2263	1310	1441	21818	14251	7567	53%
		SB	1322	1381	2689	23213	13906	9307	67%
		BOTH	3585	2691	4130	45031	28157	16874	60%
14	Great South Road North of Mahia Road	NB	740	650	850	10330	12025	-1695	-14%
		SB	687	658	1027	10666	11643	-977	-8%
		BOTH	1427	1308	1877	20996	23668	-2672	-11%
15	Great South Road North of Walters Road	NB	1192	979	1131	15415	15551	-136	-1%
		SB	1073	953	1181	14991	15430	-439	-3%
		BOTH	2265	1932	2312	30406	30981	-575	-2%
16	Porchester Road South of Airfield Road	NB	519	368	503	6092	6725	-633	-9%
		SB	420	357	822	6411	7108	-697	-10%
		BOTH	939	725	1325	12503	13833	-1330	-10%
								-30181	

OPTION 3B 2021

NUMBER	DESCRIPTION	DIRECTION	O3BAM21	O3BIP21	O3BPM21	O3B21ADT	DM21ADT	DIFF	% DIFF	O3B21ADT	O121ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB	907	382	470	6956	0	6956	#DIV/0!	6956	0	6956	#DIV/0!
		SB	463	298	1337	6878	0	6878	#DIV/0!	6878	0	6878	#DIV/0!
		BOTH	1370	680	1807	13834	0	13834	#DIV/0!	13834	0	13834	#DIV/0!
2	Hingia Road	EB	712	312	377	5610	6204	-594	-10%	5610	6061	-451	-7%
		WB	182	256	681	4542	5815	-1273	-22%	4542	5758	-1216	-21%
		BOTH	894	568	1058	10152	12019	-1867	-16%	10152	11819	-1667	-14%
3	Karaka Road SH22	EB	177	129	209	2191	11478	-9287	-81%	2191	5440	-3249	-60%
		WB	142	118	342	2266	11830	-9564	-81%	2266	4499	-2233	-50%
		BOTH	319	247	551	4457	23308	-18851	-81%	4457	9939	-5482	-55%
4	New SH22	EB	777	642	678	9972	0	9972	#DIV/0!	9972	12986	-3014	-23%
		WB	570	586	724	9034	0	9034	#DIV/0!	9034	12133	-3099	-26%
		BOTH	1347	1228	1402	19006	0	19006	#DIV/0!	19006	25119	-6113	-24%
5	SH1 South of Quarry Road Overbridge	NB	2039	1571	1706	24771	31796	-7025	-22%	24771	24985	-214	-1%
		SB	1091	1702	2792	26488	31515	-5027	-16%	26488	26796	-308	-1%
		BOTH	3130	3273	4498	51259	63311	-12052	-19%	51259	51781	-522	-1%
6	New Drury - Papakura Link	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
7	Great South Road North of Drury	NB	305	192	263	3248	7145	-3897	-55%	3248	3616	-368	-10%
		SB	243	208	254	3282	7461	-4179	-56%	3282	3882	-600	-15%
		BOTH	548	400	517	6530	14606	-8076	-55%	6530	7498	-968	-13%
8	SH1 North of Drury Interchange	NB	3183	2429	2711	38507	40915	-2408	-6%	38507	44622	-6115	-14%
		SB	1909	2414	4042	38456	39803	-1347	-3%	38456	43498	-5042	-12%
		BOTH	5092	4843	6753	76963	80718	-3755	-5%	76963	88120	-11157	-13%
9	SH1 South of Takanini	NB	4413	2949	3280	47825	50816	-2991	-6%	47825	54077	-6252	-12%
		SB	2402	2779	5183	45739	47940	-2201	-5%	45739	52281	-6542	-13%
		BOTH	6815	5728	8463	93564	98756	-5192	-5%	93564	106358	-12794	-12%
10	Mill Road	NB	495	399	493	6365	7726	-1361	-18%	6365	7132	-767	-11%
		SB	426	357	738	6255	7713	-1458	-19%	6255	6442	-187	-3%
		BOTH	921	756	1231	12620	15439	-2819	-18%	12620	13574	-954	-7%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
12	Redoubt Road	NB	638	328	627	6138	8218	-2080	-25%	6138	6758	-620	-9%
		SB	641	333	1372	7689	8582	-893	-10%	7689	7886	-197	-2%
		BOTH	1279	661	1999	13827	16800	-2973	-18%	13827	14644	-817	-6%
13	Roscommon Road North of Weymouth R	NB	2097	1176	1343	19816	14251	5565	39%	19816	14078	5738	41%
		SB	1137	1087	2535	19301	13906	5395	39%	19301	13692	5609	41%
		BOTH	3234	2263	3878	39117	28157	10960	39%	39117	27770	11347	41%
14	Great South Road North of Mahia Road	NB	736	634	797	10040	12025	-1985	-17%	10040	11218	-1178	-11%
		SB	646	633	921	10097	11643	-1546	-13%	10097	11313	-1216	-11%
		BOTH	1382	1267	1718	20137	23668	-3531	-15%	20137	22531	-2394	-11%
15	Great South Road North of Walters Road	NB	1030	922	966	14134	15551	-1417	-9%	14134	13840	294	2%
		SB	973	956	1158	14778	15430	-652	-4%	14778	14427	351	2%
		BOTH	2003	1878	2124	28912	30981	-2069	-7%	28912	28267	645	2%
16	Porchester Road South of Airfield Road	NB	392	363	497	5771	6725	-954	-14%	5771	5912	-141	-2%
		SB	384	346	472	5518	7108	-1590	-22%	5518	5926	-408	-7%
		BOTH	776	709	969	11289	13833	-2544	-18%	11289	11838	-549	-5%
								-19929				-17591	

OPTION 3C 2021

NUMBER	DESCRIPTION	DIRECTION	O3CAM21	O3CIP21	O3CPM21	O3C21ADT	DM21ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB	1052	635	602	10293	0	10293	#DIV/0!
		SB	654	584	1516	10764	0	10764	#DIV/0!
		BOTH	1706	1219	2118	21057	0	21057	#DIV/0!
2	Hingia Road	EB	788	462	623	7904	6204	1700	27%
		WB	327	394	672	6332	5815	517	9%
		BOTH	1115	856	1295	14236	12019	2217	18%
3	Karaka Road SH22	EB	319	159	239	2865	11478	-8613	-75%
		WB	182	149	600	3203	11830	-8627	-73%
		BOTH	501	308	839	6068	23308	-17240	-74%
4	New SH22	EB				0	0	0	#DIV/0!
		WB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
5	SH1 South of Quarry Road Overbridge	NB	2454	1780	1979	28446	31796	-3350	-11%
		SB	1286	1832	3084	28892	31515	-2623	-8%
		BOTH	3740	3612	5063	57338	63311	-5973	-9%
6	New Drury - Papakura Link	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
7	Great South Road North of Drury	NB	305	192	262	3246	7145	-3899	-55%
		SB	243	208	254	3282	7461	-4179	-56%
		BOTH	548	400	516	6528	14606	-8078	-55%
8	SH1 North of Drury Interchange	NB	2962	2026	2329	32868	40915	-8047	-20%
		SB	1574	1990	3868	32774	39803	-7029	-18%
		BOTH	4536	4016	6197	65642	80718	-15076	-19%
9	SH1 South of Takanini	NB	4279	2687	3158	44431	50816	-6385	-13%
		SB	2224	2555	5040	42633	47940	-5307	-11%
		BOTH	6503	5242	8198	87064	98756	-11692	-12%
10	Mill Road	NB	474	436	492	6728	7726	-998	-13%
		SB	428	339	727	6039	7713	-1674	-22%
		BOTH	902	775	1219	12767	15439	-2672	-17%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!
12	Redoubt Road	NB	609	333	615	6111	8218	-2107	-26%
		SB	641	341	1386	7805	8582	-777	-9%
		BOTH	1250	674	2001	13916	16800	-2884	-17%
13	Roscommon Road North of Weymouth R	NB	2131	1400	1425	22512	14251	8261	58%
		SB	1301	1358	2631	22802	13906	8896	64%
		BOTH	3432	2758	4056	45314	28157	17157	61%
14	Great South Road North of Mahia Road	NB	723	624	848	10006	12025	-2019	-17%
		SB	646	633	927	10109	11643	-1534	-13%
		BOTH	1369	1257	1775	20115	23668	-3553	-15%
15	Great South Road North of Walters Road	NB	1052	888	957	13786	15551	-1765	-11%
		SB	981	923	1130	14375	15430	-1055	-7%
		BOTH	2033	1811	2087	28161	30981	-2820	-9%
16	Porchester Road South of Airfield Road	NB	382	369	496	5815	6725	-910	-14%
		SB	381	336	480	5418	7108	-1690	-24%
		BOTH	763	705	976	11233	13833	-2600	-19%
								-32157	

OPTION 4 2021

NUMBER	DESCRIPTION	DIRECTION	O4AM21	O4IP21	O4PM21	O421ADT	DM21ADT	DIFF	% DIFF	O421ADT	O121ADT	DIFF	% DIFF
1	New Weymouth - Karaka Link	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
2	Hingia Road	EB	727	339	356	5895	6204	-309	-5%	5895	6061	-166	-3%
		WB	201	297	795	5259	5815	-556	-10%	5259	5758	-499	-9%
		BOTH	928	636	1151	11154	12019	-865	-7%	11154	11819	-665	-6%
3	Karaka Road SH22	EB	720	311	368	5597	11478	-5881	-51%	5597	5440	157	3%
		WB	297	206	1074	5008	11830	-6822	-58%	5008	4499	509	11%
		BOTH	1017	517	1442	10605	23308	-12703	-55%	10605	9939	666	7%
4	New SH22	EB	1126	814	997	13200	0	13200	#DIV/0!	13200	12986	214	2%
		WB	857	755	1262	12543	0	12543	#DIV/0!	12543	12133	410	3%
		BOTH	1983	1569	2259	25743	0	25743	#DIV/0!	25743	25119	624	2%
5	SH1 South of Quarry Road Overbridge	NB	1918	1545	1630	24091	31796	-7705	-24%	24091	24985	-894	-4%
		SB	1118	1716	2594	26300	31515	-5215	-17%	26300	26796	-496	-2%
		BOTH	3036	3261	4224	50391	63311	-12920	-20%	50391	51781	-1390	-3%
6	New Drury - Papakura Link	NB	464	258	358	4482	0	4482	#DIV/0!	4482	0	4482	#DIV/0!
		SB	220	241	785	4661	0	4661	#DIV/0!	4661	0	4661	#DIV/0!
		BOTH	684	499	1143	9143	0	9143	#DIV/0!	9143	0	9143	#DIV/0!
7	Great South Road North of Drury	NB	262	152	207	2610	7145	-4535	-63%	2610	3616	-1006	-28%
		SB	226	194	269	3124	7461	-4337	-58%	3124	3882	-758	-20%
		BOTH	488	346	476	5734	14606	-8872	-61%	5734	7498	-1764	-24%
8	SH1 North of Drury Interchange	NB	3653	2565	2888	41297	40915	382	1%	41297	44622	-3325	-7%
		SB	2151	2444	4453	40092	39803	289	1%	40092	43498	-3406	-8%
		BOTH	5804	5009	7341	81389	80718	671	1%	81389	88120	-6731	-8%
9	SH1 South of Takanini	NB	5093	3275	3549	53309	50816	2493	5%	53309	54077	-768	-1%
		SB	2816	3037	5756	50551	47940	2611	5%	50551	52281	-1730	-3%
		BOTH	7909	6312	9305	103860	98756	5104	5%	103860	106358	-2498	-2%
10	Mill Road	NB	816	575	715	9387	7726	1661	21%	9387	7132	2255	32%
		SB	597	495	1337	9313	7713	1600	21%	9313	6442	2871	45%
		BOTH	1413	1070	2052	18700	15439	3261	21%	18700	13574	5126	38%
11	New Mill Road Limited Access	NB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		SB				0	0	0	#DIV/0!	0	0	0	#DIV/0!
		BOTH	0	0	0	0	0	0	#DIV/0!	0	0	0	#DIV/0!
12	Redoubt Road	NB	898	387	709	7471	8218	-747	-9%	7471	6758	713	11%
		SB	786	374	1988	9662	8582	1080	13%	9662	7886	1776	23%
		BOTH	1684	761	2697	17133	16800	333	2%	17133	14644	2489	17%
13	Roscommon Road North of Weymouth R	NB	1317	849	932	13837	14251	-414	-3%	13837	14078	-241	-2%
		SB	757	829	1399	13431	13906	-475	-3%	13431	13692	-261	-2%
		BOTH	2074	1678	2331	27268	28157	-889	-3%	27268	27770	-502	-2%
14	Great South Road North of Mahia Road	NB	893	669	844	10833	12025	-1192	-10%	10833	11218	-385	-3%
		SB	725	664	1073	10900	11643	-743	-6%	10900	11313	-413	-4%
		BOTH	1618	1333	1917	21733	23668	-1935	-8%	21733	22531	-798	-4%
15	Great South Road North of Walters Road	NB	1018	879	951	13607	15551	-1944	-13%	13607	13840	-233	-2%
		SB	948	928	1158	14420	15430	-1010	-7%	14420	14427	-7	0%
		BOTH	1966	1807	2109	28027	30981	-2954	-10%	28027	28267	-240	-1%
16	Porchester Road South of Airfield Road	NB	288	276	416	4444	6725	-2281	-34%	4444	5912	-1468	-25%
		SB	303	266	498	4528	7108	-2580	-36%	4528	5926	-1398	-24%
		BOTH	591	542	914	8972	13833	-4861	-35%	8972	11838	-2866	-24%
								-1744				594	

Southern Sector Average Daily Traffic Comparisons

NUMBER	DESCRIPTION	DM21ADT	O121ADT	O2A21ADT	O2B21ADT	O2C21ADT	O2D21ADT	O2E21ADT	O2F21ADT	O3A21ADT	O3B21ADT	O3C21ADT	O421ADT
1	New Weymouth - Karaka Link	0	0	0	0	0	0	0	0	21400	13900	21100	0
2	Hingia Road	12100	11900	11500	11400	11400	11200	11400	11100	13100	10200	14300	11200
3	Karaka Road SH22	23400	10000	25500	24300	10400	10500	24000	10600	6600	4500	6100	10700
4	New SH22	0	25200	0	0	25600	25600	0	25600	0	19100	0	25800
5	SH1 South of Quarry Road Overbridge	63400	51800	61800	63000	51500	50500	63300	50400	57800	51300	57400	50400
6	New Drury - Papakura Link	0	0	15100	13100	10900	9200	13800	13100	0	0	0	9200
7	Great South Road North of Drury	14700	7500	6800	7200	3800	6000	6900	3300	13300	6600	6600	5800
8	SH1 North of Drury Interchange	80800	88200	74300	75900	81600	81200	75500	80000	59700	77000	65700	81400
9	SH1 South of Takanini	98800	106400	93200	97300	104100	104000	95900	100100	82300	93600	87100	103900
10	Mill Road	15500	13600	3000	22100	19100	18800	2600	2300	13400	12700	12800	18700
11	New Mill Road Limited Access	0	0	28000	0	0	0	22600	20600	0	0	0	0
12	Redoubt Road	16800	14700	22900	19400	17200	17100	20900	18000	15400	13900	14000	17200
13	Roscommon Road North of Weymouth Road	28200	27800	27700	27700	27400	27300	27600	27400	45100	39200	45400	27300
14	Great South Road North of Mahia Road	23700	22600	21900	23300	22100	22100	22400	21500	21000	20200	20200	21800
15	Great South Road North of Walters Road	31000	28300	28500	29600	27600	27900	30000	28900	30500	29000	28200	28100
16	Porchester Road South of Airfield Road	13900	11900	8400	10300	8800	9100	9500	8700	12600	11300	11300	9000

Southern Sector ADT Comparisons with Do Minimum

NUMBER	DESCRIPTION	DM21ADT	O121ADT	O2A21ADT	O2B21ADT	O2C21ADT	O2D21ADT	O2E21ADT	O2F21ADT	O3A21ADT	O3B21ADT	O3C21ADT	O421ADT
1	New Weymouth - Karaka Link		0	0	0	0	0	0	0	21400	13900	21100	0
2	Hingia Road		-200	-600	-700	-700	-900	-700	-1000	1000	-1900	2200	-900
3	Karaka Road SH22		-13400	2100	900	-13000	-12900	600	-12800	-16800	-18900	-17300	-12700
4	New SH22		25200	0	0	25600	25600	0	25600	0	19100	0	25800
5	SH1 South of Quarry Road Overbridge		-11600	-1600	-400	-11900	-12900	-100	-13000	-5600	-12100	-6000	-13000
6	New Drury - Papakura Link		0	15100	13100	10900	9200	13800	13100	0	0	0	9200
7	Great South Road North of Drury		-7200	-7900	-7500	-10900	-8700	-7800	-11400	-1400	-8100	-8100	-8900
8	SH1 North of Drury Interchange		7400	-6500	-4900	800	400	-5300	-800	-21100	-3800	-15100	600
9	SH1 South of Takanini		7600	-5600	-1500	5300	5200	-2900	1300	-16500	-5200	-11700	5100
10	Mill Road		-1900	-12500	6600	3600	3300	-12900	-13200	-2100	-2800	-2700	3200
11	New Mill Road Limited Access		0	28000	0	0	0	22600	20600	0	0	0	0
12	Redoubt Road		-2100	6100	2600	400	300	4100	1200	-1400	-2900	-2800	400
13	Roscommon Road North of Weymouth Road		-400	-500	-500	-800	-900	-600	-800	16900	11000	17200	-900
14	Great South Road North of Mahia Road		-1100	-1800	-400	-1600	-1600	-1300	-2200	-2700	-3500	-3500	-1900
15	Great South Road North of Walters Road		-2700	-2500	-1400	-3400	-3100	-1000	-2100	-500	-2000	-2800	-2900
16	Porchester Road South of Airfield Road		-2000	-5500	-3600	-5100	-4800	-4400	-5200	-1300	-2600	-2600	-4900

Southern Sector ADT Comparisons with Option 1

NUMBER	DESCRIPTION	DM21ADT	O121ADT	O2A21ADT	O2B21ADT	O2C21ADT	O2D21ADT	O2E21ADT	O2F21ADT	O3A21ADT	O3B21ADT	O3C21ADT	O421ADT
1	New Weymouth - Karaka Link			0	0	0	0	0	0	21400	13900	21100	0
2	Hingia Road			-400	-500	-500	-700	-500	-800	1200	-1700	2400	-700
3	Karaka Road SH22			15500	14300	400	500	14000	600	-3400	-5500	-3900	700
4	New SH22			-25200	-25200	400	400	-25200	400	-25200	-6100	-25200	600
5	SH1 South of Quarry Road Overbridge			10000	11200	-300	-1300	11500	-1400	6000	-500	5600	-1400
6	New Drury - Papakura Link			15100	13100	10900	9200	13800	13100	0	0	0	9200
7	Great South Road North of Drury			-700	-300	-3700	-1500	-600	-4200	5800	-900	-900	-1700
8	SH1 North of Drury Interchange			-13900	-12300	-6600	-7000	-12700	-8200	-28500	-11200	-22500	-6800
9	SH1 South of Takanini			-13200	-9100	-2300	-2400	-10500	-6300	-24100	-12800	-19300	-2500
10	Mill Road			-10600	8500	5500	5200	-11000	-11300	-200	-900	-800	5100
11	New Mill Road Limited Access			28000	0	0	0	22600	20600	0	0	0	0
12	Redoubt Road			8200	4700	2500	2400	6200	3300	700	-800	-700	2500
13	Roscommon Road North of Weymouth Road			-100	-100	-400	-500	-200	-400	17300	11400	17600	-500
14	Great South Road North of Mahia Road			-700	700	-500	-500	-200	-1100	-1600	-2400	-2400	-800
15	Great South Road North of Walters Road			200	1300	-700	-400	1700	600	2200	700	-100	-200
16	Porchester Road South of Airfield Road			-3500	-1600	-3100	-2800	-2400	-3200	700	-600	-600	-2900

Southern Sector Travel Time Economics

Time Period	Do Minimum	Option 1	Option 2A	Option 2B	Option 2C	Option 2D	Option 3A	Option 3B	Option 3C	Option 4	
AM Peak	10365.89	9225.6	9654.12	10011.49	9166.29	9313.5	9771.1	8994.06	9019.67	9109.77	
Inter Peak	7575.93	7446.63	7429.32	7490.8	7389.53	7401.93	7555.03	7462.92	7483.37	7352.02	
PM Peak	18341.73	14949.85	14462.93	15343.82	13508.86	13501.03	14137.35	13243.48	13122.73	13516.66	
Daily	**140750.47**	**130263.83**	**129956.62**	**133109.42**	**126635.13**	**127050.29**	**130922.23**	**126567.2**	**126601.87**	**126125.08**	
Annual TT Cost	$ 904,093,708.90	$ 847,568,131.57	$ 845,575,525.81	$ 863,132,732.39	$ 827,700,853.05	$ 830,119,949.51	$ 853,613,849.80	$ 829,182,782.06	$ 829,868,174.61	$ 824,174,227.31	Value of Time $ 20.75
Annual CRV Cost	$ 61,591,193.94	$ 51,867,581.83	$ 51,742,286.68	$ 54,398,930.17	$ 48,648,740.69	$ 48,947,775.61	$ 51,294,742.68	$ 47,709,863.76	$ 47,505,744.22	$ 48,544,213.64	CRV Value of Time $ 4.38
+10% Additional Costs	$ 96,568,490.28	$ 89,943,571.34	$ 89,731,781.25	$ 91,753,166.26	$ 87,634,959.37	$ 87,906,772.51	$ 90,490,859.25	$ 87,689,264.58	$ 87,737,391.88	$ 87,271,844.10	
Total Costs	**$ 1,062,253,393.13**	**$ 989,379,284.75**	**$ 987,049,593.74**	**$ 1,009,284,828.81**	**$ 963,984,553.12**	**$ 966,974,497.63**	**$ 995,399,451.72**	**$ 964,581,910.40**	**$ 965,111,310.71**	**$ 959,990,285.05**	
Total Benefits		$ 72,874,108.38	$ 75,203,799.39	$ 52,968,564.31	$ 98,268,840.01	$ 95,278,895.50	$ 66,853,941.40	$ 97,671,482.73	$ 97,142,082.42	$ 102,263,108.08	
NPV Benefits		**$ 265,371,310.89**	**$ 273,854,888.53**	**$ 192,885,205.19**	**$ 357,846,311.57**	**$ 346,958,418.57**	**$ 243,448,852.59**	**$ 355,671,033.02**	**$ 353,743,220.03**	**$ 372,391,452.20**	**NPV Factor for 23 Years 3.641503**
Costs		$ 475,000,000.00	$ 700,000,000.00	$ 505,000,000.00	$ 980,000,000.00	$ 1,000,000,000.00	$ 650,000,000.00	$ 1,125,000,000.00	$ 860,000,000.00	$ 1,010,000,000.00	
NPV Costs		**$ 192,071,576.32**	**$ 283,052,849.31**	**$ 204,202,412.72**	**$ 396,273,989.04**	**$ 404,361,213.31**	**$ 262,834,788.65**	**$ 454,906,364.97**	**$ 347,750,643.44**	**$ 408,404,825.44**	**NPV Factor @ Year 9.5 0.404361**
B/C Ratio		**1.38**	**0.97**	**0.94**	**0.90**	**0.86**	**0.93**	**0.78**	**1.02**	**0.91**	

			Option 1						Option 2A			
Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year	Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year
2004	-1	1.1					2004	-1	1.1				
2005	0	1					2005	0	1				
2006	1	0.909091					2006	1	0.909091				
2007	2	0.826446					2007	2	0.826446				
2008	3	0.751315					2008	3	0.751315				
2009	4	0.683013					2009	4	0.683013				
2010	5	0.620921					2010	5	0.620921				
2011	6	0.564474					2011	6	0.564474				
2012	7	0.513158					2012	7	0.513158				
2013	8	0.466507					2013	8	0.466507				
2014	9	0.424098					2014	9	0.424098				
2015	10	0.385543					2015	10	0.385543				
2016	11	0.350494		$ 61,942,992.12	$ 21,710,640.85	1	2016	11	0.350494		$ 63,923,229.48	$ 22,404,701.97	1
2017	12	0.318631		$ 64,129,215.37	$ 20,433,544.33	2	2017	12	0.318631		$ 66,179,343.46	$ 21,086,778.32	2
2018	13	0.289664		$ 66,315,438.62	$ 19,209,220.40	3	2018	13	0.289664		$ 68,435,457.44	$ 19,823,314.33	3
2019	14	0.263331		$ 68,501,661.88	$ 18,038,628.54	4	2019	14	0.263331		$ 70,691,571.42	$ 18,615,300.17	4
2020	15	0.239392		$ 70,687,885.13	$ 16,922,117.69	5	2020	15	0.239392		$ 72,947,685.41	$ 17,463,095.91	5
2021	16	0.217629	**$ 72,874,108.38**	$ 72,874,108.38	$ 15,859,529.23	6	2021	16	0.217629	**$ 75,203,799.39**	$ 75,203,799.39	$ 16,366,537.87	6
2022	17	0.197845		$ 75,060,331.63	$ 14,850,286.46	7	2022	17	0.197845		$ 77,459,913.37	$ 15,325,030.91	7
2023	18	0.179859		$ 77,246,554.88	$ 13,893,471.89	8	2023	18	0.179859		$ 79,716,027.35	$ 14,337,628.22	8
2024	19	0.163508		$ 79,432,778.13	$ 12,987,893.96	9	2024	19	0.163508		$ 81,972,141.33	$ 13,403,100.13	9
2025	20	0.148644		$ 81,619,001.38	$ 12,132,144.48	10	2025	20	0.148644		$ 84,228,255.31	$ 12,519,993.45	10
2026	21	0.135131		$ 83,805,224.64	$ 11,324,647.85	11	2026	21	0.135131		$ 86,484,369.30	$ 11,686,682.20	11
2027	22	0.122846		$ 85,991,447.89	$ 10,563,703.13	12	2027	22	0.122846		$ 88,740,483.28	$ 10,901,411.06	12
2028	23	0.111678		$ 88,177,671.14	$ 9,847,519.87	13	2028	23	0.111678		$ 90,996,597.26	$ 10,162,332.35	13
2029	24	0.101526		$ 90,363,894.39	$ 9,174,248.42	14	2029	24	0.101526		$ 93,252,711.24	$ 9,467,537.27	14
2030	25	0.092296		$ 92,550,117.64	$ 8,542,005.49	15	2030	25	0.092296		$ 95,508,825.22	$ 8,815,082.36	15
2031	26	0.083905		$ 94,736,340.89	$ 7,948,895.59	16	2031	26	0.083905		$ 97,764,939.20	$ 8,203,011.50	16
2032	27	0.076278		$ 96,922,564.14	$ 7,393,028.76	17	2032	27	0.076278		$ 100,021,053.19	$ 7,629,374.33	17
2033	28	0.069343		$ 99,108,787.40	$ 6,872,535.28	18	2033	28	0.069343		$ 102,277,167.17	$ 7,092,241.35	18
2034	29	0.063039		$ 101,295,010.65	$ 6,385,577.57	19	2034	29	0.063039		$ 104,533,281.15	$ 6,589,716.23	19
2035	30	0.057309		$ 103,481,233.90	$ 5,930,359.81	20	2035	30	0.057309		$ 106,789,395.13	$ 6,119,945.74	20
2036	31	0.052099		$ 105,667,457.15	$ 5,505,135.55	21	2036	31	0.052099		$ 109,045,509.11	$ 5,681,127.61	21
2037	32	0.047362		$ 107,853,680.40	$ 5,108,213.55	22	2037	32	0.047362		$ 111,301,623.09	$ 5,271,516.53	22
2038	33	0.043057		$ 110,039,903.65	$ 4,737,962.20	23	2038	33	0.043057		$ 113,557,737.07	$ 4,889,428.72	23
2039	34	0.039143		$ 112,226,126.90		24	2039	34	0.039143		$ 115,813,851.06		24
2040	35	0.035584		$ 114,412,350.16		25	2040	35	0.035584		$ 118,069,965.04		25
2041	36	0.032349		$ 116,598,573.41		26	2041	36	0.032349		$ 120,326,079.02		26
2042	37	0.029408		$ 118,784,796.66		27	2042	37	0.029408		$ 122,582,193.00		27
2043	38	0.026735		$ 120,971,019.91		28	2043	38	0.026735		$ 124,838,306.98		28
2044	39	0.024304		$ 123,157,243.16		29	2044	39	0.024304		$ 127,094,420.96		29
					$ 265,371,310.89							**$ 273,854,888.53**	
			3.641503365							3.641503365			

			Option 2B							Option 2C			
Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year	Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year
2004	-1	1.1					2004	-1	1.1				
2005	0	1					2005	0	1				
2006	1	0.909091					2006	1	0.909091				
2007	2	0.826446					2007	2	0.826446				
2008	3	0.751315					2008	3	0.751315				
2009	4	0.683013					2009	4	0.683013				
2010	5	0.620921					2010	5	0.620921				
2011	6	0.564474					2011	6	0.564474				
2012	7	0.513158					2012	7	0.513158				
2013	8	0.466507					2013	8	0.466507				
2014	9	0.424098					2014	9	0.424098				
2015	10	0.385543					2015	10	0.385543				
2016	11	0.350494		$ 45,023,279.67	$ 15,780,384.86	1	2016	11	0.350494		$ 83,528,514.01	$ 29,276,234.59	1
2017	12	0.318631		$ 46,612,336.60	$ 14,852,126.92	2	2017	12	0.318631		$ 86,476,579.21	$ 27,554,103.15	2
2018	13	0.289664		$ 48,201,393.53	$ 13,962,226.76	3	2018	13	0.289664		$ 89,424,644.41	$ 25,903,134.16	3
2019	14	0.263331		$ 49,790,450.45	$ 13,111,381.77	4	2019	14	0.263331		$ 92,372,709.61	$ 24,324,621.48	4
2020	15	0.239392		$ 51,379,507.38	$ 12,299,845.57	5	2020	15	0.239392		$ 95,320,774.81	$ 22,819,035.63	5
2021	16	0.217629	**$ 52,968,564.31**	$ 52,968,564.31	$ 11,527,502.88	6	2021	16	0.217629	**$ 98,268,840.01**	$ 98,268,840.01	$ 21,386,162.73	6
2022	17	0.197845		$ 54,557,621.24	$ 10,793,934.51	7	2022	17	0.197845		$ 101,216,905.21	$ 20,025,225.10	7
2023	18	0.179859		$ 56,146,678.17	$ 10,098,473.59	8	2023	18	0.179859		$ 104,164,970.41	$ 18,734,985.53	8
2024	19	0.163508		$ 57,735,735.10	$ 9,440,254.05	9	2024	19	0.163508		$ 107,113,035.61	$ 17,513,837.24	9
2025	20	0.148644		$ 59,324,792.03	$ 8,818,252.32	10	2025	20	0.148644		$ 110,061,100.81	$ 16,359,881.33	10
2026	21	0.135131		$ 60,913,848.96	$ 8,231,323.19	11	2026	21	0.135131		$ 113,009,166.01	$ 15,270,993.12	11
2027	22	0.122846		$ 62,502,905.89	$ 7,678,230.33	12	2027	22	0.122846		$ 115,957,231.21	$ 14,244,878.96	12
2028	23	0.111678		$ 64,091,962.82	$ 7,157,672.34	13	2028	23	0.111678		$ 118,905,296.41	$ 13,279,124.45	13
2029	24	0.101526		$ 65,681,019.75	$ 6,668,304.81	14	2029	24	0.101526		$ 121,853,361.61	$ 12,371,235.40	14
2030	25	0.092296		$ 67,270,076.68	$ 6,208,758.87	15	2030	25	0.092296		$ 124,801,426.81	$ 11,518,672.26	15
2031	26	0.083905		$ 68,859,133.61	$ 5,777,656.79	16	2031	26	0.083905		$ 127,749,492.01	$ 10,718,878.98	16
2032	27	0.076278		$ 70,448,190.54	$ 5,373,624.85	17	2032	27	0.076278		$ 130,697,557.21	$ 9,969,307.03	17
2033	28	0.069343		$ 72,037,247.47	$ 4,995,304.03	18	2033	28	0.069343		$ 133,645,622.41	$ 9,267,435.10	18
2034	29	0.063039		$ 73,626,304.40	$ 4,641,358.69	19	2034	29	0.063039		$ 136,593,687.61	$ 8,610,785.29	19
2035	30	0.057309		$ 75,215,361.33	$ 4,310,483.54	20	2035	30	0.057309		$ 139,541,752.81	$ 7,996,935.98	20
2036	31	0.052099		$ 76,804,418.25	$ 4,001,409.18	21	2036	31	0.052099		$ 142,489,818.01	$ 7,423,532.12	21
2037	32	0.047362		$ 78,393,475.18	$ 3,712,906.32	22	2037	32	0.047362		$ 145,437,883.21	$ 6,888,293.13	22
2038	33	0.043057		$ 79,982,532.11	$ 3,443,789.03	23	2038	33	0.043057		$ 148,385,948.41	$ 6,389,018.81	23
2039	34	0.039143		$ 81,571,589.04		24	2039	34	0.039143		$ 151,334,013.61		24
2040	35	0.035584		$ 83,160,645.97		25	2040	35	0.035584		$ 154,282,078.81		25
2041	36	0.032349		$ 84,749,702.90		26	2041	36	0.032349		$ 157,230,144.01		26
2042	37	0.029408		$ 86,338,759.83		27	2042	37	0.029408		$ 160,178,209.21		27
2043	38	0.026735		$ 87,927,816.76		28	2043	38	0.026735		$ 163,126,274.41		28
2044	39	0.024304		$ 89,516,873.69		29	2044	39	0.024304		$ 166,074,339.61		29
					$ 192,885,205.19							**$ 357,846,311.57**	

			Option 2D							Option 3A			
Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year	Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year
2004	-1	1.1					2004	-1	1.1				
2005	0	1					2005	0	1				
2006	1	0.909091					2006	1	0.909091				
2007	2	0.826446					2007	2	0.826446				
2008	3	0.751315					2008	3	0.751315				
2009	4	0.683013					2009	4	0.683013				
2010	5	0.620921					2010	5	0.620921				
2011	6	0.564474					2011	6	0.564474				
2012	7	0.513158					2012	7	0.513158				
2013	8	0.466507					2013	8	0.466507				
2014	9	0.424098					2014	9	0.424098				
2015	10	0.385543					2015	10	0.385543				
2016	11	0.350494		$ 80,987,061.17	$ 28,385,470.88	1	2016	11	0.350494		$ 56,825,850.19	$ 19,917,113.83	1
2017	12	0.318631		$ 83,845,428.04	$ 26,715,737.30	2	2017	12	0.318631		$ 58,831,468.43	$ 18,745,518.89	2
2018	13	0.289664		$ 86,703,794.90	$ 25,115,000.97	3	2018	13	0.289664		$ 60,837,086.68	$ 17,622,336.98	3
2019	14	0.263331		$ 89,562,161.77	$ 23,584,516.40	4	2019	14	0.263331		$ 62,842,704.92	$ 16,548,448.31	4
2020	15	0.239392		$ 92,420,528.63	$ 22,124,739.75	5	2020	15	0.239392		$ 64,848,323.16	$ 15,524,172.98	5
2021	16	0.217629	**$ 95,278,895.50**	$ 95,278,895.50	$ 20,735,463.69	6	2021	16	0.217629	**$ 66,853,941.40**	$ 66,853,941.40	$ 14,549,365.49	6
2022	17	0.197845		$ 98,137,262.36	$ 19,415,934.18	7	2022	17	0.197845		$ 68,859,559.65	$ 13,623,496.78	7
2023	18	0.179859		$ 100,995,629.23	$ 18,164,951.66	8	2023	18	0.179859		$ 70,865,177.89	$ 12,745,725.14	8
2024	19	0.163508		$ 103,853,996.09	$ 16,980,958.24	9	2024	19	0.163508		$ 72,870,796.13	$ 11,914,957.47	9
2025	20	0.148644		$ 106,712,362.96	$ 15,862,112.78	10	2025	20	0.148644		$ 74,876,414.37	$ 11,129,901.89	10
2026	21	0.135131		$ 109,570,729.82	$ 14,806,355.28	11	2026	21	0.135131		$ 76,882,032.61	$ 10,389,112.96	11
2027	22	0.122846		$ 112,429,096.69	$ 13,811,461.84	12	2027	22	0.122846		$ 78,887,650.86	$ 9,691,030.27	12
2028	23	0.111678		$ 115,287,463.55	$ 12,875,091.55	13	2028	23	0.111678		$ 80,893,269.10	$ 9,034,011.27	13
2029	24	0.101526		$ 118,145,830.42	$ 11,994,826.08	14	2029	24	0.101526		$ 82,898,887.34	$ 8,416,359.11	14
2030	25	0.092296		$ 121,004,197.28	$ 11,168,203.17	15	2030	25	0.092296		$ 84,904,505.58	$ 7,836,346.09	15
2031	26	0.083905		$ 123,862,564.14	$ 10,392,744.54	16	2031	26	0.083905		$ 86,910,123.82	$ 7,292,233.30	16
2032	27	0.076278		$ 126,720,931.01	$ 9,665,979.19	17	2032	27	0.076278		$ 88,915,742.07	$ 6,782,286.92	17
2033	28	0.069343		$ 129,579,297.87	$ 8,985,462.54	18	2033	28	0.069343		$ 90,921,360.31	$ 6,304,791.66	18
2034	29	0.063039		$ 132,437,664.74	$ 8,348,792.07	19	2034	29	0.063039		$ 92,926,978.55	$ 5,858,061.77	19
2035	30	0.057309		$ 135,296,031.60	$ 7,753,619.84	20	2035	30	0.057309		$ 94,932,596.79	$ 5,440,449.78	20
2036	31	0.052099		$ 138,154,398.47	$ 7,197,662.46	21	2036	31	0.052099		$ 96,938,215.03	$ 5,050,353.51	21
2037	32	0.047362		$ 141,012,765.33	$ 6,678,708.74	22	2037	32	0.047362		$ 98,943,833.28	$ 4,686,221.44	22
2038	33	0.043057		$ 143,871,132.20	$ 6,194,625.43	23	2038	33	0.043057		$ 100,949,451.52	$ 4,346,556.74	23
2039	34	0.039143		$ 146,729,499.06		24	2039	34	0.039143		$ 102,955,069.76		24
2040	35	0.035584		$ 149,587,865.93		25	2040	35	0.035584		$ 104,960,688.00		25
2041	36	0.032349		$ 152,446,232.79		26	2041	36	0.032349		$ 106,966,306.24		26
2042	37	0.029408		$ 155,304,599.66		27	2042	37	0.029408		$ 108,971,924.49		27
2043	38	0.026735		$ 158,162,966.52		28	2043	38	0.026735		$ 110,977,542.73		28
2044	39	0.024304		$ 161,021,333.39		29	2044	39	0.024304		$ 112,983,160.97		29
					$ 346,958,418.57							**$ 243,448,852.59**	

			Option 3B							Option 3C			
Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year	Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year
2004	-1	1.1					2004	-1	1.1				
2005	0	1					2005	0	1				
2006	1	0.909091					2006	1	0.909091				
2007	2	0.826446					2007	2	0.826446				
2008	3	0.751315					2008	3	0.751315				
2009	4	0.683013					2009	4	0.683013				
2010	5	0.620921					2010	5	0.620921				
2011	6	0.564474					2011	6	0.564474				
2012	7	0.513158					2012	7	0.513158				
2013	8	0.466507					2013	8	0.466507				
2014	9	0.424098					2014	9	0.424098				
2015	10	0.385543					2015	10	0.385543				
2016	11	0.350494		$ 83,020,760.32	$ 29,098,270.02	1	2016	11	0.350494		$ 82,570,770.06	$ 28,940,551.18	1
2017	12	0.318631		$ 85,950,904.80	$ 27,386,607.08	2	2017	12	0.318631		$ 85,485,032.53	$ 27,238,165.82	2
2018	13	0.289664		$ 88,881,049.28	$ 25,745,674.01	3	2018	13	0.289664		$ 88,399,295.00	$ 25,606,126.96	3
2019	14	0.263331		$ 91,811,193.76	$ 24,176,756.81	4	2019	14	0.263331		$ 91,313,557.48	$ 24,045,713.63	4
2020	15	0.239392		$ 94,741,338.24	$ 22,680,323.12	5	2020	15	0.239392		$ 94,227,819.95	$ 22,557,390.93	5
2021	16	0.217629	**$ 97,671,482.73**	$ 97,671,482.73	$ 21,256,160.38	6	2021	16	0.217629	**$ 97,142,082.42**	$ 97,142,082.42	$ 21,140,947.45	6
2022	17	0.197845		$ 100,601,627.21	$ 19,903,495.63	7	2022	17	0.197845		$ 100,056,344.89	$ 19,795,614.43	7
2023	18	0.179859		$ 103,531,771.69	$ 18,621,099.17	8	2023	18	0.179859		$ 102,970,607.37	$ 18,520,168.84	8
2024	19	0.163508		$ 106,461,916.17	$ 17,407,374.01	9	2024	19	0.163508		$ 105,884,869.84	$ 17,313,022.33	9
2025	20	0.148644		$ 109,392,060.65	$ 16,260,432.77	10	2025	20	0.148644		$ 108,799,132.31	$ 16,172,297.75	10
2026	21	0.135131		$ 112,322,205.13	$ 15,178,163.71	11	2026	21	0.135131		$ 111,713,394.78	$ 15,095,894.82	11
2027	22	0.122846		$ 115,252,349.62	$ 14,158,287.10	12	2027	22	0.122846		$ 114,627,657.26	$ 14,081,546.15	12
2028	23	0.111678		$ 118,182,494.10	$ 13,198,403.22	13	2028	23	0.111678		$ 117,541,919.73	$ 13,126,865.06	13
2029	24	0.101526		$ 121,112,638.58	$ 12,296,033.06	14	2029	24	0.101526		$ 120,456,182.20	$ 12,229,385.93	14
2030	25	0.092296		$ 124,042,783.06	$ 11,448,652.48	15	2030	25	0.092296		$ 123,370,444.67	$ 11,386,598.34	15
2031	26	0.083905		$ 126,972,927.54	$ 10,653,720.99	16	2031	26	0.083905		$ 126,284,707.15	$ 10,595,975.55	16
2032	27	0.076278		$ 129,903,072.03	$ 9,908,705.54	17	2032	27	0.076278		$ 129,198,969.62	$ 9,854,998.24	17
2033	28	0.069343		$ 132,833,216.51	$ 9,211,100.16	18	2033	28	0.069343		$ 132,113,232.09	$ 9,161,174.03	18
2034	29	0.063039		$ 135,763,360.99	$ 8,558,441.99	19	2034	29	0.063039		$ 135,027,494.57	$ 8,512,053.41	19
2035	30	0.057309		$ 138,693,505.47	$ 7,948,324.15	20	2035	30	0.057309		$ 137,941,757.04	$ 7,905,242.54	20
2036	31	0.052099		$ 141,623,649.95	$ 7,378,405.90	21	2036	31	0.052099		$ 140,856,019.51	$ 7,338,413.37	21
2037	32	0.047362		$ 144,553,794.43	$ 6,846,420.52	22	2037	32	0.047362		$ 143,770,281.98	$ 6,809,311.46	22
2038	33	0.043057		$ 147,483,938.92	$ 6,350,181.20	23	2038	33	0.043057		$ 146,684,544.46	$ 6,315,761.86	23
2039	34	0.039143		$ 150,414,083.40		24	2039	34	0.039143		$ 149,598,806.93		24
2040	35	0.035584		$ 153,344,227.88		25	2040	35	0.035584		$ 152,513,069.40		25
2041	36	0.032349		$ 156,274,372.36		26	2041	36	0.032349		$ 155,427,331.87		26
2042	37	0.029408		$ 159,204,516.84		27	2042	37	0.029408		$ 158,341,594.35		27
2043	38	0.026735		$ 162,134,661.32		28	2043	38	0.026735		$ 161,255,856.82		28
2044	39	0.024304		$ 165,064,805.81		29	2044	39	0.024304		$ 164,170,119.29		29
					$ 355,671,033.02							**$ 353,743,220.03**	

			Option 4			
Year	Timestream	Discount Factor	Annual Amount	Interpolated Annual Amount	Amount Included in Benefit Period	Benefit Year
2004	-1	1.1				
2005	0	1				
2006	1	0.909091				
2007	2	0.826446				
2008	3	0.751315				
2009	4	0.683013				
2010	5	0.620921		$ 68,516,282.41	$ 42,543,220.73	1
2011	6	0.564474		$ 71,584,175.66	$ 40,407,400.96	2
2012	7	0.513158		$ 74,652,068.90	$ 38,308,315.20	3
2013	8	0.466507		$ 77,719,962.14	$ 36,256,935.93	4
2014	9	0.424098		$ 80,787,855.38	$ 34,261,937.06	5
2015	10	0.385543		$ 83,855,748.63	$ 32,330,021.16	6
2016	11	0.350494		$ 86,923,641.87	$ 30,466,206.20	7
2017	12	0.318631		$ 89,991,535.11	$ 28,674,076.42	8
2018	13	0.289664		$ 93,059,428.35	$ 26,956,001.59	9
2019	14	0.263331		$ 96,127,321.60	$ 25,313,328.17	10
2020	15	0.239392		$ 99,195,214.84	$ 23,746,545.77	11
2021	16	0.217629	**$ 102,263,108.08**	$ 102,263,108.08	$ 22,255,431.83	12
2022	17	0.197845		$ 105,331,001.32	$ 20,839,177.08	13
2023	18	0.179859		$ 108,398,894.56	$ 19,496,494.00	14
2024	19	0.163508		$ 111,466,787.81	$ 18,225,710.52	15
2025	20	0.148644		$ 114,534,681.05	$ 17,024,850.53	16
2026	21	0.135131		$ 117,602,574.29	$ 15,891,703.01	17
2027	22	0.122846		$ 120,670,467.53	$ 14,823,881.07	18
2028	23	0.111678		$ 123,738,360.78	$ 13,818,872.18	19
2029	24	0.101526		$ 126,806,254.02	$ 12,874,080.77	20
2030	25	0.092296		$ 129,874,147.26	$ 11,986,864.06	21
2031	26	0.083905		$ 132,942,040.50	$ 11,154,562.12	22
2032	27	0.076278		$ 136,009,933.75	$ 10,374,522.81	23
2033	28	0.069343		$ 139,077,826.99		24
2034	29	0.063039		$ 142,145,720.23		25
2035	30	0.057309		$ 145,213,613.47		26
2036	31	0.052099		$ 148,281,506.72		27
2037	32	0.047362		$ 151,349,399.96		28
2038	33	0.043057		$ 154,417,293.20		29
2039	34	0.039143		$ 157,485,186.44		24
2040	35	0.035584		$ 160,553,079.69		25
2041	36	0.032349		$ 163,620,972.93		26
2042	37	0.029408		$ 166,688,866.17		27
2043	38	0.026735		$ 169,756,759.41		28
2044	39	0.024304		$ 172,824,652.65		29
					$ 548,030,139.15	

0.186601248
5.359020955

Southern Sector Travel Time Comparison (Veh-hrs/hr)

TIME	DO MINIMUM	OPTION 1	OPTION 2A	OPTION 2B	OPTION 2C	OPTION 2D	OPTION 3A	OPTION 3B	OPTION 3C	OPTION 4
AM Peak	10366	9226	9654	10011	9166	9314	9771	8994	9020	9110
Inter Peak	7576	7447	7429	7491	7390	7402	7555	7463	7483	7352
PM Peak	18342	14950	14463	15344	13509	13501	14137	13243	13123	13517
Daily	**140750**	**130264**	**129957**	**133109**	**126635**	**127050**	**130922**	**126567**	**126602**	**126125**

Differences between Do Minimum and Other Options

TIME	DO MINIMUM	OPTION 1	OPTION 2A	OPTION 2B	OPTION 2C	OPTION 2D	OPTION 3A	OPTION 3B	OPTION 3C	OPTION 4
AM Peak		1140	712	354	1200	1052	595	1372	1346	1256
Inter Peak		129	147	85	186	174	21	113	93	224
PM Peak		3392	3879	2998	4833	4841	4204	5098	5219	4825
Daily		**10487**	**10794**	**7641**	**14115**	**13700**	**9828**	**14183**	**14149**	**14625**

Differences between Option 1 and Other Options

TIME	DO MINIMUM	OPTION 1	OPTION 2A	OPTION 2B	OPTION 2C	OPTION 2D	OPTION 3A	OPTION 3B	OPTION 3C	OPTION 4
AM Peak			-429	-786	59	-88	-546	232	206	116
Inter Peak			17	-44	57	45	-108	-16	-37	95
PM Peak			487	-394	1441	1449	813	1706	1827	1433
Daily			**307**	**-2846**	**3629**	**3214**	**-658**	**3697**	**3662**	**4139**

Appendix E – Interchange Spacing

Proposed New Interchange	Adjacent Interchanges										Comments
	North					South					
	Location	Distance NB	Meets Standard	Distance SB	Meets Standard	Location	Distance NB	Meets Standard	Distance SB	Meets Standard	
Quarry Road (South Drury)	Pukekohe Drury	800	Marginal	800	Marginal	Ramarama	2900	YES	2900	YES	May be difficult to accommodate north facing slips. Alternative might be a limited access interchange (south facing slips only)
Hingaia (Park Estate Road)	Papakura existing	975	JUST	1225	OK	Motordrome Services			550	NO	Southbound onslip would not meet standards – possible solution might be to provide access to services from Hingaia SB offslip
	Papakura Proposed	975	JUST	975	JUST	Pukekohe Drury	2575	YES			
Upgraded Papakura (diamond Interchange	Manurewa Takanini	4000	OK	4000	OK	Motordrome Services			1750	YES	
						Pukekohe Drury	3800	YES			
Alfriston Road	Hill Rd Manurewa*	600	NO	600	NO	Manurewa Takanini	2000	YES	1550	YES	North facing slips would be very difficult to achieve without some sort of auxiliary lane arrangement, which would require widening between Alfriston Road and Hill Street

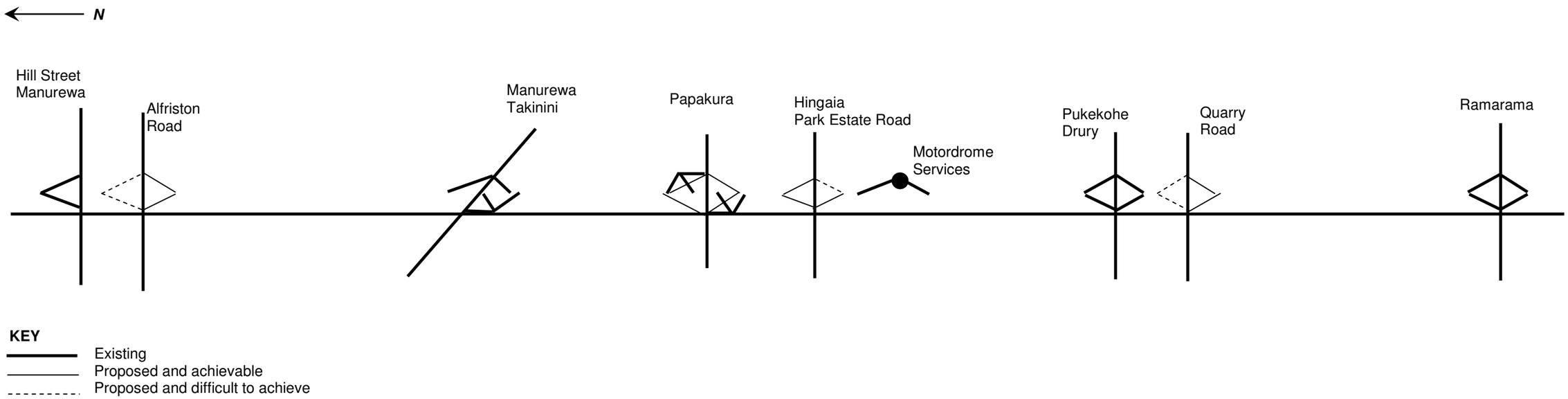
* north facing slips only

Assumption that ramps would be approx 250m long and in diamond interchange format

From Grant Gordon's note (attached)

- Signing considerations limit nose to nose spacing to 800m
- Exit to exit spacing less than 800m to be avoided (applies to Alfriston/Hill St Manurewa in SB direction)
- Absolute minimum spacing (from Geometric Designs Standards) between nosings is 600m
- According to Highway Capacity Manual, influence of ramps is 450m, therefore spacing between on/off ramps is 900m, while on/on or off/off is 450m

Anything below 1km will however need careful design and may not be possible after detailed consideration



Appendix F – Draft Communications Plan

Manukau City Council

Contract Number 1469 Professional Services

Southern Sector Transport Strategy

CONSULTATION AND COMMUNICATION PLAN

Opus International Consultants
Level 3, 100 Beaumont Street
PO Box 5848
Wellesley Street
Auckland

Phone: 355 9500
Fax: 355 9584
Date: 22 February 2006
Reference: t:\tlas\manukau\projects\1-36246.00-southern_sector_ss-idc\technical\p_planning\consulation\consultation plan.doc
Status: Draft

Document History and Status

File Location: g:\tlas\manukau\projects\1-36246.00-southern_sector_ss-idc\technical\tr_traffic\reports\appendix f - draft consultation & communications plan\consultation plan v2.doc

Status	Date	Details	Approved for Release by:	Title

Review and Approval

Prepared by: ---------- **Date:** ----------
Karyn Sinclair
Principal Planner

Reviewed by: ---------- **Date:** ----------
Phil Haizelden
Deputy Team Leader

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Table of Contents

1 INTRODUCTION

Manukau City Council and the project partners have embarked on a project to develop a transportation strategy to assist in the facilitation and realisation of objectives outlined in the Southern Sector Agreement for the area's growth. Consultation is an essential part of the process, to ensure that the community's issues are known and understood as the transportation strategy is developed.

This plan sets out a process for consultation for the southern sector corridor that is designed to:

- Focus on main arterials within the southern sector
- Work with the user groups to gather a wide range of information about their aspirations and their needs, that will contribute to planning for the future transportation needs of the study area
- Be inclusive of both organisations and individuals
- Be efficient and practical, to meet required timelines and budgets

It is intended that, as a result of consultation:

- Decisions are well informed
- Decisions are more likely to be supported by and acceptable to stakeholders and the community
- Legal requirements are met.

2 CONSULTATION PRINCIPLES

The definition of consultation for the purposes of this project is:

> *Consultation is a genuine exchange of information and points of view between affected and interested parties and decision-makers before a corridor plan is finalised and adopted*.

Key principles that will underpin the consultation are:

- People have a right to have a say in decisions that affect them
- The consultation will contribute to decisions that have not yet been made
- People's views will be listened to and considered with an open mind
- We will be prepared to change things as a result of what we hear
- We will allow enough time, while endeavouring to ensure that the process is efficient and meets project timelines
- We will provide clear information that enables people to make intelligent and useful responses
- The consultation will not necessarily result in total agreement with all outcomes.

3 CONSULTATION OBJECTIVE

Overall objective: As a result of consultation, the Opus team developing the southern sector transportation strategy and the Project Partners will have access to wide-ranging information that enables them to understand and consider people's views, experiences and aspirations for the corridor.

4 CONSULTATION STRATEGY

As required by the Scope of Services, the consultation will be undertaken in three stages. The stages are aligned to the requirements of the wider project for information and feedback.

Stage	Project requirement	Consultation strategy	Techniques
One	Production of the Consultation and Communications Plan and PSMI		Formulation of process for consultation and confirmation through Project Partners
Two	Letter drop to stakeholder groups	Focus on their issues, at early stage, to assist with issue identification and option evaluation	Simple questions for feedback
Three	Public consultation – 3 community information days based on draft strategy	Obtain responses from interested public as to directions proposed by draft report and how to identify priorities and local issues	Displays and presence of staff with knowledge and client representatives Feedback sheets

5 COMMUNICATION OBJECTIVE

Good quality, understandable information will need to be communicated at every stages of the consultation. The communication objective is to ensure that people have clear information that:

- enables them to make useful responses when asked for information or their views
- enables them to understand the project and how their input will influence its outcome
- positions this project as best practice corridor planning, that meets the needs of both the community and the council

6 KEY MESSAGES FOR COMMUNICATION

(to be determined with Project Team)

Suggested messages:

- *Long term strategy – implementation over years not months*
- *Need strategy designed to address all users (short or long distance, recreational, business and commuter)*

7 COMMUNICATION PROTOCOLS

All communications material will follow the approval process agreed between Opus and the client partners.

- Preparation of draft by Opus
- Project Partners nominate key contact for approvals prior to release
- All communications to meet Project Partners standard (where differences in standards, project partners to concur then advise Opus)
- Press releases through Project Partners PR departments

Spokespeople: **For Client partners**

Project Partners to advise

For Opus

Ian Clark, Project Team Leader

8 CONSULTATION PROGRAMME

Stage 2

Letter drop to Stakeholders including iwi groups (likely date for delivery of these is to be confirmed via the project partners)

Stage 3

Information Days – staffed by Opus and Project Partners – series of displays outlining likely issues into the future for transportation in the sector and opportunities that can be incorporated into the Strategy, including opportunity to provide feedback via verbal communication or feedback sheet. (Likely date for delivery of these is to be confirmed via the project partners)

Appendix G – Letter to Stakeholder Groups

27 May 2005

Stakeholder

1-36246.07

Dear Stakeholder

Southern Sector Strategic Transportation Strategy

Manukau City Council, Papakura District Council, Franklin District Council and Auckland Regional Council, as well as Transit New Zealand have united to prepare a Southern Sector Strategic Transportation Strategy. The intention of the Strategy is to identify the long term transport improvements required to support the strategic and growth objectives of the southern part of the Auckland Region.

We have included a map of the study area, with the major arterials marked. Also shown are the future growth areas of the southern sector that may influence the transportation networks in the future.

We are currently in the process of developing and testing future route options for the study area. We want your input at this stage of the project, to provide a user's perspective. In particular, we would appreciate it if you could take the time to answer the questions on the form attached to this letter.

We will be embarking on a general public consultation phase later in the project when a draft strategy has been produced, but at this stage we are focusing on issues relating to user groups.

Opus International Consultants are giving assistance to the project partners in this project to ensure delivery of the Strategy We would encourage you to provide feedback, either by emailing the attached form to Karyn.sinclair@opus.co.nz or Phil.Haizelden@opus.co.nz, posting it to Opus, P O Box 5848 Auckland, or telephoning Karyn on ph. 09 355 9556 or Phil on ph. 09 355 9544.

We look forward to hearing from you soon.

Yours faithfully

Steve Dudley
Senior Transport Planner
Manukau City Council

Opus International Consultants Limited
Environmental

Level 3, The Westhaven
100 Beaumont Street, PO Box 5848
Auckland, New Zealand

Telephone +64 9 355 9500
Facsimile +64 9 355 9584
Website www.opus.co.nz

Southern Sector Strategic Transport Study

Stakeholder Feedback Form

What travel/road trips do people within your organisation make? What time of day do people normally travel (work related)? Where do most trips begin and end?
What and where are the main problems e.g. congestion points, unsafe areas, access to motorways etc
What parts of the road and public transport network have become worse in the last 10 years?
Have you changed how you operate to make travelling easier? How?
What parts of the road/public transport networks do you think will get worse in the next 10-20 years?

Appendix H – Consultation Feedback

Southern Sector Strategic Transport Study

Stakeholder Feedback Form

What travel/road trips do people within your organisation make?
What time of day do people normally travel (work related)?
Where do most trips begin and end?

Mainly local within the area of Pakuranga, Bucklands Beach, Howick & Botany
some trips to Auckland CBD & Manukau CBD but not at any regular time of day

What and where are the main problems e.g. congestion points, unsafe areas, access to motorways etc

1) Ti Rakau Drive / Reeves Rd.
2) Ti Rakau Drive / ~~[illegible]~~ Grossaues Drive
3) Ti Rakau Drive / Te Irirangi / Botany
4) Cascades Rd / Botany Rd.

What parts of the road and public transport network have become worse in the last 10 years?

All of the above

Have you changed how you operate to make travelling easier? How?

where possible, choosing the time of day to travel
using the ferry service from Half Moon Bay where possible

What parts of the road/public transport networks do you think will get worse in the next 10-20 years?

The above intersections plus Pakuranga Rd. are likely to be totally clocked unless the Eastern Corridor road is built.

BURTON
CONSULTANTS

Level 1, 2-8 Northcroft St. PO Box 33-817, Takapuna, Auckland, New Zealand
Phone 09-917 4300 Fax 09-917 4311

14 July 2005

File: 02/065

Writer's Details
DDI: (09) 917-4306
Email: dhughes@burtonconsultants.co.nz

Opus International Consultants
P O Box 5848
Auckland

Attention: Karyn Sinclair

Dear Karyn,

RE: Southern Sector Strategic Transportation Studies

I write on behalf of Stevenson Resources in respect of the Company's quarry operation at Drury, Papakura District. We have earlier met with members of the strategy team to outline the Company's views on the need for improved access to and from the southern motorway for quarry related traffic. The Company appreciates this opportunity to follow up the earlier meeting and is keen to maintain a dialogue with key members of the team on this issue. This can be achieved either through the Company's discussions with Papakura District Council or directly with team members

The Company's Position

The Drury Quarry is recognised as a significant regional asset providing a convenient and high quality aggregate resource for the growing demands for new urban infrastructure and development throughout the Auckland and Waikato regions. The Drury Quarry is one of the largest supplier of aggregate material to the Auckland market

with over 2 million tonnes being produced annually. The quarry is currently operating close to capacity but recent property acquisitions and new plant will enable aggregate production to increase to meet an anticipated doubling in demand within the next five years and thereafter to provide a consistently high source of aggregate to the Auckland market.

Though geographically close to its main markets, the Drury Quarry cannot rely upon its present road links to the regional arterial network and in particular to the Southern Motorway, to safely and efficiently transport increased aggregate products to required destinations. These links are essentially rural roads which suffer major limitations in terms of their configuration or the potential compatibilities between adjoining surrounding land uses and heavy volumes of quarry related truck traffic. As the volume of truck activity increases (currently up to 1650 vehicle movements per day), the inadequacy of these routes becomes ever more apparent to the Company, to the local community and to the Papakura District Council. In this regard, the Company firmly believes that unless a new more direct transport link to the Southern Motorway is provided, aggregate production at Drury could become adversely affected to the point where production levels would decline over a period of time.

The Company's Requirement

The Company has already identified the improvements which it considers are required to maintain and enhance the supply of aggregate from its Drury Quarry to the Auckland market. These principally involve the formation of a new interchange on the Southern Motorway between Ramarama and Drury to provide a direct connection between the Southern Motorway and the Drury Quarry. Such an interchange could also form part of a new regional link from the Southern Motorway at Ramarama through Takanini to East Tamaki/Flatbush. The Company understands that this new route option is being considered in both the Southern Sector Strategic Transportation Study and the Papakura District Transportation Study.

The Company considers that there are unique features associated with this proposal which set it apart from the generality of circumstances claiming improved transportation links throughout the Southern Corridor sector. In the main these relate to :

- The regional significance of the Drury Quarry to the supply of aggregate in the Auckland region and in particular its ongoing, and growing contribution to the large roading projects proposed for the region over the next decade.

- The significant safety and environmental issues which arise from the concentrated and increasing flow of heavy quarry-related truck traffic on the surrounding Drury rural environment and the Drury community.

- The opportunities available to develop an efficient alternative route for trucks to the Southern Motorway. These opportunities will diminish over time as the pattern of land usage within this area intensifies through continued rural land fragmentation associated with the pressures of countryside living

- The Company's willingness to participate at all stages in this new roading proposal.

The Company believes that it would be a mistake for this proposal to be omitted from further consideration in the Southern Sector Strategic Study simply because the volumes of traffic do not achieve levels normally required for the creation of a new interchange. This is, in the Company's view, a unique situation demanding a singularly unique response. We trust that the option will be pursued and that the Company be invited to participate fully in any further discussions on this subject.

Yours faithfully,
BURTON PLANNING CONSULTANTS LTD

David Hughes
Director

Southern Sector Strategic Transport Study

Stakeholder Feedback Form

1. What travel/road trips do people within your organisation make?
What time of day do people normally travel (work related)?
Where do most trips begin and end?

PRIVATE CARS

7AM – 9AM. 3.30PM – 6PM. TO AND FROM WORK

CONIFER GROVE — PAPAKURA. MANUKAU. AUCKLAND CITY.

VIA GT. STH RD. SOUTHERN MOTORWAY.

2. What and where are the main problems e.g. congestion points, unsafe areas, access to motorways etc

INTERSECTIONS: BEAUMARIS WAY
MANUROA ROAD.
WALTER STREVENS DRIVE / ALL WITH GREAT SOUTH RD. TAKANINI

GREAT SOUTH ROAD: PAPAKURA STREAM. TO. WATERVIEW RD. WEST.

SOUTHERN MOTORWAY – BRIDGE OVER GT. STH RD. TAKANINI.

3. What parts of the road and public transport network have become worse in the last 10 years?

GREAT SOUTH RD – TAKANINI.
SOUTHERN MOTORWAY..

4. Have you changed how you operate to make travelling easier? How?

SOME CONIFER GROVE RESIDENTS HAVE TRIED TRAVELLING OUTSIDE PEAK HOURS. (WITH LITTLE RELIEF FROM CONGESTION).

5. What parts of the road/public transport networks do you think will get worse in the next 10-20 years?

GT. STH RD. TAKANINI.
SOUTHERN MOTORWAY. – INTERCHANGES AT PAPAKURA & TAKANINI.
BEACH RD. PAPAKURA.
MANUROA RD. TAKANINI. MAHIA ROAD. MANUREWA.

* PLEASE ALSO REFER ATTACHED..

4/7/05

FROM. J. VAN WIJK. CONIFER GROVE RESIDENTS ASSN CHAIRMAN.

Southern Sector Strategic Transportation Study **4.07.05**
Stakeholder Feedback Form (additional)

Great South Road – Takanini (from Walter Strevens Dr. to Trentham Rd)
Traffic congestion is caused by local traffic passing through on the way to and from Papakura centre, As well as commercial traffic calling on the commercial properties. Car transporters, parked in the centre of the road, while delivering cars to dealers, also are a hazard.
The removal of the hatched road markings would allow a better flow of traffic, perhaps enabling the provision of an extra lanes.

Great South Road/Taka Street & Great South Road/ Manuroa Road Intersections.
These intersections are becoming more congested with the development of the Takanini/Addison housing development.
The level crossing of the MTR on Manuroa Road already causes major hold-ups with waiting traffic banking up to the Great South Road intersection at peak times. This happens to a lesser degree on Taka Street.
Alternate routes should be improved e.g. Mill Road. Manuroa road should be widened, sealing over the open cobbled area. Rail crossings also need replacing with over bridges.

Great South Road – (from Papakura Stream to Manuroa Road)
This section of road needs a major upgrade, as do the on/off ramps at he Takanini M'way interchange. Much congestion occurs along this stretch of road causing many dangerous traffic situations.
I have suggested to Papakura District Council that the speed restriction in this area be reduced from 70kph to 50kph The motorway onramp, southbound, should be cut back further on the Great South Road, enabling more traffic to clear to the left of vehicles held up by traffic signals.

Beach Road/Elliott Street Intersection & Motorway Interchange Papakura
With the housing development at Hingaia, this area will also need a major upgrade.
A new on ramp leading from Beach Road to the southbound Southern Motorway could be constructed on the south eastern side of the Motorway overbridge. Vacant land is available. The overbridge should also be widened.

Great South Road/Redoubt Road/ Wiri Station Road Intersection
This nightmare of an intersection should be altered, enabling the east/west traffic to pass over the Great South Road. The geography is ideally suited for an over situation. The Great South Road, at a point some 200metres away in each direction is well below the level of the current intersection. Why this was not done in the first instance defies logic. Serious consideration should be given to this alteration.

Thank you for the opportunity to present this feedback.
I will be happy to discuss and expand on these comments.

Jan van Wijk
Chairman - Conifer Grove Residents Association
21 Foxbridge Lane, Takanini 1702 Ph: 298 4679

Southern Sector Strategic Transport Study

Stakeholder Feedback Form

NZ FIRE SERVICE.

What travel/road trips do people within your organisation make?
What time of day do people normally travel (work related)?
Where do most trips begin and end?

* OUR VEHICLES ARE USING THE ROADS 24/7, NOT BIG VOLUME USERS BUT OUR BUSINESS IS OFTEN URGENT - CONSIDERABLE NON EMERGENCY TRAVEL
* STAFF TRAVEL FOR 0730 - 1730 STARTS.
* OUR JOURNEYS' START - RETURN TO OUR FIRE STATIONS
* OUR STAFF TRAVEL PREDOMINANTLY FROM EAST - SOUTH (HOME) TO OUR CENTRAL SOUTH AUCKLAND STATIONS

What and where are the main problems e.g. congestion points, unsafe areas, access to motorways etc

* MAIN CHOKE POINTS ARE WIRI CENTRAL, OLD PAPATOETOE EAST TAMAKI SOUTHERN MOTORWAY IN GENERAL SOUTH WESTERN (PEAKS) WIRI STATION RD, PUKUNUI (PEAKS) - CAMBRIDGE TRAFFICE

What parts of the road and public transport network have become worse in the last 10 years?

* ARTERIALS AROUND WIRI
* STATE 20
* MAIN MOTORWAY

In fact everywhere is getting harder now in the peak times

Have you changed how you operate to make travelling easier? How?

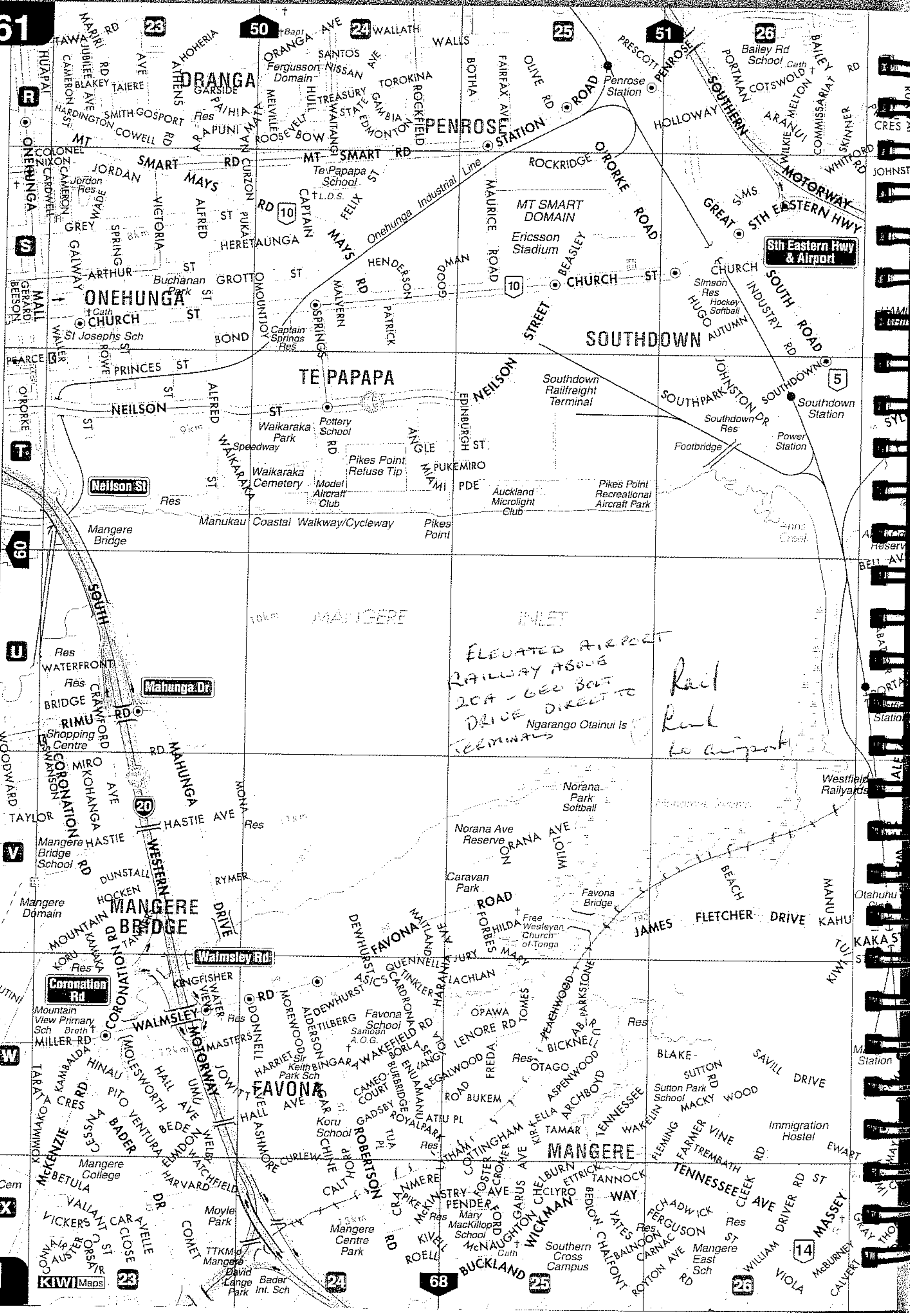
YES - Moved stations. Planning Moreas previously held in Auckland City now South Auckland.

What parts of the road/public transport networks do you think will get worse in the next 10-20 years?

* Feeders to the Motorway System
* State 20 has to be widened - new Mangere Bridge

* Must electrify railway network

* MUST have an urgent railway.


ORANGA
PENROSE
ONEHUNGA
SOUTHDOWN
TE PAPAPA
MANGERE BRIDGE
FAVONA
MANGERE
MT SMART DOMAIN
Ericsson Stadium
Penrose Station
Southdown Station
Southdown Railfreight Terminal
Sth Eastern Hwy & Airport
Neilson St
Mahunga Dr
Walmsley Rd
Coronation Rd
MANGERE INLET
Manukau Coastal Walkway/Cycleway
Pikes Point Refuse Tip
Waikaraka Cemetery
Westfield Railyards
Ngarango Otainui Is
SOUTH WESTERN MOTORWAY
SOUTHERN MOTORWAY
GREAT STH EASTERN HWY
Onehunga Industrial Line

159 Khyber Pass, Newmarket
Private Bag 92066
Auckland Mail Centre
Phone: (09) 379 0057
Fax: (09) 379 0782
Freephone: (0800) 327 646
Email: auckland.ff@fedfarm.org.nz

FEDERATED FARMERS
OF NEW ZEALAND (INC)

7 July 2005

Steve Dudley
Senior Transport Planner
Manukau City Council
Private Bag 76-917
MANUKAU CITY

Re: Southern Sector Strategic Transportation Strategy

Thank you for the opportunity to comment on the Southern Sector Strategic Transportation Strategy. With reference to the questions on the "Stakeholder Feedback Form" I comment as follows:

What travel / road trips do people within your organisation make?
What time of day do people normally travel (work related)?
Where do most trips begin and end?

Federated Farmers' members generally live in the rural areas of the Southern Sector, and their travelling is generally to and from the urban centres and townships in the Sector.

No particular time of day stands out from any other for work related travel, but it would normally be during business hours.

What and where are the main problems eg congestion points, unsafe areas, access to motorways etc?

The area of the Sector about which members concerns are most often expressed is the section of SH22 between the Glenbrook Road and SH1 and the section of SH1 between Drury and Manurewa.

What parts of the road and public transport network have become worse in the last 10 years?

As above – SH22 between the Glenbrook Road, and SH1 and SH1 between Drury and Manurewa.

Have you changed how you operate to make travelling easier? How?

Members have indicated that they try and arrange to travel when they think the traffic on the roads they propose to use will be lighter.

What parts of the road / public transport networks do you think will get worse in the next 10-20 years?

As above – SH22 between the Glenbrook Road and SH1, and SH1 between Drury and Manurewa. In this context, it is particularly noted that Pukekohe is flagged as a "Future Residential Growth Area" on the consultation map.

Federated Farmers considers that a link between SH22 and SH20 via a bridge between Karaka and Weymouth is an option that should be seriously considered.

Federated Farmers is also of the view that consideration should be given to reviving the project to realign SH22 between Drury and the Glenbrook road turnoff, which was under consideration last year but is now apparently shelved.

Yours faithfully

Richard Gardner
Senior Policy Analyst

Karyn Sinclair

From: andy_smith@nzgt.co.nz
Sent: Thursday, 30 June 2005 08:50
To: karyn.sinclair@opus.co.nz
Subject: Fw: Southern Sector Strategic Transport study

Thank you for your letter to Walk Auckland as a stakeholder in the Southern Sector Strategic Transport study.

I forward the experiences of one of our members.

www.walkauckland.org

-- Response from WalkAuckland

The questions are

1. What travel/road trips do you/people within your organisation make?

I DRIVE 1 HOUR EACH WAY FROM BEACHLANDS TO WORK EACH DAY. ALL THE PEOPLE I WORK WITH (29) DRIVE TO WORK APART FROM THE RECEPTIONIST WHO BUSES. SHE IS OFTEN LATE DUE TO HER BUS BEING LATE. 20% OF US USE OUR CARS DURING THE DAY FROM BETWEEN 1-3 HOURS.

2. What time of day do you/people normally travel (work related)?

I TRAVEL ANYWHERE FROM 0615 - 0800 / 1730 - 2000 DEPENDING ON WORK LOAD.

3. Where do most trips begin and end

BEACHLANDS TO FREEMANS BAY, RETURN FOR ME

4. What and where are the main problems e.g. congestion points, unsafe areas, access to motorways etc.

CONGESTION ON MOTORWAY BOTH SOUTH AND NORTH BOUND IS UNACCEPTABLE. CROSS TOWN TRAFFIC IS A NIGHTMARE - IE FROM PARNELL TO FREEMANS BAY.

5. What parts of the road and public transport network have become worse in the last 10 years?
PUBLIC TRANSPORT ONLY WORKS WITH THE LINK BUS ROUTE. ALL OTHER NETWORKS ARE EITHER SLOW, LATE OR UNSAFE - MY OPTION IS TO CATCH A FERRY TO TOWN (LEAVES AT 0630 OR 0750 THEN RETURNS AT 1710 OR 1830 - NOT MUCH CHOICE) OR i CAN BUS TO MANUKAU, THEN CATCH THE TRAIN - A TOTAL TRIP I THINK WE WORKED OUT OF 2.5 HOURS ONE WAY - MAY AS WELL DRIVE. THERE ARE NO PARK AND TRAVEL STATIONS LIKE THEY HAVE IN SAN FRANCISCO - AN EXCELLENT IDEA. PUBLIC TRANSPORT IS EASY AND WELL FUNDED. OURS SEEMS AND IS A PAIN IN THE BUM SO NOT WORTH DOING. ALSO WHERE IS THE GUARANTEE OF SAFE PASSAGE FOR ME. I AM NOT KEEN TO SIT WITH A BUNCH OF HOODY WEARERS ON A BUS AND BE INTIMIDATED WHILE I LOOK FOR MY CAR IN THE MANUKAU CARPARK AT 2100 ON A RAINING WEDS NIGHT

6. Have you changed how you operate to make travelling easier? How?

I TRY TO TRAVEL IN NON PEAK PERIODS BUT JUST SEEM TO GRIN AND BEAR IT. I STAY IN TOWN ON WEDS NIGHTS TO BREAK UP THE WEEK - MAKES IT EASIER MENTALLY

7. What parts of the road/public transport networks do you think will get worse in the next 10-20 years?

IT WILL ALL GET WORSE. THE COUNCIL HAS PUT IN MORE HOUSING WITH NO CONSIDERATION FOR PARKING / TRANSPORTING THESE PEOPLE TO WORK. MANUKAU CITY IS THE WORST OFFENDER OF THIS - FLAT BUSH DEVELOPEMENT (NEE SLUM) HAS NOT HAD ANY ADDITIONAL MOTORWAY ACCESS PUT IN BUT THEY ARE BRINGING IN MANY 1000'S OF PEOPLE. GREEDY COUNCIL MEMBERS SEEM TO NOT THINK ABOUT IT AT ALL. WE HAD AN EASY RUN TO OTARA AND ITS NOW A NIGHTMARE RUN TO OTARA. THANKS TO MR LINE MY OWN POCKETS MAYOR OF MANUKAU

andy_smith@nzgt.co.nz

cc
Subject

Re: Southern Sector Strategic Transport study

From: K Flavell [karl_flavell@hotmail.com]
Sent: Monday, 11 July 2005 10:35
To: SDudley@manukau.govt.nz
Subject: Ngaati Te Ata: Southern Sector Strategic Transportation Strategy

MANUKAU CITY COUNCIL
Senior Transport Planner

11th July 2005

Tena Koe Steve

Ref: Southern Sector Strategic Transportation Strategy

Further to our earlier correspondence, our review of the site plan and associated letter our comments are as follows:

1. Ngaati Te Ata is one of the iwi with a primary interest in the identified

study area. The surrounding environs including the Puhinui catchment and Manukau harbour has high cultural and environmental significance to Ngaati Te Ata.

2. That the requirements in the Manukau City Council Operative District Plan

- Section 3A [Tangata Whenua], particularly 3.A. 1.2 [Associational Rights] are provided for.

3. We recognise that the southern part of the region is heavily reliant on State Highway 1 and the Great South Road and that this strategy needs to deal with deficiencies in the transport network [peak flows, incidences occurred due to accidents, upgrades, etc] and improve links to developing areas

4. We were involved in the improving of the Highway 22 and 20 with Transit. We advised Transit that cultural values assessment would need to be undertaken by us to ascertain any impact on cultural heritage as a result of

planned routes. Consequently before this could happen the project was put back due to funding priorities elsewhere.

5. Support for the encouraged use of rail [Manukau rail link] to extend to Drury and Pukekohe regarding improvements

6. Assisting safety and security, improving access and mobility, protecting and promoting public health and environmental sustainability are supported objectives [should also include cultural/heritage protection and wellbeing]

Kia ora

Karl Whare Tipeti Flavell
Ngaati Te Ata

Karyn Sinclair

From: Phil Haizelden [Phil.Haizelden@opus.co.nz]
Sent: Friday, 1 July 2005 09:16
To: 'Steve Dudley'
Cc: 'Karyn Sinclair'
Subject: RE: Contact from South Sector consultation

Thanks Steve,

We are getting some feedback as well.

Karyn - please record this.

Phil

-----Original Message-----
From: Steve Dudley [mailto:SDudley@manukau.govt.nz]
Sent: Friday, 1 July 2005 8:39 a.m.
To: Phil.Haizelden@opus.co.nz
Subject: Contact from South Sector consultation

Phil

For your records.....

I fielded one call yesterday from Hariata Gordon of Ngati Poua. She had no specific comment on the project. She rang to say that she had received the information and was really checking to understand more about what the project was about. I explained the scope of the job and that any projects recommended out of the study be subject to further, more detaield study and the normal processes prior to any work starting.

Steve

From: Phil Haizelden [Phil.Haizelden@opus.co.nz]
Sent: Thursday, 14 July 2005 15:57
To: 'Steve Dudley'
Cc: 'Karyn Sinclair'
Subject: RE: Police

Ok, well let us know what we can do.

Karyn - for your records.

-----Original Message-----
From: Steve Dudley [mailto:SDudley@manukau.govt.nz]
Sent: Thursday, 14 July 2005 2:34 p.m.
To: Phil.Haizelden@opus.co.nz
Subject: Police

Phil

For you records, I met today with reps from the NZ Police regarding the Southern Sector Study.

I explained the study and its purpose and origins. I also outlined the direction it has taken and the views we have come to so far.

Apparently the Police have about 200 vehicles in the study area and travel about 5 million kms per year.

In terms of feedback, they are going to put something in writing. They are most interested in being informed earlier by planning agencies regarding growth and transport developments as it can affect their area planning and incident response plans.

In terms of specific links, the nature of thier work means that they have no specific wel-traveled rouites as they need access to all areas of the region. Obviously motorway and arterial links are important for response and incident management.

They were more interested in what we can do for them. They are preapring to brief the Minister on future needs in this paert of the region and are struggling to find adequate information which can help with their understanding of what land use/development patterns and transport conditions will be like in, say, 20 years.

I might give you a call to discuss their needs. I think you can priobably help them. I'd like to but haven't got time.

Steve